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PROCEEDINGS BOOK

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2nd
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FOOD and AGRICULTURAL ECONOMICS
27-28th April 2018
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Harun Uçak (Ed.)
Alanya Alaaddin Keykubat University

2nd

INTERNATIONAL CONFERENCE ON
FOOD AND AGRICULTURAL ECONOMICS

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(Full Texts-Abstracts-Posters)

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PREFACE

Economics refers to the scientific study that investigates how to supply unlimited human needs with the utilization of scarce resources. Although individual needs have altered throughout most of the human historical process, the only basic and fundamental need that cannot be given up is water and food. Therefore, the agricultural and food industries as the sources of food are strategic sectors have been protected under state regulations. History has demonstrated that the human losses and mortality rate caused by food shortages from time to time are serious, and even some civilizations have ceased to exist because of the lack of agricultural production due to droughts. One of the most important differences between today's and the past lives is that people can now store food for longer periods of time so that food safety can be provided. Therefore, it can be said that particularly developed countries are affected in the slightest degree by food crises. However, almost one billion people in least developed countries face hunger; especially price fluctuations have serious negative impact on these people.

The economic problems brought by food consumption as well as food production have become one of the important debates in recent years. Technological change, development and globalization make it possible for people to consume far more various products. The products reach the consumers through the food industry much differently than the agricultural products. Technological development has important influences on the increase of food supply and generates high-calorie food products which are more caloric than human needs. Ultimately, as much as insufficient food consumption, food overconsumption has become one of the major problems of human beings, especially in developed countries, which leads to an increased economic burden due to health related costs.

It had been postulated that the least developed countries and the developing countries have a significant cost advantage over developed countries, given the assumption that the agricultural sector in international trade is a labor intensive sector compared to other sectors. Yet, the technological transformation in the agricultural sector has led the agricultural sector to become a more capital intensive sector compared to the past. Today, it is noted that the developed countries have become one of the important exporters of agricultural products in addition to the industrial products.

The 2nd International Conference on Food and Agricultural Economics, which was held on 27-2th April 2018, includes presentations on macro and micro level food and agriculture economics. Accepted submissions came from 4 different continents and 19 countries as Azerbaijan, Bulgaria, Egypt, Germany, Hungary, Indonesia, Iran, Italy, Japan, Jordan, Lithuania, Morocco, Pakistan, Poland, South Africa, Turkey, United Kingdom, USA, Vietnamas also showing that the event is of global interest.

It is my wish that this conference that allows scientists, practitioners and independent researchers outside universities to present their theoretical, analytical and experimental research will contribute to the scientific literature and policy-makers' decisions, and I would like to express my appreciation to all participants and keynote speakers for their significant contributions.Prof. Dr. Ian Hodge (University of Cambridge, United Kingdom)made presentation about "Articulating the Total Social Value of Rural Land", Prof. Dr. Csaba Forgacs (Budapest Corvinus University, Hungary) made presentation about "Farm Specialization and Productivity in EU with Special Respect to CEECs", Prof. Dr. Nigel Poole (SOAS University of London, United Kingdom) made presentation about "Agrifood Value Chains in South Asia: Tackling Malnutrition" and they shared their scientific knowledge with us.

Last but not least, I would like to send my gratitude to Dr. Yakup Arı, Dr. Sezin Zengin Farias Martinez, Saliha Çelik, Mehmet Bayırlı, Nazlı Türker, Muhammet Necati Çelik, Kemal Sür, Fatih Boz and Bekir Çınar for his valuable assistance and co-operation. I would also like to gratefully acknowledge the generous support from Rector of Alanya Alaaddin Keykubat University Professor Ahmet Pınarbaşı, and I would like to extend my thanks to the head of TÜRSAB Regional Executive Board Alanya Suat Çavuşoğlu.

Prof. Dr. Harun Uçak
Chairman/Editor

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THE PROSPECTS FOR AGRIBUSINESS MARKETING BETWEEN TURKEY AND AZERBAIJAN

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Abstract

The future of food security and rural development significantly depends on the development of agribusiness sector. Agribusiness is the set of cooperation and integration of all firms that are involved in different processes on a movement of agricultural products from producers to consumers. These firms may belong to different countries. The study has shown that there are opportunities for further development of agribusiness marketing between Turkey and Azerbaijan

Political and economic relations between Azerbaijan and Turkey, as well as cooperation on scientific, educational, cultural and other fields, are rapidly developing. A strategic partnership exists between two states. Turkey is the first state that recognized the independence of Azerbaijan. 9th of November 1991 Turkey recognized the independence of Azerbaijan and on 14th of January, 1992 diplomatic relations were established between the two countries. Turkey is the first state that recognized the independence of Azerbaijan. (The Ministry of Foreign Affairs of the Republic Azerbaijan, 2018).

In 2017, Turkey shared 9.89% (1 366 337.09 thus. $) in export and 14.50 % (1 273 709.08 thus. $) in import of Azerbaijan. Total trade flow between two countries was 2 640 046.16 thus. $ or 11.68 %. However, the indicator was 6.3 % in 2012, 5,7% in 2013, 5,8% in 2014, 12.1% in 2015 and 13.1 % in 2016 (The Statistical Committee of the Republic of Azerbaijan, 2018).

Fresh fruits, tea, cotton fiber, raw skin of sheep and lambs, cotton fabrics are main exported agricultural goods from Azerbaijan to Turkey. The main agricultural goods exported to Turkey are live poultry, poultry meat and its additional products, fresh and frozen fish, milk and cream, butter and other fats and oils derived from milk, cheese and curd, eggs, potatoes, fresh vegetables, fresh fruits, tea, wheat flour, vegetable oil, margarine and other nutrient mixtures, sausages of meat and analogical products and other goods.

Of course, the current level of agricultural trade between two countries is not considered sufficient. Beyond mutual trade partnership, Turkey is a key country for export of Azerbaijani agricultural products to international, including European market. At the same time, there is a high demand for Turkish agricultural goods in CIS countries and Azerbaijan is an efficient corridor for export.

Excellent level of bilateral relations between two countries, implementation of joint international projects, such as the Baku-Tbilisi-Kars railway establishes favorable conditions for further development of agribusiness marketing for mutual economic and political benefits.

Further development of agribusiness marketing between two countries requires identifying new market opportunities, matching supply and demand, detailed estimation of market potential, assessment of risks, market fragmentation, the establishment of joint ventures etc.

Keywords: Agribusiness, marketing, Turkey, Azerbaijan, agricultural goods.

THE IMPACT OF EXCHANGE RATE VOLATILITY ON AGRICULTURAL EXPORTS IN TURKEY

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Abstract

Agricultural trade flows are becoming increasingly important in the world and Turkey is not the exception. In recent years, the effects of exchange rate and its volatility oninternational trade has been an issue broadly discussed within scientific community and policy makers in Turkey. Furthermore, itis believed that understanding its impact may play an important role for development and design of approriate policies.This paper empirically examines the impact of exchange rate volatility on the real agricultural exports in Turkey performing the autoregressive distributed lag (ARDL) bounds testing procedure proposed by Pesaran et al. (2001). The empirical analyses has been carried out for the period 2003:Q1 to 2016:Q4using quarterly time series data. Generalized Autoregressive Conditional Heteroscedasticity (GARCH) (1,1) has been employed to obtain real effective exchange rate volatility series. The study results confirm that real agricultural exports are cointegrated with exchange rate volatility and real exchange rate. Our findings indicate that the exchange rate volatility has significant positive impact on real exports in the short-run and significant negative impact in the long-run, implying that higher exchange rate fluctuation tends to increase real agricultural exports in the short run and reduce real agricultural exports in the long-run in Turkey. Besides, the real exchange rate has significiant negative effects on real agricultural exports both in the short-run and long-run. The paper's results imply that possible exchange rate instability in coming years is an important threat for Turkish export revenues in the agriculture sector. The study suggests that Central Bank of the Republic of Turkey should empower policy framework to ensure exchange rate stability in the country.
Keywords: Exchange rate, volatility, agricultural exports, ARDL bounds testing, GARCH (1,1)

SUSTAINABILITY OF BULGARIAN FARMS

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Abstract

Assessing sustainability of agricultural farms is among the most topical issues for researchers, farmers, investors, administrators, politicians, interests groups and public at large. In academic publications, official documents and agricultural practices social, economic and environmental aspects (pillars) of sustainability are assessed, while critical "governance" functions of the farm ignored. Nevertheless, comparative governance efficiency often (pre)determines the overall sustainability of a farm despite its (high) productivity, social responsibility or eco-conservation. Most frameworks usually employ "universal" approach for "faceless" farms and "anonymous" environment despite that real socio-economic, institutional and natural conditions are critical for sustainability. Assessment systems are not hierarchical and lack systemic organization of sustainability components leading to arbitrary selection of indicators. Besides, they are too simplified (few indicators), unilateral ("pure" economic, ecological, etc.), or too complicated and impossible to use. In this presentation we suggest a holistic approach for assessing absolute and comparative sustainability of farms of different juridical type, size, product specialization, ecological and geographical location in Bulgaria. It encompass governance, economic, social, and environmental aspects which are analyzed by a hierarchical system of 12 principles, 21 criteria, 45 indicators and reference values. Study, including 190 typical holdings, has found out that the overall sustainability of Bulgarian farms is good, with superior levels for environmental and social sustainability, and inferior level for governance and economic sustainability. There are great variations in sustainability levels of farms of different type and location as well as in shares of holdings with unlike sustainability level. In conclusion, we make recommendations for improvement of sustainability research and managerial practices.
Keywords: Governance, economic, social, ecological sustainability

1. Introduction

Adequate assessment of diverse aspects of sustainability of agricultural farms is among the most topical academic and practical issues (Andreoli and Tellarini, 2000; Bastianoni et al., 2001; Brklacich. and Smith; Csaki et al., 2008; Davidova, 2014; Diazabakana et al., 2014; EC, 2001; FAO, 2013; Fuentes, 2004; Häni et al., 2006 ; OECD, 2001; Rigby et al., 2001; Sauvenier et al., 2005; UN, 2015). Sustainability - absolute and comparative, of deferent type of farms is among main factors for rural development. Despite the importance of sustainability in theoretical and practical aspect, comprehensive studies on sustainability of farms lack in Bulgarian agricultural economics.

In academic publications, official documents and agricultural practices is widely accepted, that in addition to "pure" economic farm's sustainability has broader social and environmental aspects ("pillars"), which have to be accounted for. However, critical for farm' sustainability (and) "governance" functions of farm and associated ("transaction") costs are largely ignored. Nevertheless, often comparative governance efficiency and capacity for adaptation (pre) determine the overall sustainability of a farm despite its (high) productivity, social responsibility or eco-conservation of activity.

Most frameworks for sustainability assessment employ "universal" approach for "faceless" farms and "anonymous" environment. In fact, real socio-economic, institutional and natural conditions in which a farm functions and evolves are critical for its sustainability. Most frameworks are not

hierarchical and lack systemic organization of aspects and components of farm's sustainability determining an arbitrary selection of assessment indicators (Sauvenier et al., 2005). Suggested systemsare either too simplified (a limited number of indicators), or unilateral ("pure" economic, "pure" ecological", etc. aspects), or too complicated and impossible to use by farmers and managerial bodies (Hayati et al., 2010).

In this paper we apply a holistic framework for assessing sustainability of Bulgarian farms, and evaluate absolute and comparative sustainability of holdings of different juridical type, size, product specialization, ecological and geographical location.

2. Methodology

Farm sustainability characterizes the ability (internal potential, incentives, comparative advantages, importance, efficiency) of a particular farm to maintain its governance, economic, social and ecological functions in a long-term in the specific socio-economic and natural environment in which it functions and evolves. It has for aspects ("pillars"), which are equally important and always have to be taken into account:

-governance sustainability –a farms has to have a good or high absolute and comparative efficiency in organization and management of activity and (internal and external) relations, and a high adaptability to evolving socio-economic and natural environment, according to specific preferences (type of enterprise, character of production, long-term goals, etc.) and capabilities (education, experience, available resources, connections, power positions, etc.) of the owners;

-economic sustainability – a farm has to have a good or high productivity of deployed natural, labor, material and financial resources, sufficient ("acceptable") economic efficiency and competitiveness, and appropriate financial stability of activity;

-social sustainability – a farm to have a good or high social responsibility in regard to farmers, hired labor, other agents, communities, and consumers, and contribute to preservation of agrarian resources and traditions, amelioration of wellbeing and life style of farm households, and development of rural communities and the society as a whole;

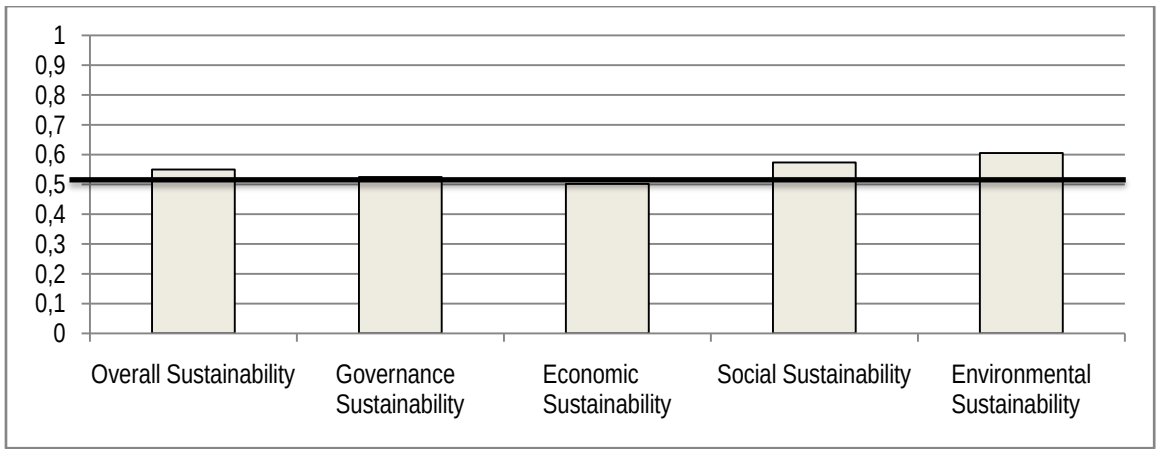
-environmental sustainability – a farm has to have a good or high eco-efficiency of activity, which is to be associated with necessary conservation, recovery and improvement of components of natural environment (landscape, lands, waters, biodiversity, atmosphere, climate, ecosystem services, etc.) and nature as a whole, respecting welfare of farm and wild animals, etc.

Ourspecific framework for assessing sustainability of Bulgarian farms includes a hierarchical system of 12 Principles, 21 Criteria, 45 Indicators and Reference values. Specific content, justification, modes of selection, calculation and integration of all elements of that framework are presented in details in another publications (Bachev, 206, 2018). Assessment of sustainability level of individual farms is based on first-hand information from managers of 190 "representative" holdings collected with assistance of National Agricultural Advisory Service and major producersassociations.Structure and importance of surveyed farms approximately corresponds to the real structure of market-oriented holdings in the country.Sustainability assessment is based on managers estimates for each Indicator in four qualitative levels: "High/Higher or Better that Average in Sector/Region", "Similar/Good", "Low/Lower or Worse than Average in Sector/Region", "Negative/Unsatisfactory/Unacceptable". Qualitative estimates are quantified and transformed into Sustainability Index for each indicator. Official typology is used for classification of farms according to juridical type, production specialization, ecological and administrative locations. In addition, manager self-determined their farms asPredominately for Subsistence, rather Small, Middle size or Big for the sector, and located mainly in Plain, Plain-mountainous or Mountainous region. For integration equal weights are used for each Principle in a particular Aspect, and for each Criterion in a particular Principle, and for each Indicator in a particular Criterion.

3. Sustainability Level of Agricultural Farms

Multi-indicators assessment of sustainability level of surveyed farms found out, that Integral Sustainability Index of holdings is 0,55 indicating a *good* level of sustainability of Bulgarian farms (Figure 1). Environmental (0,61) and Social (0,57) Sustainability of holdings are the highest, while

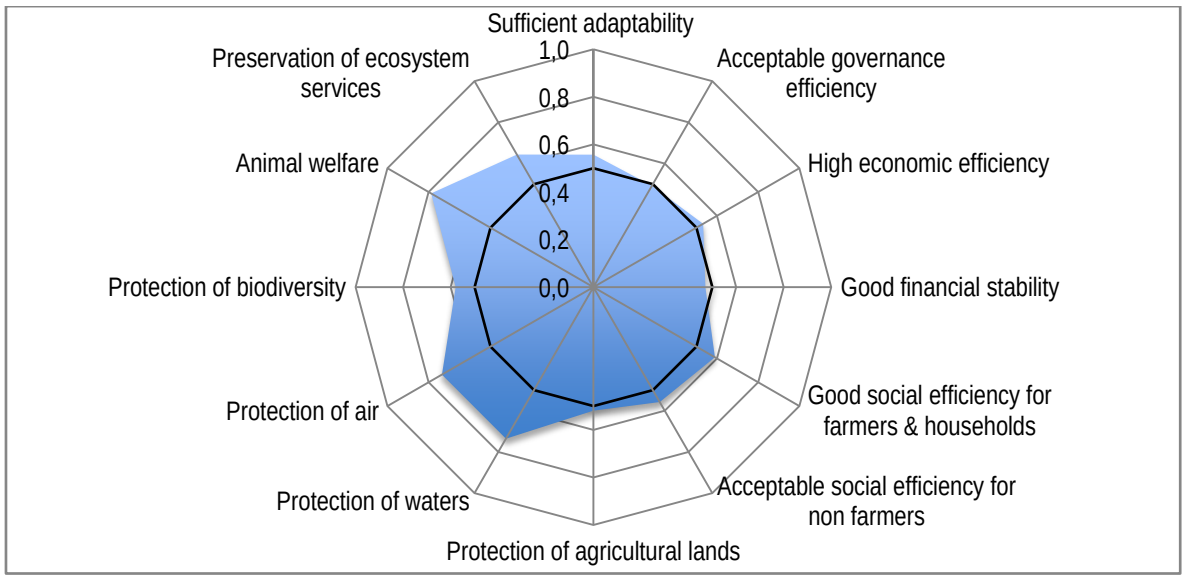
Governance (0,52) and Economic (0,5) Sustainability are at the border with a low level(see Figure 1.). Therefore, improvement of the latter two is critical for maintaining a good sustainability of farming enterprises in the country.



Source: Authors' survey

Figure 1. Sustainability Indexes of Bulgarian Farms

Analysis of individual sustainability Indexes for major Principles, Criteria and Indicators specify components contributing to diverse aspects of farms' sustainability. Governance and economic sustainability of Bulgarian farms are relatively low because of the fact that Governance Efficiency (0,49) and Financial Stability (0,47) of holdings are low (Figure 2). Furthermore, despite that overall environmental sustainability is relatively high, Preservation of Agricultural Lands (0,52) and Preservation of Biodiversity (0,56) are relatively low and critical for maintaining achieved level.

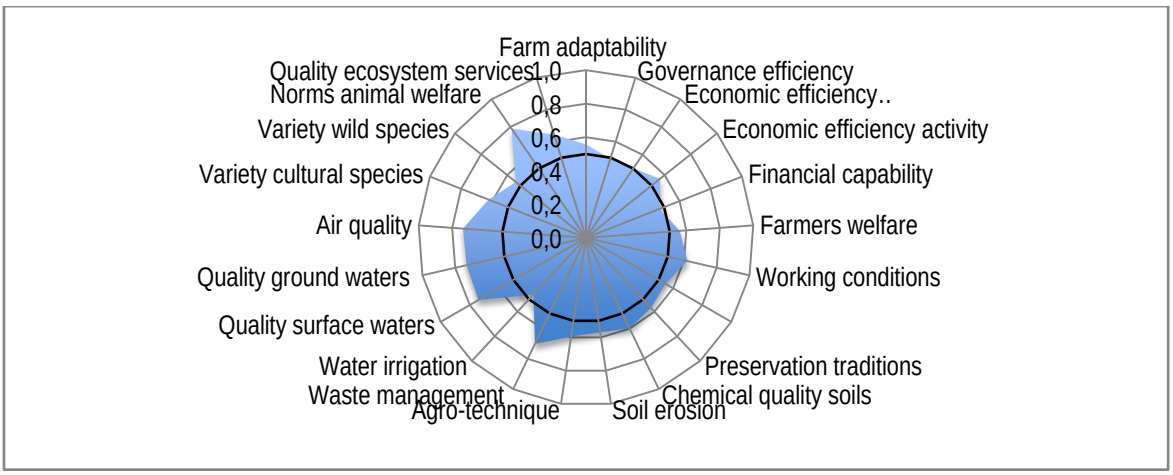


Source: Authors' survey

Figure 2. Indexes for Major Sustainability Principles of Bulgaria Farms

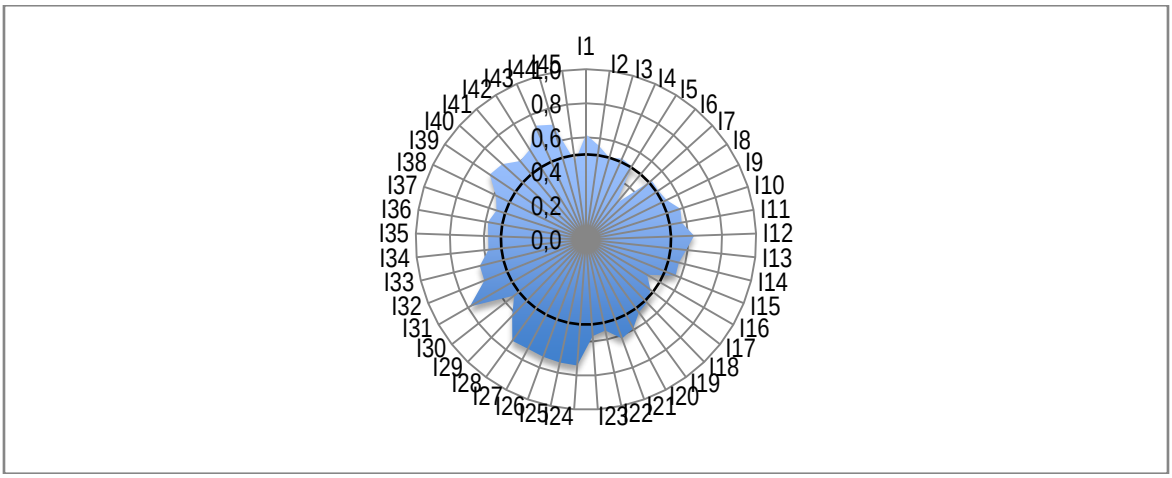
In depth analysis for individual Criteria and Indicators further specifies elements, which enhance or reduce farms' sustainability. Insufficient Comparative Governance Efficiency and Financial Capability of Bulgarian farms (Figure 3) are determined accordingly by: a low Comparative Efficiency of Supply of Short-term Inputs in relations to alternative organizations (0,28), and unsatisfactory Profitability of Own Capital (0,41) and Overall Liquidity (0,48) of farms (Figure 4). Similarly, low levels of

Preservation of Agricultural Lands and Preservation of Biodiversity are determined by insufficient Application of Recommended Irrigation Norms(0,46), high level of Soils Water Erosion (0,55), and lowered Number of Wild Animals on Farm Territory (0,53).



Source: Authors' survey

Figure 3. Indexes for Individual Sustainability Criteria of Bulgarian Farms



Source: Authors' survey

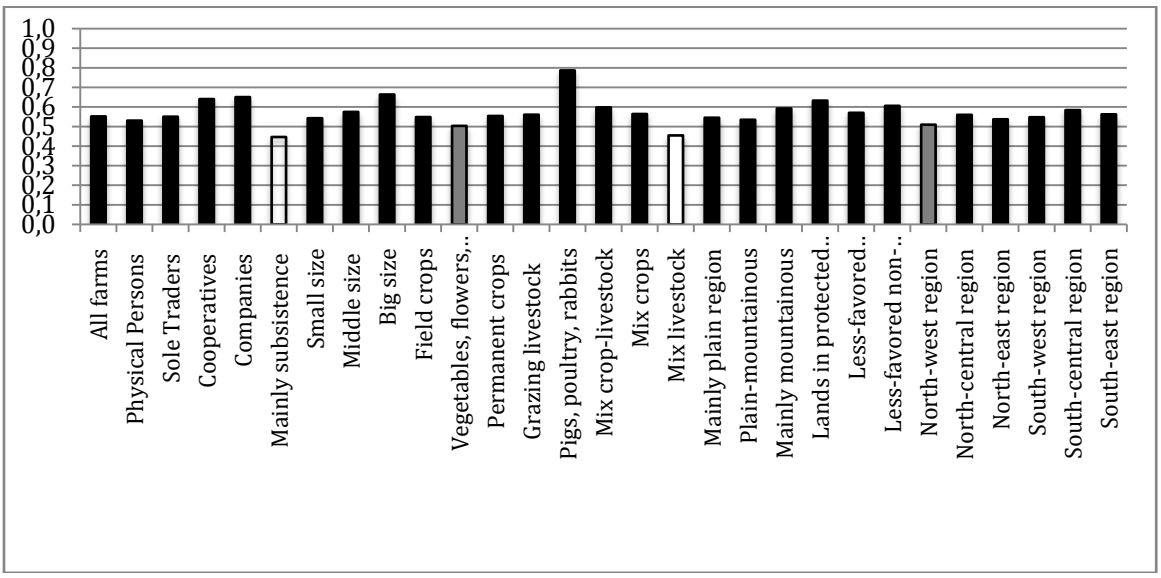
**I1-Level of Adaptability to Market Environment; I2-Level of Adaptability to Institutional Environment; I3-Level of Adaptability to Natural Environment; I4-Comparative Efficiency of Supply and Governance of Labor Resources; I5-Comparative Efficiency of Supply and Governance of Natural Recourses; I6-Comparative Efficiency of Supply and Governance of Short-term inputs; I7-Comparative Efficiency of Supply and Governance of Long-term Inputs; I8-Comparative Efficiency of Supply and Governance of Innovation; I9-Comparative Efficiency of Supply and Governance of Finance; I10-Comparative Efficiency of Governance of Marketing of Products and Services; I11-Land productivity; I12-Livestock Productivity; I13-Level of Labor productivity; I14-Rate of Profitability of Production; I15-Income of Enterprise; I16-Rate of Profitability of Own Capital; I-17-Overall Liquidity; I18-Financial Autonomy; I19-Income per Farm-household Member; I-20-Satisfaction of Activity; I21-Compliance with Working Conditions Standards; I22-Contribution to Preservation of Rural Communities; I23-Contribution to Preservation of Traditions; I24-Nitrate Content in Surface Waters; I25-Pesticide Content in Surface Waters; I26-Nitrate Content in Ground Waters; I27-Pesticide Content in Ground Waters; I28-Extent of Air Pollution; I-29-Number of Cultural Species; I30-Number of Wild Species; I31-Extent of Respecting Animal Welfare; I32-Extent of Preservation of Quality of Ecosystem Services; I33-Soil Organic Content; I34-Soil Acidity; I35-Soil Soltification; I36-Extent of Wind Erosion; I37-Extent of Water Erosion; I38-Crop Rotation; I39-Number of Livestock per ha of Farmland; I40-Norm of Nitrogen Fertilization; I41-Norm of Phosphorus Fertilization; I42-Norm of Potassium Fertilization; I43-Extent of Application of Good Agricultural Practices; I44-Type of Manure Storage; I45-Irrigation Rate.

Figure 4. Sustainability Indicators* of Bulgarian Farms

Low levels of indicators identify specific areas for improvement of sustainability of farms through adequate changes in management strategy and/or public policies. For instance, despite that the overall Adaptability of Farms is relatively high(0,56), Adaptability of Farms to Changes in Natural Environment (climate, extreme events, etc.) is relatively low (0,5). Therefore, effective measures are to be undertaken to improve that adaptability through education, training, information, amelioration of agro-techniques, structure of production and varieties, technological and organizational innovations, etc.

On the other hand, superior levels of indicators show absolute and comparative advantages of Bulgarian farms related to sustainable development. At the current stage of development they are associated with respecting Animal Welfare standards, Preservation of Quality of Surface and Ground Waters from contamination with Nitrates and Pesticides, Preservation of Air Quality, implementation of Good Agricultural Practices, reduced Number of Livestock per unit of Farmland, acceptable Labor Conditions, comparative Satisfaction from Farming Activity, optimal Productivity of Livestock, good Adaptability to Market (prices, competition, demands), and Comparative Governance Efficiency of Marketing of Products and Services.

There is a great variation in sustainability levels of farms of different type and location specifying comparative sustainability of diverse type of farming enterprises (Figure 5). Only holdings Predominately for Subsistence and Mix Livestock are with a low sustainability. Economic, governance, and social sustainability of first ones are particularly low. The second group is with a low economic, environmental and governance sustainability, and a marginal social sustainability.



Source: Authors' survey

Figure 5. Sustainability of Farms of Different Type and Location in Bulgaria

Another category of farms is with a good sustainability, but with levels on or close to the border with inferior one. In the latter group are holdings specialized in Vegetables, Flowers and Mushrooms having a low governance and economic sustainability, and not a particularly good social and environmental sustainability. In that group are also Physical Persons and farms located in North-West Region of the country. Former are with a low economic sustainability and a marginal social and governance sustainability. The latter are with a low economic sustainability and inferior social, governance and environmental sustainability. For all these enterprises effective measures have to be undertaken for improving all aspects of sustainability.

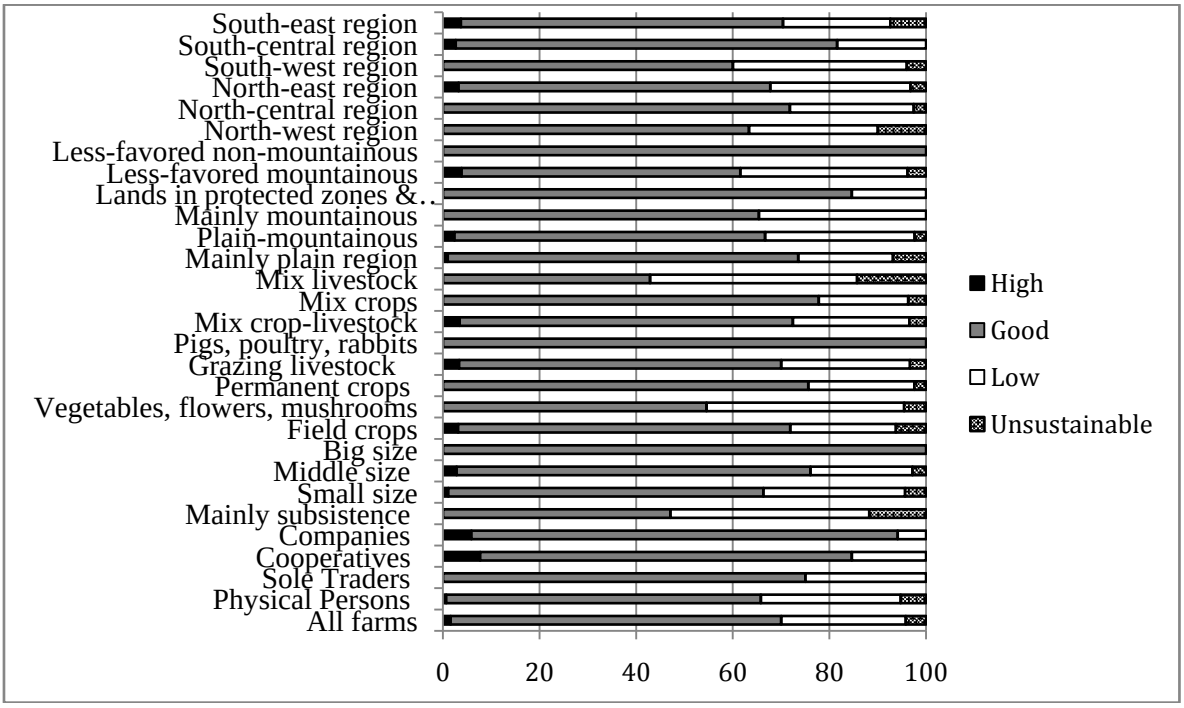
With a low economic sustainability are also farms with a Small size, those specialized in Mix Crops and Permanent Crops, and holdings situated in Mountainous Regions, and in North-East and South-West Regions of the country. Consequently, overall sustainability of these farms is close to the border with inferior level. For all these enterprises effective measures are to be undertaken for increasing economic sustainability in order to improve overall long-term sustainability. With a low

social sustainability are merely farms of Sole Traders for which adequate measures are to be introduced for improvement in that direction such as training, stimulation, regulation, support, etc.

With the best overall sustainability are Companies, Cooperatives, and farms with Big size, all having high levels of governance, economic, social and environmental sustainability. Holdings specialized in Pigs, Poultries and Rabbits are with highest sustainability, having very good levels for governance, economic and environmental aspects. The latter are only type of farms having a high level of sustainability of a certain aspect. Farms with Lands in Protected Zones and Territories, and those located in Non-mountainous Regions with Natural Handicaps, and in South-Central Region are with superior levels of sustainability. Former group are withhigh governance, economic, social and environmental sustainability. On the other hand, Holdings in Non-mountainous Regions with Natural Handicaps and in South-Central Region are with relatively good levels of certain aspects of sustainability – governance and environmental for the first ones, and environmental and social for the latter. The rest aspects of sustainability of all these farms are at relatively low levels – accordingly for the former ones economic and social sustainability, and for the latter ones governance and economic sustainability. Other aspects of sustainability of all these categories of holdings are with relatedly low levels – accordingly for the former ones in regard to economic and social sustainability, and for the latter ones for governance and economic sustainability. Similarly, Mix Crop-Livestock farms are with a relatively high environmental sustainability, but with a lower level of governance sustainability. The latter necessitates taking adequate measures to improve sustainability in aspects with critical inferior levels for these types of enterprises.

4. Share of Farms with Different Levels of Sustainability

The overall and partial levels of farms' sustainability do not give a full picture about the state of sustainability of all holdings since there is a great variation in share of farms with unlike sustainability levels. The biggest portion of Bulgarian farms is with a good sustainability and only under 2% with a high sustainability (Figure 6). At the same time, 30% of all agricultural holdings in the country are with a low sustainability or unsustainable at all.



Source: Authors' survey

Figure 6. Structure of Farms with Different Sustainability in Bulgaria (percent)

The greatest share of farms with a good and high sustainability is among Companies, following by Cooperatives, and Sole Traders, The smallest fraction of holdings with a good sustainability is among Physical Persons, where merely less than 1% is highly sustainable. Furthermore, more than a third of that holdings are with a low sustainability or unsustainable. Every forth of Sole Traders is with a low sustainability, like 15% of Cooperatives, and only 6% of Companies.

There are also considerable differences in portions of farms with unlike sustainability depending on the size of holdings. While all farms with a Big size are with a good sustainability, more than a half of holdings Predominately for Subsistence are with a low sustainability or unsustainable. Around a third of farms with a Small size and almost a quarter of those with Middle size are with a low sustainability or unsustainable.

Among farms with diverse specialization, the share of holdings with a good and high sustainability is the greatest for Pigs, Poultry and Rabbits, Mix-crops, Permanent Crops, Mix Crop-livestock, Field Crops and Grazing Livestock. On the other hand, majority of holdings in Mix-livestock are with a low sustainability (43%) or unsustainable (14%). A good portion of farms specialized in Vegetables, Flowers and Mushrooms is also low sustainable (41%) or unsustainable (4%).

The share of farms with a good and high sustainability is significant among those located in Non-mountainous Regions with Natural Handicaps, with Lands in Protected Zones and Territories, in Plain Regions, in South-Central, North-Central, and South-East Regions of the country. Simultaneously, 40% of holdings in South-West Region with low sustainability or unsustainable, similar to 37% of those in North-West and 32% in North-East Region. North-West Region is the leader in segment of unsustainable farms, where every tenth one is unsustainable. Many holdings in Mountainous Regions with Natural Handicaps (38%), and Mountainous Regions (35%), and a third in Plain-mountainous Regions are low sustainable or unsustainable.

Data for dispersion of farms of different type and location in groups with diverse level of sustainability has to be taken into account when forecast the number and importance of holdings of every type, and modernize public (structural, sectorial, regional, environmental, etc.) policies for supporting agricultural producers of certain type, sub-sectors, eco-systems, and regions of the country.

Analysis of farming structure with different sustainability level for each aspect gives important information about long-term sustainability of farms and factors for improvement. Our assessment shows that 40% of all holdings in the country are with a low governance sustainability or managerially unsustainable. That means that the comparative governance efficiency for supply of labor, land, finance, etc. and/or marketing of produce in these farms is lower than another feasible organization(s), and adaptability to evolving socio-economic, institutional and natural environment is insufficient. Furthermore, 42% of all farms are with a low economic sustainability or unsustainable at all. That means that economic and financial efficiency of activity and resource utilization in a good portion of Bulgarian farms is low and do not correspond to modern management and competition standards.

The biggest share of farms with a good and high governance sustainability is among Companies and Cooperatives, holding with Big and Middle size for the sector, these specialized in Pigs, Poultry and Rabbits, Permanent Crops, Mix Crops, Field Crops, and Mix Crop-Livestock as well as located in Non-mountainous Regions with Natural Handicaps, with Lands in Protected Zones and Territories, Plain Regions, Mountainous Regions with Natural Handicaps, and in North-Central, South-East, North-West and South-West Regions of the country. The greatest portion of farms with a low or lack of governance sustainability are among Sole Traders (50%) and Physical Persons (45%), holdings Predominately for Subsistence (65%) and Small size (49%), specialized in Vegetables, Flowers and Mushrooms (50%), and in Plain-Mountainous Regions (48%), and in North-East and South-Central Regions of the country (by 45%). All that means that a considerable fraction of Bulgarian farms are with insufficient governance sustainability for meeting contemporary socio-economic, institutional and natural challenges, and they have to modernize or will cease to exist in a middle term.

The biggest share of farms with a good or superior economic sustainability is among Companies, Cooperatives, and Sole Traders. Moreover, a significant portion of firms is with a high economic sustainability. Besides, all enterprises with a Big size are with good economics sustainability. That proves comparative economic advantages of registered holdings and those with large scale. Relative share of farms with a good and high economic sustainability is also considerable for farms with a Middle size for the sector, specialized in Pigs, Poultry and Rabbits, Mix Crop-Livestock, Field Crops, Mix Crops, and Permanent Crops, with Lands in Protected Zones and Territories, located in Plain

Regions, and Mountainous Regions with Natural Handicaps, and in South-East, South-Central, and North-Central Regions of the country.

The greatest fraction of farms with a low or lack of economic sustainability are among Physical Persons (48%), holdings Predominately for Subsistence (88%), and among specialized in Mix-Livestock (57%), Grazing Livestock (47%), and Vegetables, Flowers and Mushrooms (45%) as well as located in Mountainous (54%) and Plain-Mountainous (45%) Regions, and those in North-East (58%) and South-West (52%) Regions of the country. Moreover, a significant portion of the holdings are currently economically unsustainable, which concerns almost every tenth of Physical Persons, 29% of farms with Mix-Livestock, each fifth located in North-West Region and 12% in South-West Region of the country, 18% of holdings Predominately for Subsistence, 9% of specialized in Vegetables, Flowers and Mushrooms, almost 9% of holdings with Small size, and 7% located in Plain-Mountainous regions of the country. Thus, a great part of Bulgarian farmsare currently with a low economic sustainability or economically unsustainable, and most likely will cease to exists in near future or coming years, unless effective measures are taken (public support regulations, etc.) for improving their economic sustainability.

As far as social aspect of sustainability is concerned the majority of surveyed farms are with a good or high sustainability. Nevertheless, these holdings with a low social sustainability are numerous (almost 18%), and each tenth one is socially unsustainable. That demonstrates that social efficiency of holdings for farmers, communities and society and do not correspond to contemporary requirements and standards.A considerable part of Cooperatives is with a good social sustainability, and the rest 23% are with a high social sustainability. The share of Companies with a good and high social sustainability also is impressive, as merely 6% of them are low sociallysustainable. A significant portion of Physical Persons is also with a good or high social sustainability. Despite that, each fifth of the latter holdings are socially low sustainable, while 7% are sociallyunsustainable. With the greatest fraction of low sustainable in social aspect enterprises are Sole Traders – around 38% of total number. Level of social sustainability increases along with farm size. Every third of enterprises with a Big size are with a high social sustainability, and another major segment is with a good social sustainability. Amongholdings with a Middle size dominates those with a good and high social sustainability as almost each fifth is socially low sustainable or unsustainable. Contrary to traditional perception the largest portion of low sustainable or unsustainable in social aspect farms are semi-market ones (Predominately for Subsistence), including 18% unsustainable, as well as every forth of Small size farms.According to specialization the largest share of farms with a good and high social sustainability is in Pigs, Poultry and Rabbits, Filed Crops, and Mix Crops. On the other hand, 37% of specialized in Vegetables, Flowers, and Mushrooms are with low social sustainability or socially unsustainable, followed by holdings with Mix Livestock, (out of which 29% are with inferiors social sustainability, including 14% unsustainable). With a good or high social sustainability are farms located in Mountainous Regions and in Protected Zones and Territories, and in South-West, South-Central, and North-Central Regions of the country. At the same time, most numerous socially low sustainable or unsustainable enterprises are located in Plain and Plain-Mountainous Regions as well as in North-West, South-East, and North-East Regions of the country. All these data show, that a good portion of Bulgarian farms currently are with a low social sustainability or socially unsustainable, which compromises their overall middle and long-term sustainability. Therefore, effective measures have to be undertaken to improve income, labor and living conditions of farmers and farm households as well as their importance for preservation of rural communities and traditions.

Environmental sustainability of the majority of surveyed farms is good or superior, while a considerable portion is with a low sustainability (18%) or environmentally unsustainable (4%). The latter figures clarify that eco-efficiency in a large number of Bulgarian farms do not meet contemporary norms and standards for preservation of lands, waters, air, biodiversity, ecosystem services, and animal welfare. A big share of Companies and a good number of Physical Persons and Cooperatives are with a high environmental sustainability, while majority of enterprises in these categories are with a good eco-sustainability. Despite that, main portion of above holdings are with a low sustainability (accordingly 24%, 18% and 23%), as every twentieth of Physical Persons is even environmentally unsustainable. All Sole Traders are with a good level of eco-efficiency. The largest portion of farms with a good and high eco-sustainability is among holdings Predominately for Subsistence, with a Small size, and Big farms. The greatest part of holdings with a low or

unacceptable eco-sustainability is in groups of Middle and Big sizes. The fraction of strongly environmentally sustainable farms is significant among those specialized in Crop-Livestock, Grazing Livestock, Mix Crops, and Permanent Crops. All holdings specialized in Pigs, Poultry and Rabbits, most in Mix Crops and three-quarters in Crop-Livestock and Permanent Crops are with a good environmental sustainability. At the same time, a considerable portion of farms specialized in Vegetables, Flowers, and Mushrooms are with a low eco-sustainability (32%) or eco-unsustainable (14%), similarly to those in Mix Livestock (accordingly 29% and 14%) and Field Crops (accordingly 31% and 3%). Share of environmentally unsustainable farms is also considerable for specialized in Permanent Crops (7%), while most low eco-sustainable are in Grazing Livestock. All farms located in Non-mountainous Regions with Natural Handicaps are with a good environmental sustainability as well as most with Lands in Protected Zones and Territories. The biggest share of holdings with a high eco-sustainability is in Plain Mountainous and Mountainous Regions as well as in Mountainous Regions with Natural Handicaps. At the same time, the greatest fraction of enterprises with a low eco-sustainability or eco-unsustainable are in Plain-Mountainous (26%) and Plain (25%) Regions as well as in Mountainous Regions with Natural Handicaps (19%). The biggest part of holdings with a high and good eco-sustainability is in North-Central and South-Central Regions of the country while of these with a low eco-sustainability or eco-unsustainable in South-West, North-West, South-East and North-East Regions. All these data indicates, that a good number of Bulgarian farms are with a low eco-sustainability or environmentally unsustainable, which also compromises their overall long-term sustainability. Therefore, effective measures have to be undertaken to improve eco-efficiency in these groups through training, informing, stimulation, sanctions, etc.

5. Conclusion

Suggested holistic framework gives a possibility to improve sustainability assessmentand management in individual farms and holdings of different type in general and for major aspects, principles, criteria and indicators of governance, economic, social and environmental sustainability. That approach has to be further discussed, experimented, improved and adapted to the specific conditions of operation of farms of different type, subsector of production, geographical region and ecosystem as well as special needs of decision-makers at various levels.

Overall sustainability of Bulgarian farms is at a good level, with superior levels for environmental and social sustainability, and inferior level for governance and economic sustainability. Improvement of the latter two is critical for maintaining sustainability of Bulgarian holdings (Bachev and Terziev, 2018). Governance and economic sustainability of farms are low because of the fact that Governance Efficiency and Financial Stability of holdings are low. Furthermore, low Comparative Efficiency of Supply of Short-term Inputs in relations to alternative organizations, and unsatisfactory Profitability of Own Capital and Overall Liquidity of farms, determine the latter. Simultaneously despite that the overall environmental sustainability is relatively high, Preservation of Agricultural Lands and Biodiversity are relatively low and critical for maintaining achieved level. Insufficient Application of Recommended Irrigation Norms, a high level of Soils Water Erosion, and lowered Number of Wild Animals on farm territory, determines the latter inferior levels.

There are great variations in sustainability levels of farms of different type and location as well as in shares of holdings with unlike level of sustainability in each farm category. These figures give idea about comparative sustainability if diverse type of farms. Distribution of farms of different type in groups with diverse levels of sustainability has to be also taken into account when forecast the number and importance of holdings of each kind, and modernize public (structural, sectorial, regional, environmental, etc.) policies for supporting agricultural producers of certain type, sub-sectors, eco-systems and regions of the country.

Having in mind the importance of comprehensive assessments of sustainability of farms and enormous benefits for farm management and agrarian policies, such studies are to be expended and their precision and representation increased. The latter require a close cooperation between all interests parties and participation of farmers, agrarian organizations, local and state authorities, interest groups, research institutes and experts, etc. Moreover, precision of estimates has to be improved and besides on assessments of managers to incorporate relevant information from field tests and surveys, statistical and other data, and expertise of professionals in the area.

References

Andreoli M. and V Tellarini. (2000). Farm sustainability evaluation: methodology and practice.Agriculture, Ecosystems & Environment, Volume 77, Issues 1–2: 43–52.

Bachev, H. (2017). Sustainability Level of Bulgarian Farms, Bulgarian Journal of Agricultural Science, 23 (1), 1-13.

Bachev, H. (2018). The Sustainability of Farming Enterprises in Bulgaria, Newcastle upon Tyne: Cambridge Scholars Publishing.

Bachev, H. and D. Terziev. (2018). A Study on Agrarian Sustainability Impact of Governance Modes in Bulgaria. Journal of Applied Economic Sciences, Volume XIII, Spring, 2(56)

Bastianoni S, N. Marchettini, M. Panzieri, E. Tiezzi (2001). Sustainability assessment of a farm in the Chianti area (Italy).Journal of Cleaner Production, Volume 9, Issue 4: 365–373.

EC. (2001). A Framework for Indicators for the Economic and Social Dimensions of Sustainable Agriculture and Rural Development. European Commission.

FAO. (2013). SAFA. Sustainability Assessment of Food and Agriculture Systems Indicators. FAO

Fuentes M. (2004). Farms Management Indicators Related to the Policy Dimension in the European Union. OECD Expert Meeting on Farm Management Indicators and the Environment, 8-12 March 2004, New Zealand

Häni F., L. Pintér and H.Herren. (2006). Sustainable Agriculture. From Common Principles to Common Practice, Proceedings of the first Symposium of the International Forum on Assessing Sustainability in Agriculture (INFASA), March 16, 2006, Bern, Switzerland.

OECD (2001). Environmental indicators for agriculture. Volume 3: Methods and Results. OECD, Paris.

RigbyD., P. Woodhouse, T. Young, M. Burton. (2001). Constructing a farm level indicator of sustainable agricultural practice.Ecological Economics, Vol. 39, Issue 3: 463–478.

Sauvenier X., J. Valekx, N. Van Cauwenbergh, E. Wauters, H.Bachev. K.Biala, C. Bielders, V. Brouckaert, V. Garcia-Cidad, S. Goyens, M.Hermy, E. Mathijs, B.Muys, M.Vanclooster. and A.Peeters. (2005). Framework for Assessing Sustainability Levels in Belgium Agricultural Systems – SAFE, Belgium Science Policy, Brussels

UN (2015): Transforming our world: the 2030 Agenda for Sustainable Development, United Nations Resolution A/RES/70/1 of 25 September 2015.

MIGRATION AND AGEING PATTERNS IN AGRICULTURAL AREAS OF HUNGARY

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Abstract

Number of citizens in a country represents its primary production potential. Hungary has significant natural resources for agriculture. However, many problems follow rural areas, and one of these problems is connected to demographic changes such as; population decrease, outmigration and ageing. This paper attempts to investigate these factors to more fully understand the recent trends of an ageing population in agricultural areas of Hungary. Scolars argue that, in the rural context of aging, changes in the working-age population have a significant impact on agricultural output. The aim of the paper is to highlight the trend of demographic changes and their impact on the development of agriculture in Hungary. The obtained results indicate negative consequences of demographic changes as well as the reduction of the population working in the agricultural sector. One of the greatest consequences of deagrarisation is the lack of manpower. In this research we focus on Hungarian settlements, where individual farms and primary producers, ie small farmers carry out agricultural activities, in a way that they produce and receive revenue from this activity. Those revenues which have been realised by business organisations are not included in the research criteria. However, these organisation are members of the agricultural market, but they serve only as employers, and the employees of these companies, are actually doing agricultural activities, but not for their own benefit. Data was collected from the Territorial Information System provided by the Hungarian National Statistical Office.
Keywords: Migration, ageing, rural areas, agricultural areas, Hungary.

1. Introduction

Migration is a current phenomenon that includes flows of various distance and duration that affect two geographical areas (urban, rural) at the same time. Several theories have been propounded to explain the occurrence of migration. Among the factors that induce migration there are social, cultural, economic, spatial, demographic factors, but economic reasons are considered as primary behind decision to migrate. Migration can change the spatial distribution of the population and many times the demographic structure and potential. Central and Eastern European countries have had experienced large amount of population movements many timers in the history due to the several reasons. However, of course in terms of globalization and increasing in interdependence of European economies and societies, migration move shows diversity of social and demographic patterns. When we consider a specific country such as Hungary, which demonstrates that those patterns have critical influence on agricultural areas of Hungary.

This paper attempts to investigate these factors to more fully understand the current trends of an ageing population in agricultural areas of Hungary. This paper aims at analysing the different kinds of demographic behaviour and the local variations of demographic development in Hungary which has significant influence on labouring, aging in agricultural areas of Hungary.

2. Literature Review

In this section we are focusing on theories of the internal migration, and ageing and depopulation respectively. Demographic Transition (Thompson, 1929) is an empirical model of the growth of human populations with industrialization. Differences in earnings – more precisely, the net present value of earnings – between the sending and the receiving countries is usually considered as the main economic incentive for migration. This is not only true in terms of migration between countries, it is also true in terms of internal migration. The most effective theory for explaining migration is push and pull theory which states that the migration generally takes place when the positive pull factors at the place of destination are outnumbered by native push factors at the place of origin (Bague, 1969).In addition, the motivations behind migration decisions are complex, still decisions are driven not only based on personal reasons and the destination region's magnetic factors, but also the unattractiveness of the issuing region (Gödri, 2016). In terms of Kulcsár (2017), if decisions are made in favour of staying in rural areas, it is not thanks to the success of local and prioritised development, but it is more a matter of low human resources and capacities as well as cultural aspects.

The new economics of migration explains that the decision to migrate is taken by households or families rather than autonomous individuals. (Stark, 1986). It can be supposed that earnings differences are generally mirrored in living standards. In consequence, the difference in living standards between the two regions which is a driver for migration where the difference is significant enough. The flow of migration between two places or regions should decline when living standards between the two areas (or regions) converge. Factors other than earnings differences influence migration decisions strongly and in different ways. Risk concerning the expected gains (income uncertainty, job uncertainty, uncertain or risky communications and/or living circumstances, etc.) may determine the migration as well (Hárs, 2018).

The population of Hungary is ageing constantly (Farkas-Kassai, 2012) (as population of Europe), but we can find high rate of young population in the most underdeveloped, and in the most developed micro-regions too. (Obádovics, Bruder, 2017) Aging agricultural labour forces are the trend in many parts of the world including Hungary. Both the second national agricultural census and preliminary research have shown that Hungary agriculture is facing an aging workforce; but the share of older population is increasing in the total labour force too. In this context, people are increasingly worried about how the aging of the agricultural labour force will affect the output of agricultural land and whether aging agricultural producers will continue to engage in agricultural production. There is a substantial body of scholarly literature on aging agricultural labour forces. Tang and MacLeod (2006) suggested that older workers are, on average, less productive than younger workers and that labour force aging has a modest negative direct impact on productivity growth.

It was evident that there was a reduction in the population in Hungary, while the central of Hungary had increased in population by those who left mostly agricultural areas. Mentioned changes are caused by the natural migration of the population, as distinct migratory flows go from rural to urban parts of the country. In addition to changes in structure of the population were also experienced - primarily due to age, which may be an important factor of influence on the further development of the region. These changes and trends have had a negative impact on the development of agricultural production, which is almost entirely based on family house holdings (Despotović et al., 2015).

The youth in rural areas have not asked for their economic emancipation due to improving of economic situation of agriculture but instead they went away from it (Bandin, 2011). The population is a significant factor in rural development, because the existing population recruits a new workforce, and also because the population is a carrier of needs, as a factor of consumption, production (Pejanović, 2010). Main reasons for depopulation were: industrialization, urbanization, expropriation and agrarian reform. Unfavourable position of agriculture and private households, as well as more favourable conditions of life in the city caused population escaping from villages and agriculture (Čikić, 2012). Processes of leaving the rural areas also occurred in some other countries as well. Permanent change in generation would casue long-term reduction in aging and raise a number of difficult solvable existential and other problems (Nejašmić, 2012).According to the public perception (shared by policy makers) rural populations are declining, old and undereducated (Kulcsar et al. 2011).

3. Data and Methods

In our analysis we are comparing the papulation change, the migration and aging trends of settlements with high and settlements with low agricultural activities. In many cases we found, that data show different tendencies if the settlement is in a rural and in an intermediate area. Therefore, comaprisons are also made between these categories. In the following section we operationalise what we mean when we refer to agricultural and non-agricultural, as well as rural and intermediate areas.

Ruralty is defined based on the OECD classification. The first step of this methodology consists in classifying settlements (TL2) as rural if their population density is below 150 inhabitants per square kilometre.The second step consists in aggregating this lower level (local units) into TL3 regions andclassifying the latter as “predominantly urban”, “intermediate” and “predominantly rural” usingthe percentage of population living in rural local units. This classification is as follows predominantly urban area is where the share of population living in rural local units is below 15%; intermediate area is where the share of population living in rural local units is between 15% and 50%; predominantly rural area is if the share of population living in rural local units is higher than 50% (OECD, 2011).

Agricultural and non-agricultural settlements are decomposed based on multiple criteria. The variables used for decomposition are:

- Income of agricultural primary producers compared to all income,
- Percentage of agricultural primary producers in the total population,
- Income of agricultural secondary producers compared to all income,
- Percentage of agricultural secondary producers in the total population,
- Percentage of agricultural business to all types of business,
- Agricultural land (arable land, gardens, vineyards, fruitery and grasslands) per inhabitant.

Settlements have been ranked by the above mentioned indicators, then the ranks have been added. The created variable served as the base of the decomposition. Categories of the importance of the agriculture in each settlement have been made by merging three types of categorisation. We categorised the ranked variable based on equal width intervals, and equal percentiles, as well as based on a k-means cluster analysis. The final categorisation have been done based on the combination of the these the methods. The dispersion of the Hungarian settlements throughout these categories is summarised in table 1.

Table 1. Number of Settlements after the Decomposition of Ruralty and Agricultural Activities Carried out in the Settlement

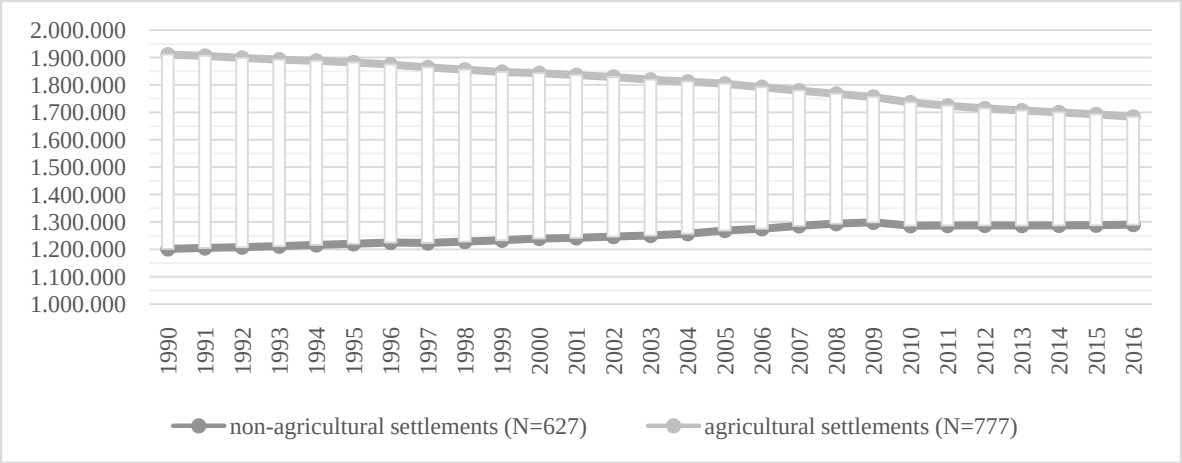
		Agricultural Settlement Categories			Total
		Non-agricultural	Intermediate	Agricultural	
Ruralty Categories	Predominantly Rural	290	1004	554	1848
	Intermediate	263	644	217	1124
	Predominantly Urban	74	81	6	161
Total		627	1729	777	3133

Source: Own calculation based on TEIR database.

Out of 3133 settlements, 1848 is in a predominantly rural region, 1124 is in an intermediate region, and 161 is in predominantly urban region. In terms of agricultural activities carried out in the settlement 627 have been characterised as non-agricultural settlement, 1729 as intermediate settlement and 777 have been categorised into the agricultural group.

4. Population Change

The changes of the population in rural areas are highly influenced by socio-economic changes in the past decades. Factors that significantly influence the depopulation of agricultural areas are development of the productive potential, as well as the geographical location. Deagrarisation of rural areas resulted from urban-based industrialization, as well as the polarized development of Hungary. Figure 1 shows the population change of agricultural and non-agricultural settlements in Hungary over time.



Source: Own calculation based on TEIR database.

Figure1: Changes of Population in Agricultural and Non-Agricultural Settlements in Hungary between 1990 and 2016

In line of our results, the total aggregate population of agricultural settlements went through a constant and significant decrease in the past decades. Starting from 1910 774 inhabitants in 1990, in 2016 the size of the population was only 1683 798, which is means that the population decreased to 88% of the original population in 1990. While, if we look at the population change in non-agricultural settlements, we can observe, that the population is going through a constant increased in the examined period.

Depopulation is not taking place in all levels of ruralty. Agricultural settlements of intermediate areas showed different path in terms of population change in the examined period. Table 2 shows the aggregate population change separately in rural and in intermediate areas.

Table 2. Total Aggregate Population of Agricultural and Non-Agricultural Settlements in Rural and Intermediate Areas of Hungary

Rural Areas				
	1990	**2000**	**2010**	**2016**
Non-Agricultural Settlements N=290	200345	197327	192269	189241
Agricultural Settlements N=554	1458645	1402436	1315378	1275843
Intermediate Areas				
	1990	**2000**	**2010**	**2016**
Non-Agricultural Settlements N=263	493441	508322	517029	513193
Agricultural Settlements N=217	440827	428011	407192	394044

Source: Own calculation based on TEIR database.

The data presented in Table 2indicate the different trend in terms of population change of rural and intermediate areas. The number of aggregate population in rural areas was decreasingconstantly in agricultural and in non-agricultural too, between 1990 and 2016. At the same time, if look at the development in the intermediate regions, we can observe different results. In the intermediate areas, population was only declining in agricultural settlement, while non-agricultural settlements aggregate population showed a constant increased. The reason for this process is due to better facilities and more economic potential of intermediate areas, which makes these settlements more attractive to citizens.

5. Migration

Migration trend has been outstandingly flowing since couple decades in Hungary especially affecting the rural parts. An overview of changes in internal migration is important in many aspects. We can track the positive and negative periods of the issuing and receiving areas, and on the other

hand, the causes of population movements can become visible, as well as future trends and expected changes can also be outlined. We will focus on the differences in the trends between agricultural and non-agricultural settlements in order to highlight the disadvantaged situation of agricultural areas. Table 3 shows the migration balance of Hungarian settlements in the selected years.

Table 3. Migration Balance (in-out/Pop*1000) in Hungary by Settlement Type

Rural Areas				
	1990	**2000**	**2010**	**2016**
Non-Agricultural Settlements N=290	-5.39	5.39	-4.91	0.44
Agricultural Settlements N=554	-4.74	0.73	-7.54	-4.18
Intermediate Areas				
	1990	**2000**	**2010**	**2016**
Non-Agricultural Settlements N=263	-0.64	8.91	-0.40	6.19
Agricultural Settlements N=217	-1.86	2.34	-6.24	-2.29

Source: Own calculation based on TEIR database.

During the post-communist era, many new processes were induced on the basis of the capitalist transformation of the economy in Hungary. In the examined period, it is noteworthy that certain regions suffered a significant loss, while in other areas there was a serious immigration surplus, in others stagnationstagnation in some parts of the country. Agricultural settlements are especially suffering from out-migration decisions in the studied period, starting from 1990, but resent trends also show negative change. This phenomenon is present in rural and in intermediate areas as well, however, rural areas face even higher out-migration from agricultural areas. Non-agricultural settlements at some point at time were also affected by negative migration balance due to general trend of outmigration from rural areas, but most recent data shows, that they are recovering from out-migration, especially those settlements, which are situated in more densely populated areas.

6. Ageing

Hungarian population has been characterised by declining fertility since many decades. Natural decline of the populationhas been continuous since the 80's. In association with fertility decline, the ageing of thepopulation is also observed. In the next section we will have a closer look at the rate of young and old generations in agricultural and non-agricultural settlements.

Table 4. Rate of Young And Old in Different Settlement Types in Hungary

	% of 17- Population			**% of 60+ Population**		
	1990	**2000**	**2016**	**1990**	**2000**	**2016**
Rural Areas						
Non-Agricultural Settlements N=290	24.1%	22.3%	19.5%	20.7%	20.7%	23.3%
Agricultural Settlements N=554	25.7%	21.7%	17.7%	18.5%	19.4%	24.5%
Intermediate Areas						
Non-Agricultural Settlements N=263	25.4%	21.2%	18.0%	25.4%	18.6%	23.8%
Agricultural Settlements N=217	25.8%	20.1%	16.8%	25.8%	18.8%	25.9%

Source: Own calculation based on TEIR database.

The rate of youth population shows a constant decrease based on the studied three years datapoints in each type of settlements, and the decrease accelerated especially in the agricultural settlements of Hungary in the past six years (Table 4). This again suggests, that agricultural settlements are not the desired place to live for the young generations. This phenomena is undoubtedly affected by the birth rate too, although the rate of 60 years and above population have not gone through as significant increase as to only be credited to the changing reproduction trends.

7. Conclusions

Data shows, that the population of agricultural settlements is constantly decreasing. The unfavourable position rural areas and agriculture areas resulted in the population escaping from villages and agriculture. Although the process of leaving rural areas is not a Hungarian speciality it is happening in other countries neighbouring Hungary too. Agricultural areas are at particular threat of depopulation, compared to other areas. Settlements with notable agricultural activities show constant population decrease, however other settlements, where agriculture is not the main base for livelihoods is being more attractive for living.

Depopulation can be a result of low fertility and migration. In terms of migration, general trends shows, that rural areas face significant out-migration, although we can observe different trends between agricultural and non-agricultural areas. Agricultural settlements are higher at-risk of negative migration decisions. In the long run, this might influence the productivity of agricultural production, due to low labour force availability, and low willingness start agricultural activities in rural areas.

Rural areas not only face depopulation and out-migration, but due to low fertility and being less attractive to young populations, it also experiences the aging of the population. Ageing population in agricultural areas is also a risk for sustainable agricultural production. Youth population is escaping from all rural areas, although agricultural settlements are at higher risk of population ageing compared to the non-agricultural settlements.

All these circumstances highlight the evolving need for action in agricultural areas. This emerging demographic reality demands attention from policy-makers and practitioners alike.

References

Bague, D.J. (1969), Principle of Demography, New York

Bandin, S. (2011): Possibilities of Socio-Economic Integration of Rural Youth in Rural Development Process, Agricultural Economics, Belgrade, Serbia, Vol. 58, No 2, pp. 207.

Čikić, J. (2012): Educational Capital of the Rural Population in Serbia, Agricultural Economics, Novi Sad, No 53-54, pp. 53.

Despotović A., Joksimović M., JovanovićM. (2015): Impact of demographic changes on agricultural development in Montenegro, Economics of Agriculture 3/2015, pp. 613-625.

Farkas T., KassaiZs. (2012). A népességöregedéseMagyarországon -Ageing in Hungary. In: DeákyZita, Suhajda Csilla Judit (Eds.) Idősekésidősödés a maimagyartársadalomban: Konferenciakötet. Gödöllő: Szent István Egyetem Gazdaság- ésTársadalomtudományi Kar Pálya tervezésiésTanárképzőIntézet, 2013. pp. 59-71.

Gödri I. (2016).Elvándorlásiszándékokálmokéskonkréttervekközött. A migrációspotenciáljellemző iésmeghatározótényezőia 18–40 évesekkörébenMagyarországon.

Hárs Á., (2018). Hungarian emigration and immigration perspectives – some economic considerations. South-East Europe Review, pp. 19.

J. Tang and C. MacLeod, (2006). Labour force ageing and productivity performance in Canada, Canadian Journal of Economics, vol. 39, no. 2, pp. 582–603.

Kulcsár L. (2017). A vidékfejlesztéselméletimegközelítése: regionáliséskulturálisösszefüggések - Theory of rural development: regional and cultural aspects. Cluj-Napoca: Kriterion. pp. 228.

Kulcsár, L. - Kulcsár, L. J. – Obádovics Cs. (2011). Who lives in forgotten places? Age structure and socio-economic development in Hungary, Regional Statistics: journal of the Hungarian Central Statistical Office, 110-121. p.

Mendras, H. (1986): Peasant Society: Elements for a Theory of the Peasantry, Globus, Zagreb, pp. 62-65.

Nejamšić, I. (2012). The effects of future demographic changes in Croatia, ActaGeographica, Zagreb, Volume 38, pp. 10.

Obádovics Cs., Bruder E. (2017). What does young age structure suggest about socio-economic development?, Journal of Management Social Sciences Vadyba Journal of Management 2017 vol: 31 (231) pp. 17-22.

OECD (2011): OECD Regional Typology. Directorate for Public Governance and Territorial Development. 16 p.

Pejanović, R. (2010). Demographic problems as limiting factors for rural development of AP Vojvodina, Bulletin of the Anthropological Society of Serbia, Novi Sad, Vol. 45, pp. 65-72.
Stark, O. (1991). The migration of Labour, Cambridge, MA, Blackwell.
Thompson W. (1929). Population. American Journal of Sociology. 34:959–75.

THE MEAT AND EGG QUALITY CAN BE ENHANCED BY NATURAL FEED ADDITIVES

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Absract

Conscious people do not consider the food consumption as their main purposes. They give high priority to the healthy, high-quality and safe food consumption. An efficient consumer pressure group, which forces healthy food consumption, has been establishing with the aid of educated and healthy nutrition conscious people. Poultry meat and egg are among the most known healthy and safe food sources. The qualities of these food products can be affected by feeds and feed additives consumed by animals. In this context, medicinal and aromatic plants as well as lots of fruits rich in carotenoids can be used with the aim of improving characteristics of animal products. It has been determined that many of the products obtained from medicinal and aromatic plants (such as tomato paste, garlic extract, olive leaf extract, grape leaf, seed and extract, green tea extract, mint-thyme oil extract, propolis extract etc.) provide improvement in egg and meat quality. Yellow corn, linseed, corn gluten meal, marigold flour, alfalfa flour and red pepper, which are rich in carotenoid pigments, can also be used for this purpose. In this article, it has been discussed whether it is possible to enrich and enhance some quality parameters such as color, nutrient content of poultry meat and egg using natural feed additives. As a result, it is possible to produce tasty and healthy eggs which are poor in cholesterol and rich in omega 3 fatty acids and some trace minerals by using natural feed additives.
Keywords: Healthy food, natural feed additives, egg, meat.

ET VE YUMURTA KALİTESİ DOĞAL YEM KATKI MADDELERİYLE İYİLEŞTİRİLEBİLİR

Özet

Günümüzde gelişmiş ülkelerde özellikle eğitim ve gelir düzeyi yüksek insanlar gıda tüketimini ana amaçları arasında görmemekte, sağlıklı, kaliteli ve güvenli gıda tüketimini daha öncelikli olarak talep etmektedirler. Sağlıklı ve dengeli beslenme konusunda eğitim düzeyi yüksek, bilinçli toplum kesimlerinin de desteğiyle dünyada sağlıklı gıda tüketiminde gücü giderek artan bir tüketici baskı grubu oluşmaktadır. Güvenli gıda talebinde insan beslenmesinde önemli yer işgal eden beyaz et ve yumurta ön sıralarda gelmektedir. Ürünlerin kalitesi hayvanların tükettiği yem ve yem katkı maddelerinden etkilenebilmektedir. Bu bağlamda doğada bulunan bir çok tıbbi ve aromatik bitkinin yanı sıra karotenoid maddelerce zengin olan birçok meyve ve bunların kabuğu da ürün vasfını iyileştirmek amacıyla kullanılabilir. Domates posası, sarımsak ekstraktı, zeytin yaprağı ekstraktı, üzüm posası, çekirdeği ve ekstraktı, yeşil çay ekstraktı, nane-kekik yağı ekstrraktı, propolisekstraktıvb. tıbbi ve aromatik bitkilerden elde edilen birçok ürünün yumurta ve beyaz etin vasıflarında iyileşme sağladığı belirlenmiştir. Karotenoid pigmentlerince zengin sarı mısır, keten tohumu, mısır gluten unu, kadife çiçeği unu, yonca unu, kırmızıbiber de bu amaçla kullanılabilir. Bu makalede doğal yem katkı maddeleri kullanılarak tavuk eti ve yumurtasının rengi ve besin madde içerikleri gibi kalite unsurlarının zenginleştirilmesi ve beğenisinin artırılması imkanları tartışılmıştır. Sonuç olarak doğal yem ve katkı maddeleriyle lezzetli, sağlıklı et ve düşük kolesterollü, koyu sarılı, omega 3 yağ asitleri, bazı iz minerallerce zengin yumurta üretilmesinin mümkün olabildiği önerilmiştir.
Anahtar kelimeler: Sağlıklı gıda, doğal katkı maddesi, yumurta, et.

PERCEPTION OF WOMEN'S PARTICIPATION IN WORKING LIFE (CASE OF TOKAT)

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Astract

The aim of the research is to measure the perceptions of men or women, working in the industrial zone of Tokat regarding the participation of women in working life. A total of 96 respondents, 69 female and 27 male, were selected by randomized single level possibility sampling method. Chi square analysis was used to determine the age, gender, educational status, and the effect of the place of residence on the opinions of the women on their working life. According to the results of the Chi square analysis responses to the proposals of "in some branches of the industrial sector such as weaving and food, female employees are more than male employees" and "the reason why women do not participate to the labor force is being house wives" differ a statistically significantly according young and middle-aged individuals ($p<0.05$). There are statistically significant differences in responses to following proposals of "women should not work after being a mother", "women should not work after marriage", "if her husband does not give permission, woman should not work", "it is more difficult for women to build career than men", "participation of women in politics is lower than participation of men" according to gender ($p<0.05$). When the responses of proposals" if her husband does not give permission, woman should not work", "it is more difficult for women to build career than men", "there are men in the administrative staff of the professions in which women work intensively" were examined, it was found that there was a statistically significant difference ($p<0.05$) between university graduates and non-university graduates. There is a statistically significant difference ($p<0.05$) in responses to following "women should not work after marriage", "as the education levels of women increase, the possibilities of participation in the work force increase correspondingly" proposals according to discrepancy in respondants' living rural or urban areas.
Keywords: Work life, women, age, gender, education.

KADINLARIN ÇALIŞMA YAŞAMINA KATILIMINA İLİŞKİN ALGI DURUMU (TOKAT ÖRNEĞİ)

Özet

Araştırmanın amacı, Tokat organize sanayi bölgesinde çalışan kadınların çalışma hayatına katılımına ilişkin o sanayi bölgesinde çalışan erkek veya kadınların algılarını ölçmektir. Araştırmadatek aşamalı tesadüfi olasılık örnekleme yöntemi ile belirlenen 69 kadın ve 27 erkek olmak üzere toplam 96 kişiyle anket yapılmıştır. Bireylerin kadının çalışma hayatına ilişkin görüşleri üzerinde yaş, cinsiyet, eğitim durumu ve yaşanılan yerin etkisini belirlemek amacıyla khi kare analizi kullanılmıştır. Yapılan khi kare analizi sonuçlarına göre "sanayi sektöründe dokuma, gıda gibi bazı dallarda kadın çalışanları erkek çalışanlarına göre daha fazladır" ve "kadınların işgücüne katılmama nedeni ev kadını olmalarıdır" önermelerinde genç ve orta yaşlı bireyler arasında istatistiksel olarak anlamlı bir farkın olduğu ($p<0.05$) belirlenmiştir. "kadınlar anne olduktan sonra çalışmamalıdır", "kadınlar evlendikten sonra çalışmamalıdır", "kocası izin vermiyorsa kadın çalışmamalıdır", "kadın çalışanların meslek hayatında yükselme olanakları erkeklere oranla daha zayıftır", "kadınların siyasal katılımı erkeklere oranla düşüktür" önermelerinde ise, erkek ve kadınlar arasında istatistiksel olarak

anlamlı bir farkın olduğu ($p<0.05$) belirlenmiştir. “kocası izin vermiyorsa kadın çalışmamalıdır”, “kadın çalışanların meslek hayatında yükselme olanakları erkeklere oranla daha zayıftır”, “kadınların yoğun olduğu meslek gruplarının arasında yönetim kadrolarını erkekler oluşturmaktadır” önermelerine verilen cevaplar incelendiğinde, üniversite mezunu olanlar ve olmayanlar arasında istatistiksel olarak anlamlı bir farkın olduğu ($p<0.05$) saptanmıştır. “kadınlar evlendikten sonra çalışmamalıdır”, “kadınların eğitim düzeyleri arttıkça, işgücüne katılım olanakları artmaktadır” önermelerinde yaşamının çoğunu kırsal alanda geçiren bireyler ve yaşamının çoğunu kentte geçiren bireyler arasında istatistiksel olarak anlamlı bir farkın olduğu ($p<0.05$) tespit edilmiştir.
Anahtar kelimeler: Çalışma hayatı, kadın, yaş, cinsiyet, eğitim.

THE POSSIBLE IMPACTS ON RURAL TOURISM OF GEOGRAPHICAL INDICATION PRODUCTS IN MUGLA PROVINCE

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Abstract

Geographical indication is seen as an important tool in terms of rural tourism in recent years. Geographical indication plays an important role in terms of creating value added local value to the economy. The number of geographical indication products in the world is observed to increase day by day. Geographical indication products have gained importance in Turkey in recent years.

Mugla province occupies an important position among the high potential provinces of rural tourism. Although the limited number of geographical indication products, products with geographical indication of Mugla province has an important potential in terms of the number of properties that can take in the future. In this study, Mugla which has the city of agriculture and tourism has possible effects of the geographical indication products by various ways in rural tourism will be investigated.
Keywords: Geographical indication, rural tourism, economy, agriculture, Mugla.

MUĞLA İLİNDE COĞRAFİ İŞARETLİ ÜRÜNLERİN KIRSAL TURİZME OLASI ETKİLERİ

Özet

Coğrafi işaret son yıllarda kırsal turizm açısından önemli bir araç olarak görülmektedir. Yerel değerlerin ekonomiye katma değer yaratması açısından da coğrafi işaretler önemli bir rol üstlenmektedir. Dünyada coğrafi işaretli ürünlerin sayısında her geçen gün bir artış görülmektedir. Türkiye'de ise coğrafi işaretli ürünler son yıllarda önem kazanmış durumdadır.

Muğla ili kırsal turizm potansiyeli yüksek iller arasında önemli bir konumdadır. Mevcut coğrafi işaretli ürün sayısı sınırlı olmasına karşın, Muğla ili gelecekte coğrafi işaret alabilecek özellikteki ürün sayısı açısından ise önemli bir potansiyele sahiptir. Bu çalışmada, Muğla ilinin tarım ve turizm kenti özelliği göz önünde bulundurularak kırsal turizmde coğrafi işaretli ürünlerin olası etkileri çeşitli açılardan değerlendirilecektir.
Anahtar kelimeler: Coğrafi işaret, kırsal turizm, ekonomi, tarım, Muğla.

INVESTIGATION OF CONSUMER GUARANTEES AGAINST GEOGRAPHICALLY INDUSTRIAL AGRICULTURAL PRODUCTS IN TURKEY

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Abstract

A considerable part of the Turkish population is subsistence from agriculture. Approximately 27% of national income is agricultural products. Agricultural products play an important role in exports as well as an important source of domestic trade. Turkey is an important country in terms of agricultural product potential due to its geographical position, climate, soil structure and riches from the past. This feature also highlights the potential of the country's rich geographical product. The geographical indications show the distinguishing features and the products which are identified with the region which is in the foreground.

The purpose of this study is to measure the awareness of the consumers living in the province of Antalya on geographically labeled agricultural products and to determine the attitudes of consumers towards geographically labeled agricultural products. Within the scope of the study, awareness and attitude research was carried out on 52 agricultural products that have been registered in Turkey with geographically marked products. Data were gathered by interviewing with 630 consumers residing in the central districts of Antalya province via face-to-face survey method. The obtained data were analyzed with appropriate statistical methods. Dissemination of geographical marking in agricultural products, awareness raising, to be branded with geographically labeled agricultural products suggestions were made.

Keywords: Geographical sign, agricultural product, attitude.

TÜRKİYE'DEKİ COĞRAFİ İŞARETLİ TARIMSAL ÜRÜNLERE KARŞI TÜKETİCİ TUTUMLARININ İNCELENMESİ

Özet

Türkiye nüfusunun kayda değer bir kısmı geçimini tarımdan sağlamaktadır. Milli gelirin yaklaşık %27'sini tarımsal ürünler oluşturmaktadır. Tarımsal ürünler önemli bir iç ticaret kaynağı olduğu gibi ihracatta da önemli rol oynamaktadır. Türkiye coğrafi konumu, iklimi, toprak yapısı ve geçmişten gelen zenginlikleriyle tarımsal ürün potansiyeli açısından önemli bir ülke konumundadır. Bu özellik ülkenin zengin coğrafi ürün potansiyelini de ön plana çıkarmaktadır. Coğrafi işaretler ayırt edici özelliği ile ön plana çıkan ve bulunduğu bölge ile özdeşleşen ürünleri göstermektedir.

Bu çalışmanın amacı, coğrafi işaretli tarımsal ürünler konusunda Antalya ilinde yaşayan tüketicilerin farkındalıklarını ölçmek ve tüketicilerin coğrafi işaretli tarımsal ürünlere yönelik tutumlarını tespit etmektir. Çalışma kapsamında Türkiye'de coğrafi işaretli ürün tescilini almış 52 tarımsal ürünle ilgili olarak farkındalık ve tutum araştırması yapılmıştır. Antalya ilinin merkez ilçelerinde ikamet eden 630 tüketiciyle yüz yüze anket yöntemi ile görüşülerek veri toplanmıştır. Elde edilen veriler amaca uygun istatistiki yöntemlerle analiz edilmiştir. Tarımsal ürünlerde coğrafi işaretlemenin yaygınlaştırılması, farkındalığın arttırılması, coğrafi işaretli tarımsal ürünlerle markalaşmaya gidilmesi yönünde önerilerde bulunulmuştur.

Anahtar Kelimeler: Coğrafi işaret, tarımsal ürün, tutum.

1. Giriş

Dünyada son yıllarda çarpıcı bir şekilde gelişme gösteren doğayla uyumlu ve yerel değerlerin korunmasına yönelik eğilimler kültür ekonomisini ve bağlamında kırsal kalkınma konusunu gündeme getirmektedir. Kültür ekonomisi, sürdürülebilir ekonomik kalkınma ve özellikle de yerinde kalkınma açısından önemli bir disiplin olarak görülmeye başlamış kırsal kalkınma alanında kullanılabilecek temel argüman olarak değerlendirilmektedir. Turizmde kültür turizmi, ziraatta agro-turizm ve organik tarım, sanayide geleneksel üretim veya el yapımı ürünlere olan yönelim bu alanın kazanacağı ivme açısından dikkat çekici bir gelişme olarak değerlendirilebilir (Şahin, 2013: 197).Küreselleşme ile birlikte tüketici tercihlerinde yaşanan değişim, yerel üretim tarzını benimsemiş küçük ölçekli firmalara doğru yönelim şeklindedir. Bu açıdan bakıldığında sürdürülebilir ekonomik kalkınma içinhem küresel ve hem de yerel ölçekte yeni stratejilerin gerekliliği ortaya çıkmaktadır. Bu yeni stratejilerin başındageleneksel ürünler, yöresel ürünler ve coğrafi işaretli ürünler gelmektedir (Orhan, 2010: 245).

Günümüzde tüketicilerin birçoğu alışveriş yaparken, belli bir ürünü piyasada satılan benzerlerine tercih etmekte ya da başkaları tarafından yoğunlukla tercih edilen ürünün kalitesine daha fazla güvenmektedir. Bu tercih ya da güven, ürünü ayırt etmeye yarayan unsurlardan olan markalardan kaynaklandığı kadar aslında o ürünün niteliğine ve coğrafi kaynağına da bağlı olabilmektedir (Marangoz ve Ayyıldız, 2006: 2). Değişen dünya düzeninde gelişen üretim süreci ve aşırı kâr amacı, içeriği ile oynanmış ürünlerin üretimini arttırmış ve tüketici sağlığı için tehdit olmaya başlamıştır. Tüketicitercihlerine etki ederek tüketicileri daha çok geleneksel değerlerine sahip çıkma ve onları tüketme eğilimine yönelten bu durum geleneksel, yöresel ve coğrafi işaretli ürün pazarlarının ortaya çıkmasına sebep olmuştur (Orhan, 2010: 245). Bu ürün pazarları kırsal bölgelerde itici bir ekonomik güç olan niş pazar alanlarının örneklerindendir. Niş pazarlar ürüne katma değer yaratma potansiyeline sahip pazarlar olup, yaratılan değerin iyi bir örgütlenme kültürü ile ürüne adını veren yörelere iktisadi katkı verebilecek konumda olan pazarlardır (Marescotti, 2003: 5).

Geleneksel ürün pazarları tüketici tercihinin yansıtıldığı ve bölge kültürünün özelliklerinin görüldüğü, geleneksel ürünlerin, kaliteleri ile pazarda farklılaştırılabildiği pazarlardır. Geleneksel ürünlerin küresel ve ulusal pazarlarda kalite özelliği, tüketici tercihinde etkili olduğu gibi önemli rekabet aracı olarak da görülmektedir. Bu noktada ürün fiyatı kalite standartlarının gerisinde kalmaktadır (Marescotti, 2003: 5).Fiyatın bir değişken olarak kabul edilmediği bu ürünler, niş pazar ürünlerinin gelişmesinde de önemli bir araç olarak görülmekte ve niş pazarın gelişmesine katkı sağlamaktadır. Nitekim ortaya çıkan bu pazar alanları katma değeri yüksek ürünlerin yer alacağı ve geleneksel kaynak kullanımının teşvik edileceği alanlar olarak düşünülmektedir (Tekelioğlu ve Demirer, 2008: 2).

Geleneksel ürünler, bölge halkı ve yerel firmalarca, kendilerinden önceki nesiller tarafından bırakılan miras olarak görülmekte ve bu ürünleri "kültür işaretçisi" olarak nitelendirmektedirler (Marescotti, 2003:5). Ekonomik, sosyal ve kültürel anlamda birçok fayda sağlayan bu tür uygulamaların devam etmesi üretimde kontrollü kaynak kullanımına ve pazarda tüketici ihtiyacına cevap vermesine bağlıdır (Tregear, 2001: 3-5).

Yöresel ve geleneksel değerlere ait bilgilerin belirli bir düzen içerisinde toplanması ve koruma altına alınması önemli bir konu olarak değerlendirilmektedir. Bu açıdan bakıldığında, pek çok ürünün coğrafi adı ile tanındığı da görülmektedir (Filippi and Triboulet, 2005; Reviron et al., 2009). Ulusal ve uluslararası pazarda talep gören bu ürün grupları artan rekabeti de beraberinde getirmektedir. Geleneksel kültürlerden türemiş geleneksel ürünler, belirli bir bölgeye ait özellikleri barındırmaları yönü ile spesifik ürünler arasında değerlendirilmektedirler. Bu ürünler ayrıca, yöreye özgü hammadde kaynakları ile geleneksel bir üretim sürecinden geçerek ayırt edici özelliklerini kazanmaktadır (Pacciani et all., 2001: 3).

Bir yörenin herhangi bir ürünü, meyvesi, taşı, madeni diğer yörelerde üretilenlerden farklı olabilmektedir. Bir yörede üretilen halı, kilim, kumaş, çini vb. ürünler her hangi bir nedenle ün kazanabilmektedir. Bu ürünlerin üzerinde o yörenin adının kullanılması, o ürüne yönelik bir coğrafi işaret tescilinin bulunması, o ürünlerin niş pazarlarda satılıyor olması dahi, o ürünün tüketiciler tarafından benzerlerinden farklı özelliklere sahip olduğu şeklinde algılanmasına sebep olabilmektedir. Nitekim tüketiciler söz konusu yöre adıyla satılan ürünleri o yörenin adına duydukları güvenle, aynı türdeki diğer ürünlere tercih edebilmektedirler (Esen, 2016: 448). Geleneksel ürünlerin kolektif faaliyetler ile bilgi ve beceri (know-how) aktarımının nesiller arası devam etmesi kırsal bölgeler

açısından yeni getiri alanlarından biridir. Böylece, geleneksel ürünler sahip oldukları spesifik özellikleri sayesinde ekonomik bir değer kazanarak potansiyel getiri sağlayan bir kaynak konumuna gelmektedir (Marescotti, 2003: 5).

Türkiye sahip olduğu ürünlerle, benzersiz doğa, kültür ve sanat zenginlikleriyle dünyada eşi ve benzeri bulunmayan bir coğrafi ürün çeşitliliğine sahiptir. Türkiye'de her yörenin kendine özel bir ürünün üretim kaynağı olduğu ve bu ürün ile özdeşleştiği görülmektedir. Coğrafi işaretlerin, her türlü ekonomik yapı için önem arz etmesine karşılık, gelişmekte olan ve ekonomisi daha ziyade tarımsal üretime dayanan ülkelerde ayrı bir yere sahip olduğu ifade edilmektedir. Bunun en önemli sebepleri ise bu ülkelerin sanayileşmeyi tamamlayamamış, kültür ekonomisi, sürdürülebilir ekonomik kalkınma ve özellikle de yerinde kalkınma açısından önemli olan kırsal kalkınma anlayışı ile, tarımsal üretimin ve geleneksel üretim tekniklerinin ekonominin temel yapısını teşkil etmesinden kaynaklı olduğu düşüncesidir (Gürel ve ark., 2016: 1050).

Türkiye'de geleneksel ve yöresel birçok değerin bulunması ve bu değerlerin kendine özgü niteliklerinin olması, gelişen dünya ticareti içerisinde bu değerlerin sahiplenme olgusunu gündeme taşımaktadır (Orhan, 2010: 245). Coğrafi işaret tescili ile koruma altına alınan ürünlerin önemi de bu noktada ortaya çıkmaktadır. Çünkü dünyada yerel ürün ve tatların coğrafi işaret tescili ile koruma altına alınabileceği ve bunun yerel ekonomik kalkınmada bir kalkınma aracı olarak kullanılabileceği olgusu giderek yaygınlaşmaktadır (Gürel ve ark., 2016: 1050). Yapılan araştırmalarda bir ürün geleneksel ürün kategorisine girip coğrafi işaret aldığında, piyasa değerinin yaklaşık %20 üstünde bir rakama alıcı bulabildiği belirlenmiştir (TPE, 2015:6). Bu yönüyle de tescilin özellikle üreticilere önemli katkı sağlayacağı ve belirli şartlar altında üretim yapan tüm gerçek ve tüzel kişileri koruma altına alacağı görülmektedir (Albayrak, 2014:1-3, Albayrak ve ark., 2016:1841).

Coğrafi işaretler, "belirgin bir niteliği, ünü veya diğer özellikleri itibariyle kökeninin bulunduğu bir yöre, alan, bölge veya ülke ile özdeşleşmiş sınaî mülkiyet hakkı"olarak tanımlanmaktadır (Dimara ve ark., 2004; Ilıcalı, 2005; Josling, 2005; Kan ve Gülçubuk, 2008; Şahin ve Meral, 2012). Rippon (2014) Cİ'yi telif hakları, patentler ve ticari markalara kıyasla daha az bilinen bir sınai mülkiyet hakkı şeklinde ifade ederken, Menapace ve Moschini (2012) Cİ'yi ürünün ait olduğu bölgenin isminin kullanılmasını esas alan bir markalama şekli olarak tanımlamaktadır.

Dünyada Coğrafi İşaret (Cİ) tescili, geleneksel ürünlerin özgün yasalarla koruma altına alınmasını hedeflemektedir. Cİ tescilinde başlıca amaçlar; geleneksel ürünlerin kalitesinin korunması, ürün için pazar farklılaştırması yaparak pazar payının arttırılması, imaj ve bilinen özellikte üretiminin sürdürülebilirliğinin sağlanması, üretim yapanların tescil ile koruma altına alınması, sahte ürünlerin engellenmesi, milli ve kültürel değerlerinin korunması şeklinde sıralanmaktadır (Albayrak, 2014:1-3). Kan ve Gülçubuk (2008) bir işaretin Cİ olarak adlandırılması için 5 temel unsurun gerektiğini ifade etmiştir. Bunlar, *"ürün, belirli bir coğrafya, işaret, ürünün belirli bir karakteristik özellik taşıması, ürünün karakteristik özelliği ile coğrafi kökeni arasındaki ilişki"* şeklinde tanımlanmaktadır (Toklu ve ark., 2016:146-147).

Cİ'lerde Mahreç işareti ve Menşei adı olarak iki sınıf ayrımı yapılmaktadır. Bir ürünün *"üretimi, işlenmesi ve diğer işlemlerinin tümü"* ilgili bölgede gerçekleşiyorsa bu ürüne menşei adı verilirken, bu aşamaların en az biri ilgili bölgede gerçekleşiyorsa o ürüne mahreç işareti verilmektedir (TPE, 2014). Kayseri pastırması, Antep Fıstığı ve Isparta gülü menşei adı olarak tescili yapılan ürünlere örnekken, Çorum leblebisi, Trabzon telkâriye ve hasırı mahreç adı ile korunmuş ürünlere örnektir. AB standartlarında sadece tarımsal ürünler Cİ ile korunabilirken, Türkiye'de doğal ürünler, tarım, maden ve el sanatları ile sanayi ürünleri de Cİ ile korunabilecek ürünler kapsamında değerlendirilmektedir (Dimara ve Skuras, 2003).

Coğrafi işaret tescili ile ilgili alan yazını incelendiğinde yurtiçinde daha çok tüketim, üretim ve tek yada birkaç ürün boyutunda yapılan çalışmalar olduğu görülmektedir. Uluslararası çalışmalar ise gerek yöntemleri itibarı ile gerekse odaklandıkları konular açısından Türkiye'deki yapılan çalışmalardan farklı ve önemli bulgular sunmaktadır. Bu çalışmada yapılan çalışmalardan farklı olarak coğrafi işaret tescili ile koruma altına alınmış tüm tarımsal ürünlerin tanınırlığını ve bu ürünlere yönelik tüketicilerin algılarını belirlemek amaçlanmıştır.Çalışma kapsamında Türkiye'de coğrafi işaret tescili ile koruma altına alınmış 52 tarımsal ürünle ilgili olarak farkındalık ve tutum araştırması yapılmıştır. Tarımsal ürünlerde coğrafi işaretlemenin yaygınlaştırılması, farkındalığın arttırılması, coğrafi işaretli tarımsal ürünlerle markalaşmaya gidilmesi yönünde önerilerde bulunulmuştur.

2. Materyal ve Metot

2.1. Araştırmanın Yöntemi

Araştırmanın ana materyali Antalya ili kent merkezinde ikamet eden tüketicilerle yüz yüze anket yöntemi ile elde edilen verilerden oluşmaktadır. Örnek büyüklüğünün hesaplanmasında Oransal Örnekleme yöntemi kullanılmıştır.

$$n = \frac{N \cdot p \cdot (1-p)}{(N-1) \cdot \sigma_p^2 + p \cdot (1-p)}$$

Formülde; "n" örnek büyüklüğünü, "N" ana kitledeki birey sayısı,"σ_p^2 ""oranın varyansı ve "p" ise incelenen olayın meydana gelme olasılığıdır. Formülde ana kitle 2017 yılı Antalya il nüfusu 2.364.396 alınmıştır, %95 güven aralığında ve ortalamadan %5 sapma değeri kullanılmış ve örnek sayısı 384 olarak hesaplanmıştır. Veriler tüketicilerin tutumlarını saptamaya yönelik hazırlanmış anket formu ile elde edilmiştir.Coğrafi işaret ile tescil edilmiş tarımsal ürünler tanınırlıkları itibariyle incelenmiştir. Daha sonra tüketicilerin sosyo-demografik özellikleri ile coğrafi işaretli ürünlere yönelik algıları arasındaki ilişki Ki-kare testi ile incelenmiştir.

2.1. Araştırmanın Amacı

Araştırmanın temel amacı, tüketicilerin "coğrafi işaretli tarımsal ürünler" konusundaki farkındalıklarını ölçmektir. Bu amaçla, Antalya ilinde belirlenen farklı noktalarla tüketiciler ile anket uygulaması gerçekleştirilmiştir. Bu araştırmada, eldeki problemi problemle ilgili durumları ve değişkenleri, bu değişkenler arasındaki ilişkinin tanımlanmasını sağlayan tanımlayıcı araştırma modeli kullanılmıştır. Böylelikle ileriye dönük tahminler yapmak ve öneriler geliştirmek de mümkün olabilmektedir (Kurtuluş, 2004: 252). Tanımlayıcı araştırmada ele alınan olgunun düzgün bir portresini çizmek ve konu hakkında senteze ulaşabilmek önemlidir (Altunışık ve ark., 2005: 61).

2.2. Araştırmanın Kapsamı

Bu araştırmada, basit tesadüfü örnekleme yöntemi ile yüzyüze anket tekniği kullanılmıştır. Araştırmada, Antalya ili merkez ilçede (Konyaaltı, Muratpaşa, Kepez) ikamet eden hane halklarındanbasit tesadüfü örnekleme yöntemine göre seçilmiş 630 tüketici ile yapılmış anketler yer almaktadır.Anket üç bölümden oluşmaktadır. Birinci Bölümde, Yöresel Ürünler ve Coğrafi İşaretler Türkiye Araştırma Ağı (yücita.org.) üzerinden alınan, Türkiye'de tescil almış olan coğrafi işaretli tarımsal ürünlerin listesi yer almaktadır. Bu bölümde 52 adet coğrafi işaretli tarımsal ürün Duyup/Duymadıkları, Kullanıp/Kullanmadıkları çerçevesinde katılımcılara sorulmuştur. İkinci bölümde, coğrafi işaretli tarımsal ürünlere yönelik tüketici algısı 11 yargı ile 5'li likert ölçeğinde sorulmuştur. Üçüncü bölümde katılımcılara ait demografik bilgilere yer verilmiştir.

3.1. Araştırma Sonuçları ve Değerlendirmesi

3.1.1. Normallik ve Güvenilirlik Testi

Cronbach's Alpha güvenirlilik katsayısı, maddelerin ağırlıklı olarak puanlandığı ya da derecelendirme yöntemiyle puanlandığı durumlarda olur (Can, 2017: 388). Can'ın (2017: 391) çalışmasından istifade edilerek ölçeğin Cronbach Alpha güvenirlilik katsayısı şu şekilde belirlenmiştir: "$0.00 \leq \alpha < 0.40$ Güvenilir değil, $0.40 \leq \alpha < 0.60$ Düşük derecede güvenilir, $0{,}60 \leq \alpha < 0.90$ Oldukça güvenilir, $0.90 \leq \alpha < 1.00$ Yüksek derecede güvenilir. Sonuç olarak; ölçek sorularının güvenirlilik katsayıları oldukça güvenilir olarak tespit edilmiştir. Araştırması yapılan istatistiksel testlerin parametrik olması şartıyla sonuçların güvenilir ve tamim edilebilir olmasını sağlayan testtir (Can, 2017: 81). Aşağıdaki Tablo 1'de normal dağılım testi için gerekli değerler incelenmiştir. Bir ölçeğin normal dağılıma uygun olması için mean, median ve mode'un sahip olduğu değerler aynı ya da

birbirine yakın olmalıdır (Can, 2017: 82). Kolmogorov-Smirnov, gözlem sayısının 30 ve üzeri olduğu durumlarda geçerlidir (Can, 2017: 89). Veri sayısı 30'un üzerinde olduğu için Kolmogorov-Smirnov test sonucuna bakılmaktadır. Çarpıklık ve Basıklık katsayılarının -1.96 ile +1.96 arasında kalması durumunda verilerin normal dağılıma uygun olduğu söylenebilir (Can, 2017: 85). Elde edilen bilgiler doğrultusunda veriler normal dağılıma uygundur.

Tablo 1. Normallik ve Güvenilirlik Testi

N	Soru Sayısı	Cronbach Alpha Katsayısı (α)	Mean	Median	Mode	Skewness	Kurtosis	Kolmogorov -Smirnov	Shapiro-Wilk
630	11	.741	3.711	3.818	3.910	.-440	.-137	.074	.981

3.1.2. Araştırmaya Katılan Tüketiciler Hakkında Genel Bilgiler

Anket soruları birebir yüz yüze görüşmeler sonucunda cevaplandığından tüketiciler her soruya cevap vermiştir. Söz konusu analizlerde her soru ayrı ayrı ele alınmıştır.

Tablo 2. Tüketicilerin Sosyo-Demografik Özellikleri

Cinsiyet	**n**	**%**	**Bölge**	**n**	**%**
Erkek	313	49,7	Akdeniz Bölgesi	473	75,1
Kadın	317	50,3	Ege Bölgesi	43	6,8
Toplam	**630**	**100,0**	İç Anadolu Bölgesi	42	6,7
Yaş	**n**	**%**	Marmara Bölgesi	30	4,8
17-22 yaş	199	31,6	Karadeniz Bölgesi	16	2,5
23-28 yaş	143	22,7	Doğu Anadolu Bölgesi	14	2,2
29-34 yaş	86	13,7	Güneydoğu Anadolu Bölgesi	12	1,9
35-40 yaş	96	15,2	**Toplam**	**630**	**100,0**
41-46 yaş	42	6,7	**Eğitim Durumu**	**n**	**%**
47 ve üzeri yaş	64	10,2	İlköğretim	42	6,7
Toplam	**630**	**100,0**	Orta öğretim	71	11,3
Medeni Durum	**n**	**%**	Lise	215	34,1
Bekar	366	58,1	Önlisans	134	21,3
Evli	220	34,9	Lisans	152	24,1
Boşanmış	24	3,8	Lisansüstü	16	2,5
Dul	20	3,2	**Toplam**	**630**	**100,0**
Toplam	**630**	**100,0**	**Meslek**	**n**	**%**
Ailenin Gelir Durumu	**n**	**%**	Kamu Çalışanı	71	11,3
1404 TL ve altı	98	15,6	Esnaf	58	9,2
1405-2790 TL	294	46,7	Serbest Meslek Erbabı	60	9,5
2791-3340 TL	115	18,3	Özel Sektör Çalışanı	138	21,9
3341-5094 TL	78	12,4	Öğrenci	182	28,9
5095 TL ve üzeri	45	7,1	Emekli	58	9,2
Toplam	**630**	**100,0**	Çalışmıyor	63	10,0
İkamet Edilen Semt	**n**	**%**	**Toplam**	**630**	**100,0**
Konyaaltı	191	30,3	**Uyruk**	**n**	**%**
Muratpaşa	226	35,9	TC	606	96,2
Kepez	213	33,8	Diğer	24	3,8
Toplam	**630**	**100,0**	**Toplam**	**630**	**100,0**

Araştırmaya katılan tüketicilerin %49,7'si erkek, %50,3'ü kadındır. %31,6'sı 17-22 yaş aralığında, %22,7'si 23-28 yaş aralığında %15,2'si 35-40 yaş aralığındadır. Katılımcıların %58,1'i bekar, %34,9'u evlidir. %46,7'si 1405-2790 TL gelir aralığındadır. %75,1'i Akdeniz Bölgesinden, %6,8'i Ege Bölgesindendir.%34,1'i Lise mezunu, 24,1'i Lisans mezunu, %21,3'ü önlisans mezunu olduklarını belirtmiştir. %28,9'u öğrenci, %21,9'u özel sektör çalışanı,%11,3'ü kamu çalışanıdır.%96,2'si TC uyrukludur. Katılımcıların ikamet ettikleri semlere bakıldığında %30,3 Konyaaltı, %35,9 Muratpaşa, %33,8 Kepez ilçeleri sonucuna ulaşılmaktadır.

3.1.3. Coğrafi İşaretli Tarımsal Ürünlerin Tanınırlığı

Coğrafi işaretli tarımsal ürünlere yönelik tüketici farkındalığı ve algısını incelemeye yönelik olarak yapılan bu çalışmada Türkiye'de tescil almış 52 adet coğrafi işaretli tarımsal ürün araştırma kapsamına alınmıştır. Bu ürünlere yönelik olarak tüketici farkındalıkları ürünlerin kategorize edilmiş haliyle ayrıntılı olarak tablolarda sunulmaktadır.

3.1.3.1. Coğrafi İşaretle Tescil Edilen Meyveler

Tablo 3, Tablo 4, Tablo 5, Tablo 6, Tablo 7 ve Tablo 8'de "*Coğrafi İşaretle Tescil Edilen Meyveler*" grubunda yer alan tarımsal ürünlere yer verilmiştir.

Tablo 3. Üzümsü Meyveler

ArapgirKöhnü Üzümü	Kullandım		Kullanmadım		Toplam		Çimin Üzümü	Kullandım		Kullanmadım		Toplam	
	n	%	n	%	n	%		n	%	n	%	n	%
Duydum	81	75	27	25	108	100	Duydum	88	75,2	29	24,8	117	100
Duymadım	4	,8	518	99,2	522	100	Duymadım	3	,6	510	99,4	513	100
Toplam	85	13,5	545	86,5	630	100	Toplam	91	14,4	539	85,6	630	100
Ege Sultani Üzümü aegeanSultanas	**Kullandım**		**Kullanmadım**		**Toplam**			**Kullandım**		**Kullanmadım**		**Toplam**	
	n	**%**	**n**	**%**	**n**	**%**	**Elazığ Öküz Gözü Üzümü**	**n**	**%**	**n**	**%**	**n**	**%**
Duydum	127	76,5	39	23,5	166	100	Duydum	138	70,8	57	29,2	195	100
Duymadım	6	1,3	458	98,7	464	100	Duymadım	0	0	435	100	435	100
Toplam	133	21,1	497	78,9	630	100	Toplam	138	21,9	492	78,1	630	100
İnce Su Karaevrek Üzümü	**Kullandım**		**Kullanmadım**		**Toplam**		**Tarsus Beyazı Üzüm Topacık**	**Kullandım**		**Kullanmadım**		**Toplam**	
	n	**%**	**n**	**%**	**n**	**%**		**n**	**%**	**n**	**%**	**n**	**%**
Duydum	76	73,8	27	26,2	103	100	Duydum	77	68,8	35	31,2	112	100
Duymadım	2	,4	525	99,6	527	100	Duymadım	2	,4	516	99,6	518	100
Toplam	78	12,4	552	87,6	630	100	Toplam	79	12,5	551	87,5	630	100
İsabey Çekirdeksiz Üzümü	**Kullandım**		**Kullanmadım**		**Toplam**		**Kalecik Karası Üzümü**	**Kullandım**		**Kullanmadım**		**Toplam**	
	n	**%**	**n**	**%**	**n**	**%**		**n**	**%**	**n**	**%**	**n**	**%**
Duydum	123	80,9	29	19,1	152	100	Duydum	128	81,5	29	18,5	157	100
Duymadım	2	,4	476	99,6	478	100	Duymadım	4	,8	469	99,2	473	100
Toplam	125	19,8	505	80,2	630	100	Toplam	132	21	498	79	630	100

Tablo 4. Yumuşak Çekirdekli Meyveler

Bayramiç Beyazı	Kullandım		Kullanmadım		Toplam		Bayramiç Elması	Kullandım		Kullanmadım		Toplam	
	n	%	n	%	n	%		n	%	n	%	n	%
Duydum	55	65,5	29	34,5	84	100	Duydum	56	62,2	34	37,8	90	100
Duymadım	1	,2	545	99,8	546	100	Duymadım	3	,6	537	99,4	540	100
Toplam	56	8,9	574	91,1	630	100	Toplam	59	9,4	571	90,6	630	100
Piraziz Elması	**Kullandım**		**Kullanmadım**		**Toplam**								
	n	**%**	**n**	**%**	**n**	**%**							
Duydum	61	71,8	24	28,2	85	100							
Duymadım	6	1,1	539	98,9	545	100							
Toplam	67	10,6	563	89,4	630	100							

Tablo 5. Sert Çekirdekli Meyveler

Akşehir Kirazı	**Kullandım**		**Kullanmadım**		**Toplam**	
	N	**%**	**n**	**%**	**n**	**%**
Duydum	198	73,9	70	26,1	268	100
Duymadım	5	1,4	357	98,6	362	100
Toplam	203	32,2	427	67,8	630	100
Malatya Kayısısı	**Kullandım**		**Kullanmadım**		**Toplam**	
	n	**%**	**n**	**%**	**n**	**%**
Duydum	473	87,3	69	12,7	542	100
Duymadım	10	11,4	78	88,6	88	100
Toplam	483	76,7	147	23,3	630	100
Çay İlçesi Vişnesi	**Kullandım**		**Kullanmadım**		**Toplam**	
	n	**%**	**n**	**%**	**n**	**%**
Duydum	89	78,8	24	21,2	113	100
Duymadım	3	,6	514	99,4	517	100
Toplam	92	14,6	538	85,4	630	100

Salihli Kirazı	**Kullandım**		**Kullanmadım**		**Toplam**	
	n	**%**	**n**	**%**	**n**	**%**
Duydum	183	79,2	48	20,8	231	100
Duymadım	7	1,8	392	98,2	399	100
Toplam	190	30,2	440	69,8	630	100
Mut kayısısı	**Kullandım**		**Kullanmadım**		**Toplam**	
	N	**%**	**n**	**%**	**n**	**%**
Duydum	138	73,8	49	26,2	187	100
Duymadım	5	1,1	438	98,9	443	100
Toplam	143	22,7	4877	77,3	630	100

Tablo 6. Turunçgiller

Finike Portakalı	**Kullandım**		**Kullanmadım**		**Toplam**	
	n	**%**	**n**	**%**	**n**	**%**
Duydum	475	88,5	62	11,5	537	100
Duymadım	11	11,8	82	88,2	93	100
Toplam	486	77,1	144	22,9	630	100

Bodrum Mandarini	**Kullandım**		**Kullanmadım**		**Toplam**	
	n	**%**	**n**	**%**	**n**	**%**
Duydum	280	78,2	78	21,8	358	100
Duymadım	4	1,5	268	98,5	272	100
Toplam	284	45,1	346	54,9	630	100

Tablo 7. Sert Kabuklu Meyveler

Aydın Kestanesi	**Kullandım**		**Kullanmadım**		**Toplam**	
	n	**%**	**n**	**%**	**n**	**%**
Duydum	252	76,4	78	23,6	330	100
Duymadım	6	2,0	294	98,0	300	100
Toplam	258	41,0	372	59,0	630	100
Osmaniye Yer Fıstığı	**Kullandım**		**Kullanmadım**		**Toplam**	
	n	**%**	**n**	**%**	**n**	**%**
Duydum	244	75,1	81	24,9	325	100
Duymadım	8	2,6	297	97,4	305	100
Toplam	252	40	378	60	630	100
Antep Fıstığı	**Kullandım**		**Kullanmadım**		**Toplam**	
	n	**%**	**n**	**%**	**n**	**%**
Duydum	530	94,1	33	5,9	563	100
Duymadım	5	7,6	62	92,5	67	100
Toplam	535	84,9	95	15,1	630	100
Çağlayan Cerit Cevizi	**Kullandım**		**Kullanmadım**		**Toplam**	
	n	**%**	**n**	**%**	**n**	**%**
Duydum	88	76,5	27	23,5	115	100
Duymadım	2	,4	513	99,6	515	100
Toplam	90	14,3	540	85,7	630	100

Giresun Tombul Fındığı	**Kullandım**		**Kullanmadım**		**Toplam**	
	n	**%**	**n**	**%**	**n**	**%**
Duydum	253	81,1	59	18,9	312	100
Duymadım	3	,9	315	99,1	318	100
Toplam	256	40,6	374	59,4	630	100
Siirt Fıstığı	**Kullandım**		**Kullanmadım**		**Toplam**	
	n	**%**	**n**	**%**	**n**	**%**
Duydum	179	73,7	64	26,3	243	100
Duymadım	7	1,8	380	98,2	387	100
Toplam	186	29,5	444	70,5	630	100
Bergama Kozak Çam Fıstığı	**Kullandım**		**Kullanmadım**		**Toplam**	
	n	**%**	**n**	**%**	**n**	**%**
Duydum	109	61,9	67	38,1	176	100
Duymadım	2	,4	452	99,6	454	100
Toplam	111	17,6	519	82,4	630	100
Niksar Cevizi	**Kullandım**		**Kullanmadım**		**Toplam**	
	n	**%**	**n**	**%**	**n**	**%**
Duydum	117	72,2	45	27,8	162	100
Duymadım	5	1,1	463	98,9	468	100
Toplam	122	19,4	508	80,6	630	100

Coğrafi işaretle tescil edilen tarımsal ürünlerden üzümsü meyveler kategorisinde en fazla duyulan ve kullanılan ürün %81,5 oranı ile **"Kalecik Karası Üzüm**"üdür. Coğrafi işaretli üzümsü meyvelerden duyulan ancak kullanılmayan kategorisinde en fazla %31,2 oranı ile **"Tarsus Beyazı Üzüm Topacık"** dikkat çekmektedir.

Yumuşak çekirdekli meyveler kategorisinde **"Piraziz Elması"**%71,8 oranı ile en fazla duyulan ve kullanılan kategoride ön plandadır. Duyulan ancak kullanılmayan kategoride ise %37,8 oranı ile "**Bayramiç Elması"** yer almaktadır.

%87,2 ile **"Malatya Kayısı"**sı en çok duyulan ve kullanılan sert çekirdekli meyve iken, **"Mut Kayısı"**sı %26,2 ile en fazla duyulan ancak kullanılmayan sert çekirdekli meyvedir.

Tablo 8. AkdenizMeyveleri

Akhisar Domat Zeytini	Kullandım		Kullanmadım		Toplam	
	n	%	n	%	n	%
Duydum	141	70,9	58	29,1	199	100
Duymadım	2	,5	429	99,5	431	100
Toplam	143	22,7	487	77,3	630	100

Akhisar uslu zeytini	Kullandım		Kullanmadım		Toplam	
	n	%	n	%	n	%
Duydum	129	71,7	51	28,3	180	100
Duymadım	2	,4	448	99,6	450	100
Toplam	131	20,8	499	79,2	630	100

Aydın İnciri	Kullandım		Kullanmadım		Toplam	
	n	%	n	%	n	%
Duydum	360	82	79	18	439	100
Duymadım	7	3,7	184	96,3	191	100
Toplam	367	58,3	263	41,7	630	100

Anamur Muzu	Kullandım		Kullanmadım		Toplam	
	n	%	n	%	n	%
Duydum	466	90,1	51	9,9	517	100
Duymadım	7	6,2	106	93,8	113	100
Toplam	473	75,1	157	24,9	630	100

Edremit Körfezi Çizik Yeşil Zeytini	Kullandım		Kullanmadım		Toplam	
	n	%	n	%	n	%
Duydum	214	79,9	54	20,1	268	100
Duymadım	5	1,4	357	98,6	362	100
Toplam	219	34,8	411	65,2	630	100

Gemlik Zeytini	Kullandım		Kullanmadım		Toplam	
	n	%	n	%	n	%
Duydum	425	86,6	66	13,4	491	100
Duymadım	6	4,3	133	95,7	139	100
Toplam	431	68,4	199	31,6	630	100

Ege İnciri AegeanFig	Kullandım		Kullanmadım		Toplam	
	n	%	n	%	n	%
Duydum	214	77,3	63	22,7	277	100
Duymadım	4	1,1	349	98,9	353	100
Toplam	218	34,6	412	65,4	630	100

Coğrafi işaretle tescil edilen meyvelerde turunçgiller kategorisinde iki tarımsal ürün yer almaktadır. Tüketicilerin %87,5 i **"Finike Portakalı"**, %78,2 si **"Bodrum Mandarini"**meyvelerini duyduklarını ve kullandıklarını belirtmişlerdir.

"Antep Fıstığı" %94,1 oranı ile sert kabuklu meyveler grubunda en çok duyulan ve kullanılan meyvedir. Bu grupta **"Bergama Kozak Çam Fıstığı"** %38,1 oranı ile en çok duyulan ancak kullanılmayan sert kabuklu meyve olarak tespit edilmiştir.Aynı zamanda **"Antep Fıstığı"** meyveler grubunda en çok tanınan ve kullanılan coğrafi işaretle tescil edilmiş tarımsal üründür.

Akdeniz Meyveleri kategorisinde %90,1 ile **"Anamur Muzu"** en çok duyulan ve kullanılan ürün iken, %29,1 ile **"Akhisar Domat Zeytini"** en fazla duyulan ancak kullanılmayan Akdeniz meyvesidir.

3.1.3.2. Coğrafi İşaretle Tescil Edilen Sebzeler

Tablo 9, Tablo 10, Tablo 11 ve Tablo 12'de "*Coğrafi İşaretle Tescil Edilen Sebzeler*" grubunda yer alan tarımsal ürünlere yer verilmiştir.

Tablo 9. Olgunlaşmış Meyvesi Yenen Sebzeler

Diyarbakır Karpuzu	Kullandım		Kullanmadım		Toplam	
	n	%	n	%	n	%
Duydum	445	83,5	88	16,5	533	100
Duymadım	7	7,2	90	92,8	97	100
Toplam	452	71,7	178	28,3	630	100

Kale Biberi	Kullandım		Kullanmadım		Toplam	
	n	%	n	%	n	%
Duydum	162	77,9	46	22,1	208	100
Duymadım	2	,5	420	99,5	422	100
Toplam	164	26	466	74	630	100

Şanlı Urfa Biberi	Kullandım		Kullanmadım		Toplam	
	n	%	n	%	n	%
Duydum	263	74,3	91	25,7	354	100
Duymadım	4	1,4	272	98,6	276	100
Toplam	267	42,4	363	57,6	630	100

Kırkağaç Kavunu	Kullandım		Kullanmadım		Toplam	
	n	%	n	%	n	%
Duydum	262	82,9	54	17,1	316	100
Duymadım	10	3,2	304	96,8	314	100
Toplam	272	43,2	358	56,8	630	100

Maraş Biberi	Kullandım		Kullanmadım		Toplam	
	n	%	n	%	n	%
Duydum	250	74,4	86	25,6	336	100
Duymadım	2	,7	292	99,3	294	100
Toplam	252	40	378	60	630	100

Tablo 10. Olgunlaşmamış Meyvesi Yenen Sebzeler

Birecik Patlıcanı	Kullandım		Kullanmadım		Toplam		Yumala Patlıcanı	Kullandım		Kullanmadım		Toplam	
	n	%	n	%	n	%		n	%	n	%	n	%
Duydum	118	65,2	63	34,8	181	100	Duydum	49	57	37	43	86	100
Duymadım	2	,4	447	99,6	449	100	Duymadım	4	,7	540	99,3	544	100
Toplam	120	19	510	81	630	100	Toplam	53	8,4	577	91,6	630	100

Tablo 11. Kökleri ve Yumruları Yenen Sebzeler

Ödemiş Patatesi	Kullandım		Kullanmadım		Toplam		Tarsus Şalgamı	Kullandım		Kullanmadım		Toplam	
	n	%	n	%	n	%		n	%	n	%	n	%
Duydum	179	69,6	78	30,4	257	100	Duydum	229	71,8	90	28,2	319	100
Duymadım	4	1,1	369	98,9	373	100	Duymadım	8	2,6	303	97,4	311	100
Toplam	183	29	447	71	630	100	Toplam	237	37,6	393	62,4	630	100
Taşköprü Sarımsağı	**Kullandım**		**Kullanmadım**		**Toplam**		**Ereğli Siyah Havucu**	**Kullandım**		**Kullanmadım**		**Toplam**	
	n	**%**	**n**	**%**	**n**	**%**		**n**	**%**	**n**	**%**	**n**	**%**
Duydum	248	77	74	23	322	100	Duydum	110	62,1	67	37,9	177	100
Duymadım	2	,6	306	99,4	308	100	Duymadım	5	1,1	448	98,9	453	100
Toplam	250	39,7	380	60,3	630	100	Toplam	115	18,3	515	81,7	630	100

Tablo 12. Tohumları Yenen Sebzeler

Akkuş Şeker Fasulyesi	Kullandım		Kullanmadım		Toplam		İspir Kuru Fasulyesi	Kullandım		Kullanmadım		Toplam	
	n	%	n	%	n	%		n	%	n	%	n	%
Duydum	112	69,6	49	30,4	161	100	Duydum	123	74,1	43	25,9	166	100
Duymadım	2	,4	467	99,6	469	100	Duymadım	1	,2	463	99,8	464	100
Toplam	114	18,1	516	81,9	630	100	Toplam	124	19,7	506	80,3	630	100
Hınıs Fasulyesi	**Kullandım**		**Kullanmadım**		**Toplam**								
	n	**%**	**n**	**%**	**n**	**%**							
Duydum	92	68,1	43	31,9	135	100							
Duymadım	0	0	495	100	495	100							
Toplam	92	14,6	538	85,4	630	100							

Coğrafi işaretle tescil edilen tarımsal ürünlerden olgunlaşmış meyvesi yenen sebzeler kategorisinde en fazla duyulan ve kullanılan ürün %83,5 oranı ile **"Diyarbakır Karpuzu**"dur. Coğrafi işaretli olgunlaşmış meyvesi yenen sebzelerden duyulan ancak kullanılmayan kategorisinde en fazla %25,7 oranı ile **"Şanlıurfa Biberi"** dikkat çekmektedir.

Coğrafi işaretle tescil edilen sebzeler kategorisinde olgunlaşmamış meyvesi yenen sebzelerde iki tarımsal ürün yer almaktadır. Tüketicilerin %65,2 si **"Birecik Patlıcanı"**, %57,0 si **"Yumala Patlıcanı"**sebzelerini duyduklarını ve kullandıklarını belirtmişlerdir.

%77,0 ile **"Taşköprü Sarımsağı"**en çok duyulan ve kullanılan kökleri ve yumruları yenen sebze iken, **"Ereğli Siyah Havucu"**%37,9 ile en fazla duyulan ancak kullanılmayan kökleri ve yumruları yenen sebzedir.

"İspir Kuru Fasülyesi" %74,1 oranı ile tohumları yenen sebzeler grubunda en çok duyulan ve kullanılan sebzedir. Bu grupta **"Hınıs Fasülyesi"** %31,9 oranı ile en çok duyulan ancak kullanılmayan tohumları yenen sebze olarak tespit edilmiştir.

Bu grupta %83,5 ile **"Diyarbakır Karpuzu"** en çok duyulan ve kullanılan sebzedir.

3.1.3.3. Coğrafi İşaretle Tescil Edilen Sanayi Bitkileri (Tütün-Pamuk)

Tablo 13'de "*Coğrafi İşaretle Tescil Edilen Sanayi Bitkileri (Tütün-Pamuk)*" grubunda yer alan tarımsal ürünlere yer verilmiştir.

Tablo 13. Sanayi Bitkileri (Tütün-Pamuk)

Çelikhan Tütünü	Kullandım		Kullanmadım		Toplam		Ege Pamuğu AegeanCotton	Kullandım		Kullanmadım		Toplam	
	n	%	n	%	n	%		N	%	n	%	n	%
Duydum	53	31,4	116	68,6	169	100	Duydum	98	44,7	121	55,3	219	100
Duymadım	1	,2	460	99,8	117	100	Duymadım	1	,2	410	99,8	411	100
Toplam	54	8,6	576	91,4	630	100	Toplam	99	15,7	531	84,3	630	100

Coğrafi işaretle tescil edilen sanayi bitkileri kategorisinde iki tarımsal ürün yer almaktadır. Tüketicilerin %68,6'sı**"Çelikhan Tütünü"**nü, %55,3'ü**"Ege Pamuğu"**sanayi bitkilerini duyduklarını ancak kullanmadıklarını belirtmişlerdir.

3.1.3.4. Coğrafi İşaretle Tescil Edilen Diğer Tarımsal Ürünler

Tablo 14'de "*Coğrafi İşaretle Tescil Edilen Diğer Tarımsal Ürünler*" grubunda yer alan tarımsal ürünlere yer verilmiştir.

Tablo 14. Diğer Tarımsal Ürünler

İpsala Pirinci	**Kullandım**		**Kullanmadım**		**Toplam**		**Tomarza Kabak Çekirdeği**	**Kullandım**		**Kullanmadım**		**Toplam**	
	n	**%**	**n**	**%**	**n**	**%**		**n**	**%**	**n**	**%**	**n**	**%**
Duydum	100	70,4	42	29,6	142	100	Duydum	107	72,8	40	27,2	147	100
Duymadım	2	,4	486	99,6	488	100	Duymadım	3	,6	480	99,4	483	100
Toplam	102	16,2	528	83,8	630	100	Toplam	110	17,5	520	82,5	630	100

Safranbolu Safranı	**Kullandım**		**Kullanmadım**		**Toplam**	
	n	**%**	**n**	**%**	**n**	**%**
Duydum	105	44,7	130	55,3	235	100
Duymadım	3	,8	392	99,2	395	100
Toplam	108	17,5	522	82,9	630	100

Coğrafi işaretle tescil edilmesine rağmen farklı türde ve tek kalem olduğu için diğer grupta değerlendirilen üç tarımsal ürün yer almaktadır. Araştırmaya katılan tüketicilerin bu ürünlerden %72,8'i **"Tomarza Kabak Çekirdeği"** ni, %70,4"ü **"İpsala Pirinci"** ni ve %44,7 **"Safranbolu Safranı"** nı duyduklarını ve kullandıklarını belirtmişlerdir. Bu grupta Safranbolu Safranı %55,3 ile en çok duyulan ancak kullanılmayan tarımsal ürün olarak belirlenmiştir.

3.1.4. Araştırmaya Katılan Tüketicilerin Coğrafi İşaretli Tarımsal Ürünlere Yönelik Algıları

Tüketicilerin coğrafi işaretli tarımsal ürünlere yönelik algılarının belirlenmesindeki yargılar 5 Likert ölçeğinde (1 Kesinlikle Katılmıyorum, 2 Katılmıyorum, 3 Kararsızım, 4 Katılıyorum ve 5 Kesinlikle Katılıyorum) hazırlanan ifadeler ile belirlenmiştir.

Araştırmaya katılan tüketicilerin coğrafi işaretli tarımsal ürünlere yönelik ön plana çıkan ilk algıları %49,5 oranında**"lezzetli"** olduğu yönündedir. Bunu sırasıyla ürünün %49,2 oranında **"kaliteli"** olması ve %47,5 oranında da**"sağlıklı"** olması takip etmektedir. Tüketicilerin en fazla katılım gösterdikleri yargı ifadeleri ise***"Coğrafi İşaretli tarımsal ürünler daha kalitelidir", "Coğrafi işaretli tarımsal ürünler daha lezzetlidir"*** ve ***"Coğrafi işaretli tarımsal ürünlerin sağlıklı olduğunu düşünüyorum"*** şeklinde belirlenmiştir (4.07, 4.05 ve 4.02). Dolayısıyla tüketiciler coğrafi işaret ile tescili kalite, lezzet ve sağlık göstergesi olarak görmektedir. Tüketicilerin***"Coğrafi işaretli tarımsal ürünlerin ne olduğunu bilmediğimi düşünüyorum"*** ifadesinde ise kararsız oldukları anlaşılmaktadır (3,03).

Tablo 15. Tüketicilerin Coğrafi İşaretli Tarımsal Ürünlere Yönelik Algıları

Yargılar	f %	1	2	3	4	5	Toplam
Coğrafi işaretli tarımsal ürünlerin ne olduğunu bilmediğimi düşünüyorum	f %	146 23,2	106 16,8	138 21,9	65 10,3	175 27,8	630 100,0
Coğrafi işaretli tarımsal ürünlerin varlığından haberdar olmadığımı düşünüyorum	f %	130 20,6	101 16,0	136 21,6	78 12,4	185 29,4	630 100,0
Coğrafi İşaretli tarımsal ürünler daha kalitelidir	f %	35 5,6	23 3,7	117 18,6	145 23,0	310 49,2	630 100,0
Coğrafi işaretli tarımsal ürünler daha lezzetlidir	f %	36 5,7	35 5,6	100 15,9	147 23,3	312 49,5	630 100,0
Coğrafi işaretli tarımsal ürünlerin üretiminde hile yoktur	f %	92 14,6	39 6,2	194 30,8	105 16,7	200 31,7	630 100,0
Coğrafi işaretli tarımsal ürünlerin diğer ürünlerden farklı olduğunu düşünüyorum	f %	50 7,9	45 7,1	125 19,8	151 24,0	259 41,1	630 100,0
Coğrafi işaretli tarımsal ürünlerin gereğinden daha pahalı olduğunu düşünüyorum	f %	71 11,3	50 7,9	123 19,5	119 18,9	267 42,4	630 100,0
Coğrafi işaretli tarımsal ürünlerin sağlıklı olduğunu düşünüyorum	f %	28 4,4	46 7,3	113 17,9	144 22,9	299 47,5	630 100,0
Coğrafi işaretli tarımsal ürünlerin güvenilir olduğunu düşünüyorum	f %	33 5,2	48 7,6	113 17,9	161 25,6	275 43,7	630 100,0
Coğrafi işaretli tarımsal ürünler çevreye daha duyarlı üretilir	f %	47 7,5	50 7,9	158 25,1	123 19,5	252 40,0	630 100,0
Coğrafi işaret tarımsal ürünlerin organik olduğunu ifade ediyor	f %	71 11,3	46 7,3	115 18,3	108 17,1	290 46,0	630 100,0
1 Kesinlikle katılmıyorum						**5 Kesinlikle Katılıyorum**	

Yargılar	N	Ortalama	Standart Sapma
Coğrafi işaretli tarımsal ürünlerin ne olduğunu bilmediğimi düşünüyorum	630	3,03	1,521
Coğrafi işaretli tarımsal ürünlerin varlığından haberdar olmadığımı düşünüyorum	630	3,14	1,506
Coğrafi İşaretli tarımsal ürünler daha kalitelidir	630	4,07	1,150
Coğrafi işaretli tarımsal ürünler daha lezzetlidir	630	4,05	1,179
Coğrafi işaretli tarımsal ürünlerin üretiminde hile yoktur	630	3,45	1,373
Coğrafi işaretli tarımsal ürünlerin diğer ürünlerden farklı olduğunu düşünüyorum	630	3,83	1,258
Coğrafi işaretli tarımsal ürünlerin gereğinden daha pahalı olduğunu düşünüyorum	630	3,73	1,372
Coğrafi işaretli tarımsal ürünlerin sağlıklı olduğunu düşünüyorum	630	4,02	1,161
Coğrafi işaretli tarımsal ürünlerin güvenilir olduğunu düşünüyorum	630	3,95	1,180
Coğrafi işaretli tarımsal ürünler çevreye daha duyarlı üretilir	630	3,77	1,260
Coğrafi işaret tarımsal ürünlerin organik olduğunu ifade ediyor	630	3,79	1,382

3.1.5. Tüketicilerin Sosyo-Demografik Özellikleri İle Coğrafi İşaretli Tarımsal Ürünlere Yönelik Algıları Arasındaki İlişkilerin Analizi

Tüketicilerin sosyo-demografik özellikleri ile coğrafi işaret ile tescil edilmiş ürünlere yönelik algıları arasındaki ilişki Ki-kare testi ile incelenmiştir.

3.1.5.1. Tüketicilerin Sosyo-Demografik Özelliklerinden Cinsiyet İle Coğrafi İşaretli Tarımsal Ürünlere Yönelik Algıları Arasındaki İlişkiler

Çalışmada tüketicilerin sosyo-demografik özelliklerinden cinsiyet ile coğrafi işaretli tarımsal ürünlere yönelik algıları arasındaki ilişkiler Ki-Kare İlgi Analizi ile test edilmiştir. Bu amaçla kurulan hipotezler aşağıda tanımlanmıştır:

H_1: Tüketicilerin cinsiyet ile coğrafi işaretli tarımsal ürünlere yönelik algıları arasında anlamlı bir ilişki vardır.

H_{1a}: Tüketicilerin cinsiyet ile coğrafi işaretli tarımsal ürünlerin ne olduğunu bilmediğimi düşünüyorum algısı arasında anlamlı bir ilişki vardır.

H_{1b}: Tüketicilerin cinsiyet ile coğrafi işaretli tarımsal ürünlerin varlığından haberdar olmadığımı düşünüyorum algısı arasında anlamlı bir ilişki vardır.
H_{1c}: Tüketicilerin cinsiyet ile coğrafi işaretli tarımsal ürünler daha kalitelidir algısı arasında anlamlı bir ilişki vardır.
H_{1d}: Tüketicilerin cinsiyet ile coğrafi işaretli tarımsal ürünler daha lezzetlidir algısı arasında anlamlı bir ilişki vardır.
H_{1f}: Tüketicilerin cinsiyet ile coğrafi işaretli tarımsal ürünlerin üretiminde hile yoktur algısı arasında anlamlı bir ilişki vardır.
H_{1g}: Tüketicilerin cinsiyet ile coğrafi işaretli tarımsal ürünlerin diğer ürünlerden farklı olduğunu düşünüyorum algısı arasında anlamlı bir ilişki vardır.
H_{1h}: Tüketicilerin cinsiyet ile coğrafi işaretli tarımsal ürünlerin gereğinden daha pahalı olduğunu düşünüyorum algısı arasında anlamlı bir ilişki vardır.
$H_{1ı}$: Tüketicilerin cinsiyet ile coğrafi işaretli tarımsal ürünlerin sağlıklı olduğunu düşünüyorum algısı arasında anlamlı bir ilişki vardır.
H_{1i}: Tüketicilerin cinsiyet ile coğrafi işaretli tarımsal ürünlerin güvenilir olduğunu düşünüyorum algısı arasında anlamlı bir ilişki vardır.
H_{1j}: Tüketicilerin cinsiyet ile coğrafi işaretli tarımsal ürünler çevreye daha duyarlı üretilir algısı arasında anlamlı bir ilişki vardır.
H_{1k}: Tüketicilerin cinsiyet ile coğrafi işaret tarımsal ürünlerin organik olduğunu ifade ediyor algısı arasında anlamlı bir ilişki vardır.

Çalışmada elde edilen Ki-Kare testi sonuçlarına göre %5 (p=0.05) anlamlılık düzeyinde kurulan hipotezler desteklenmemiştir. Yani tüketicilerin cinsiyeti ile coğrafi işaretli tarımsal ürünlere yönelik algıları arasında anlamlı bir ilişki bulunmamıştır.

3.1.5.2. Tüketicilerin Sosyo-Demografik Özelliklerinden Medeni Durum İle Coğrafi İşaretli Tarımsal Ürünlere Yönelik Algıları Arasındaki İlişkiler

Çalışmada tüketicilerin sosyo-demografik özelliklerinden medeni durum ile coğrafi işaretli tarımsal ürünlere yönelik algıları arasındaki ilişkiler Ki-Kare İlgi Analizi ile test edilmiştir. Bu amaçla kurulan hipotezler aşağıda tanımlanmıştır:
H_2: Tüketicilerin cinsiyet ile coğrafi işaretli tarımsal ürünlere yönelik algıları arasında anlamlı bir ilişki vardır.
H_{2a}: Tüketicilerin cinsiyet ile coğrafi işaretli tarımsal ürünlerin ne olduğunu bilmediğimi düşünüyorum algısı arasında anlamlı bir ilişki vardır.
H_{2b}: Tüketicilerin cinsiyet ile coğrafi işaretli tarımsal ürünlerin varlığından haberdar olmadığımı düşünüyorum algısı arasında anlamlı bir ilişki vardır.
H_{2c}: Tüketicilerin cinsiyet ile coğrafi işaretli tarımsal ürünler daha kalitelidir algısı arasında anlamlı bir ilişki vardır.
H_{2d}: Tüketicilerin cinsiyet ile coğrafi işaretli tarımsal ürünler daha lezzetlidir algısı arasında anlamlı bir ilişki vardır.
H_{2f}: Tüketicilerin cinsiyet ile coğrafi işaretli tarımsal ürünlerin üretiminde hile yoktur algısı arasında anlamlı bir ilişki vardır.
H_{2g}: Tüketicilerin cinsiyet ile coğrafi işaretli tarımsal ürünlerin diğer ürünlerden farklı olduğunu düşünüyorum algısı arasında anlamlı bir ilişki vardır.
H_{2h}: Tüketicilerin cinsiyet ile coğrafi işaretli tarımsal ürünlerin gereğinden daha pahalı olduğunu düşünüyorum algısı arasında anlamlı bir ilişki vardır.
$H_{2ı}$: Tüketicilerin cinsiyet ile coğrafi işaretli tarımsal ürünlerin sağlıklı olduğunu düşünüyorum algısı arasında anlamlı bir ilişki vardır.
H_{2i}: Tüketicilerin cinsiyet ile coğrafi işaretli tarımsal ürünlerin güvenilir olduğunu düşünüyorum algısı arasında anlamlı bir ilişki vardır.
H_{2j}: Tüketicilerin cinsiyet ile coğrafi işaretli tarımsal ürünler çevreye daha duyarlı üretilir algısı arasında anlamlı bir ilişki vardır.
H_{2k}: Tüketicilerin cinsiyet ile coğrafi işaret tarımsal ürünlerin organik olduğunu ifade ediyor algısı arasında anlamlı bir ilişki vardır.

Çalışmada elde edilen Ki-Kare testi sonuçlarına göre %5 (p=0.05) anlamlılık düzeyinde kurulan hipotezler desteklenmemiştir. Yani tüketicilerin medeni durum ile coğrafi işaretli tarımsal ürünlere yönelik algıları arasında anlamlı bir ilişki bulunmamıştır.

3.1.5.3. Tüketicilerin Sosyo-Demografik Özelliklerinden Yaş İle Coğrafi İşaretli Tarımsal Ürünlere Yönelik Algıları Arasındaki İlişkiler

Çalışmada tüketicilerin sosyo-demografik özelliklerinden yaş ile coğrafi işaretli tarımsal ürünlere yönelik algıları arasındaki ilişkiler Ki-Kare İlgi Analizi ile test edilmiştir. Bu amaçla kurulan hipotezler aşağıda tanımlanmıştır:

H_3: Tüketicilerin yaşları ile coğrafi işaretli tarımsal ürünlere yönelik algıları arasında anlamlı bir ilişki vardır.

H_{3a}: Tüketicilerin yaşları ile coğrafi işaretli tarımsal ürünlerin ne olduğunu bilmediğimi düşünüyorum algısı arasında anlamlı bir ilişki vardır.

H_{3b}: Tüketicilerin yaşları ile coğrafi işaretli tarımsal ürünlerin varlığından haberdar olmadığımı düşünüyorum algısı arasında anlamlı bir ilişki vardır.

H_{3c}: Tüketicilerin yaşları ile coğrafi işaretli tarımsal ürünler daha kalitelidir algısı arasında anlamlı bir ilişki vardır.

H_{3d}: Tüketicilerin yaşları ile coğrafi işaretli tarımsal ürünler daha lezzetlidir algısı arasında anlamlı bir ilişki vardır.

H_{3f}: Tüketicilerin yaşları ile coğrafi işaretli tarımsal ürünlerin üretiminde hile yoktur algısı arasında anlamlı bir ilişki vardır.

H_{3g}: Tüketicilerin yaşları ile coğrafi işaretli tarımsal ürünlerin diğer ürünlerden farklı olduğunu düşünüyorum algısı arasında anlamlı bir ilişki vardır.

H_{3h}: Tüketicilerin yaşları ile coğrafi işaretli tarımsal ürünlerin gereğinden daha pahalı olduğunu düşünüyorum algısı arasında anlamlı bir ilişki vardır.

$H_{3ı}$: Tüketicilerin yaşları ile coğrafi işaretli tarımsal ürünlerin sağlıklı olduğunu düşünüyorum algısı arasında anlamlı bir ilişki vardır.

H_{3i}: Tüketicilerin yaşları ile coğrafi işaretli tarımsal ürünlerin güvenilir olduğunu düşünüyorum algısı arasında anlamlı bir ilişki vardır.

H_{3j}: Tüketicilerin yaşları ile coğrafi işaretli tarımsal ürünler çevreye daha duyarlı üretilir algısı arasında anlamlı bir ilişki vardır.

H_{3k}: Tüketicilerin yaşları ile coğrafi işaret tarımsal ürünlerin organik olduğunu ifade ediyor algısı arasında anlamlı bir ilişki vardır.

Çalışmada elde edilen Ki-Kare testi sonuçlarına göre %5 (p=0.05) anlamlılık düzeyinde kurulan hipotezlerdenH_{3a} hipotezi desteklenirken diğer hipotezler desteklenmemiştir. Yani tüketicilerin yaşları ile coğrafi işaretli tarımsal ürünlerin ne olduğunu bilmedikleri düşüncesi arasında anlamlı bir bulunmuştur.

Tablo 16. Tüketicilerin Yaşları ile "Coğrafi işaretli tarımsal ürünlerin ne olduğunu bilmediğimi düşünüyorum" Algısı Arasındaki İlişki

H_{3a}		**Coğrafi işaretli tarımsal ürünlerin ne olduğunu bilmediğimi düşünüyorum**						**Ki-Kare Testi**	
		1	**2**	**3**	**4**	**5**	**Toplam**		
17-22 yaş	n	39	24	49	20	67	199	X^2=34602	
	%	19,6%	12,1%	24,6%	10,1%	33,7%	100 %	df=20	K
23-28 yaş	n	35	30	26	14	38	143	P=0.022	A
	%	24,5%	21%	18,2	9,8%	26,6	100		B
29-34 yaş	n	17	20	22	5	22	86		U
	%	19,8%	23,3%	25,6%	5,8%	25,6%	100%		L
35-40 yaş	n	31	13	18	13	21	96		
	%	32,3%	13,5%	18,8%	13,5%	21,9%	100%		
41-46 yaş	n	6	14	7	5	10	42		
	%	14,3%	33,3%	16,7%	11,9%	23,8%	100,0%		
47 yaş ve üzeri	n	18	5	16	8	17	64		
	%	28,1%	7,8%	25,0%	12,5%	26,6%	100,0%		
Toplam	n	146	106	138	65	175	630		
	%	23,2%	16,8%	21,9%	10,3%	27,8%	100,0%		

3.1.5.4. Tüketicilerin Sosyo-Demografik Özelliklerinden Gelir Durumu İle Coğrafi İşaretli Tarımsal Ürünlere Yönelik Algıları Arasındaki İlişkiler

Çalışmada tüketicilerin sosyo-demografik özelliklerinden gelir durumu ile coğrafi işaretli tarımsal ürünlere yönelik algıları arasındaki ilişkiler Ki-Kare İlgi Analizi ile test edilmiştir. Bu amaçla kurulan hipotezler aşağıda tanımlanmıştır:

H_4: Tüketicilerin gelir durumu ile coğrafi işaretli tarımsal ürünlere yönelik algıları arasında anlamlı bir ilişki vardır.

H_{4a}: Tüketicilerin gelir durumu ile coğrafi işaretli tarımsal ürünlerin ne olduğunu bilmediğimi düşünüyorum algısı arasında anlamlı bir ilişki vardır.

H_{4b}: Tüketicilerin gelir durumu ile coğrafi işaretli tarımsal ürünlerin varlığından haberdar olmadığımı düşünüyorum algısı arasında anlamlı bir ilişki vardır.

H_{4c}: Tüketicilerin gelir durumu ile coğrafi işaretli tarımsal ürünler daha kalitelidir algısı arasında anlamlı bir ilişki vardır.

H_{4d}: Tüketicilerin gelir durumu ile coğrafi işaretli tarımsal ürünler daha lezzetlidir algısı arasında anlamlı bir ilişki vardır.

H_{4f}: Tüketicilerin gelir durumu ile coğrafi işaretli tarımsal ürünlerin üretiminde hile yoktur algısı arasında anlamlı bir ilişki vardır.

H_{4g}: Tüketicilerin gelir durumu ile coğrafi işaretli tarımsal ürünlerin diğer ürünlerden farklı olduğunu düşünüyorum algısı arasında anlamlı bir ilişki vardır.

H_{4h}: Tüketicilerin gelir durumu ile coğrafi işaretli tarımsal ürünlerin gereğinden daha pahalı olduğunu düşünüyorum algısı arasında anlamlı bir ilişki vardır.

$H_{4ı}$: Tüketicilerin gelir durumu ile coğrafi işaretli tarımsal ürünlerin sağlıklı olduğunu düşünüyorum algısı arasında anlamlı bir ilişki vardır.

H_{4i}: Tüketicilerin gelir durumu ile coğrafi işaretli tarımsal ürünlerin güvenilir olduğunu düşünüyorum algısı arasında anlamlı bir ilişki vardır.

H_{4j}: Tüketicilerin gelir durumu ile coğrafi işaretli tarımsal ürünler çevreye daha duyarlı üretilir algısı arasında anlamlı bir ilişki vardır.

H_{4k}: Tüketicilerin gelir durumu ile coğrafi işaret tarımsal ürünlerin organik olduğunu ifade ediyor algısı arasında anlamlı bir ilişki vardır.

Çalışmada elde edilen Ki-Kare testi sonuçlarına göre %5 (p=0.05) anlamlılık düzeyinde kurulan hipotezlerden$H_{4d,}$ $H_{4f,}$ $H_{4h,}$ $H_{4i,}$ H_{4j} ve H_{4k} hipotezi desteklenirken diğer hipotezler desteklenmemiştir. Yani tüketicilerin gelir durumu ile "Coğrafi işaretli tarımsal ürünler daha lezzetlidir", Coğrafi işaretli tarımsal ürünlerin üretiminde hile yoktur", "Coğrafi işaretli tarımsal ürünlerin gereğinden daha pahalı olduğunu düşünüyorum", "Coğrafi işaretli tarımsal ürünlerin güvenilir olduğunu düşünüyorum", "Coğrafi işaretli tarımsal ürünler çevreye daha duyarlı üretilir" ve "Coğrafi işaret tarımsal ürünün organik olduğunu ifade eder." algıları arasında anlamlı bir ilişkibulunmuştur.

Tablo 17. Tüketicilerin Gelir Durumu ile "Coğrafi işaretli tarımsal ürünler daha lezzetlidir" Algısı Arasındaki İlişki

H_{4d}		**Coğrafi işaretli tarımsal ürünler daha lezzetlidir**						**Ki-Kare Testi**	
		1	**2**	**3**	**4**	**5**	**Toplam**		
1404 TL ve altı	n	5	8	9	28	48	98	X^2=30.273	
	%	5,1%	8,2%	9,2%	28,6%	49,0%	100,0%	df=16	K
1405-2790 TL	n	14	13	47	68	152	294	P=0.017	A
	%	4,8%	4,4%	16,0%	23,1%	51,7%	100,0%		B
2791-3340 TL	n	3	8	21	28	55	115		U
	%	2,6%	7,0%	18,3%	24,3%	47,8%	100,0%		L
3341-5094 TL	n	5	5	13	15	40	78		
	%	6,4%	6,4%	16,7%	19,2%	51,3%	100,0%		
5095 TL ve üzeri	n	9	1	10	8	17	45		
	%	20,0%	2,2%	22,2%	17,8%	37,8%	100,0%		
Toplam	n	36	35	100	147	312	630		
	%	5,7%	5,6%	15,9%	23,3%	49,5%	100,0%		

Tablo 18. Tüketicilerin Gelir Düzeyleri ile "Coğrafi işaretli tarımsal ürünlerin üretiminde hile yoktur" Algısı Arasındaki İlişki

H_{4f}		Coğrafi işaretli tarımsal ürünlerin üretiminde hile yoktur						Ki-Kare Testi	
		1	**2**	**3**	**4**	**5**	**Toplam**		
1404 TL ve altı	n	15	5	19	21	38	98	X^2=26.452	K
	%	15,3%	5,1%	19,4%	21,4%	38,8%	100,0%	df=16	A
1405-2790 TL	n	37	15	97	51	94	294	P=0.048	B
	%	12,6%	5,1%	33,0%	17,3%	32,0%	100,0%		U
2791-3340 TL	n	11	9	41	17	37	115		L
	%	9,6%	7,8%	35,7%	14,8%	32,2%	100,0%		
3341-5094 TL	n	15	7	25	10	21	78		
	%	19,2%	9,0%	32,1%	12,8%	26,9%	100,0%		
5095 TL ve üzeri	n	14	3	12	6	10	45		
	%	31,1%	6,7%	26,7%	13,3%	22,2%	100,0%		
Toplam	n	92	39	194	105	200	630		
	%	14,6%	6,2%	30,8%	16,7%	31,7%	100,0%		

Tablo 19. Tüketicilerin Gelir Düzeyleri ile "Coğrafi işaretli tarımsal ürünlerin gereğinden daha pahalı olduğunu düşünüyorum"Algısı Arasındaki İlişki

H_{4h}		Coğrafi işaretli tarımsal ürünlerin gereğinden daha pahalı olduğunu düşünüyorum						Ki-Kare Testi	
		1	**2**	**3**	**4**	**5**	**Toplam**		
1404 TL ve altı	n	14	5	16	27	36	98	X^2=28.547	K
	%	14,3%	5,1%	16,3%	27,6%	36,7%	100,0%	df=16	A
1405-2790 TL	n	25	22	55	54	138	294	P=0.027	B
	%	8,5%	7,5%	18,7%	18,4%	46,9%	100,0%		U
2791-3340 TL	n	14	8	28	24	41	115		L
	%	12,2%	7,0%	24,3%	20,9%	35,7%	100,0%		
3341-5094 TL	n	9	7	14	10	38	78		
	%	11,5%	9,0%	17,9%	12,8%	48,7%	100,0%		
5095 TL ve üzeri	n	9	8	10	4	14	45		
	%	20,0%	17,8%	22,2%	8,9%	31,1%	100,0%		
Toplam	n	71	50	123	119	267	630		
	%	11,3%	7,9%	19,5%	18,9%	42,4%	100,0%		

Tablo 20. Tüketicilerin Gelir Düzeyleri ile "Coğrafi işaretli tarımsal ürünlerin güvenilir olduğunu düşünüyorum"Algısı Arasındaki İlişki

H_{4i}		Coğrafi işaretli tarımsal ürünlerin güvenilir olduğunu düşünüyorum						Ki-Kare Testi	
		1	**2**	**3**	**4**	**5**	**Toplam**		
1404 TL ve altı	n	5	9	14	21	49	98	X^2=54.609	K
	%	5,1%	9,2%	14,3%	21,4%	50,0%	100,0%	df=16	A
1405-2790 TL	n	11	16	47	83	137	294	P=0.000	B
	%	3,7%	5,4%	16,0%	28,2%	46,6%	100,0%		U
2791-3340 TL	n	3	3	27	39	43	115		L
	%	2,6%	2,6%	23,5%	33,9%	37,4%	100,0%		
3341-5094 TL	n	7	14	12	12	33	78		
	%	9,0%	17,9%	15,4%	15,4%	42,3%	100,0%		
5095 TL ve üzeri	n	7	6	13	6	13	45		
	%	15,6%	13,3%	28,9%	13,3%	28,9%	100,0%		
Toplam	n	33	48	113	161	275	630		
	%	5,2%	7,6%	17,9%	25,6%	43,7%	100,0%		

Tablo 21. Tüketicilerin Gelir Düzeyleri ile "Coğrafi işaretli tarımsal ürünler çevreye daha duyarlı üretilir"Algısı Arasındaki İlişki

H_{4j}		Coğrafi işaretli tarımsal ürünler çevreye daha duyarlı üretilir						Ki-Kare Testi	
		1	2	3	4	5	Toplam		
1404 TL ve altı	n	5	10	17	22	44	98	X^2=41.550	
	%	5,1%	10,2%	17,3%	22,4%	44,9%	100,0%	df=16	K
1405-2790 TL	n	19	16	74	60	125	294	P=0.000	A
	%	6,5%	5,4%	25,2%	20,4%	42,5%	100,0%		B
2791-3340 TL	n	9	7	28	29	42	115		U
	%	7,8%	6,1%	24,3%	25,2%	36,5%	100,0%		L
3341-5094 TL	n	4	10	28	8	28	78		
	%	5,1%	12,8%	35,9%	10,3%	35,9%	100,0%		
5095 TL ve üzeri	n	10	7	11	4	13	45		
	%	22,2%	15,6%	24,4%	8,9%	28,9%	100,0%		
Toplam	n	47	50	158,	123	252	630		
	%	7,5%	7,9%	25,1%	19,5%	40,0%	100,0%		

Tablo 22. Tüketicilerin Gelir Düzeyleri ile "Coğrafi işaret tarımsal ürünün organik olduğunu ifade eder"Algısı Arasındaki İlişki

H_{4k}		Coğrafi işaretli tarımsal ürünün organik olduğunu ifade eder						Ki-Kare Testi	
		1	2	3	4	5	Toplam		
1404 TL ve altı	n	14	5	18,	18	43	98	X^2=32.688	
	%	14,3%	5,1%	18,4%	18,4%	43,9%	100,0%	df=16	K
1405-2790 TL	n	29	16	42	55	152	294	P=0.008	A
	%	9,9%	5,4%	14,3%	18,7%	51,7%	100,0%		B
2791-3340 TL	n	11	13	19	19	53	115		U
	%	9,6%	11,3%	16,5%	16,5%	46,1%	100,0%		L
3341-5094 TL	n	8	8	20	10	32	78		
	%	10,3%	10,3%	25,6%	12,8%	41,0%	100,0%		
5095 TL ve üzeri	n	9	4	16	6	10	45		
	%	20,0%	8,9%	35,6%	13,3%	22,2%	100,0%		
Toplam	n	71	46	115	108	290	630		
	%	11,3%	7,3%	18,3%	17,1%	46,0%	100,0%		

3.1.5.5. Tüketicilerin Sosyo-Demografik Özelliklerinden Meslekleri ile Coğrafi İşaretli Tarımsal Ürünlere Yönelik Algıları Arasındaki İlişkiler

Çalışmada tüketicilerin sosyo-demografik özelliklerinden meslekleriile coğrafi işaretli tarımsal ürünlere yönelik algıları arasındaki ilişkiler Ki-Kare İlgi Analizi ile test edilmiştir. Bu amaçla kurulan hipotezler aşağıda tanımlanmıştır:

H_5: Tüketicilerin meslekleriile coğrafi işaretli tarımsal ürünlere yönelik algıları arasında anlamlı bir ilişki vardır.

H_{5a}: Tüketicilerin meslekleri ile coğrafi işaretli tarımsal ürünlerin ne olduğunu bilmediğimi düşünüyorum algısı arasında anlamlı bir ilişki vardır.

H_{5b}: Tüketicilerin meslekleri ile coğrafi işaretli tarımsal ürünlerin varlığından haberdar olmadığımı düşünüyorum algısı arasında anlamlı bir ilişki vardır.

H_{5c}: Tüketicilerin meslekleri ile coğrafi işaretli tarımsal ürünler daha kalitelidir algısı arasında anlamlı bir ilişki vardır.

H_{5d}: Tüketicilerin meslekleri ile coğrafi işaretli tarımsal ürünler daha lezzetlidir algısı arasında anlamlı bir ilişki vardır.

H_{5f}: Tüketicilerin meslekleri ile coğrafi işaretli tarımsal ürünlerin üretiminde hile yoktur algısı arasında anlamlı bir ilişki vardır.

H_{5g}: Tüketicilerin meslekleri ile coğrafi işaretli tarımsal ürünlerin diğer ürünlerden farklı olduğunu düşünüyorum algısı arasında anlamlı bir ilişki vardır.

H_{5h}: Tüketicilerin meslekleri ile coğrafi işaretli tarımsal ürünlerin gereğinden daha pahalı olduğunu düşünüyorum algısı arasında anlamlı bir ilişki vardır.
$H_{5ı}$: Tüketicilerin meslekleri ile coğrafi işaretli tarımsal ürünlerin sağlıklı olduğunu düşünüyorum algısı arasında anlamlı bir ilişki vardır.
H_{5i}: Tüketicilerin meslekleri ile coğrafi işaretli tarımsal ürünlerin güvenilir olduğunu düşünüyorum algısı arasında anlamlı bir ilişki vardır.
H_{5j}: Tüketicilerin meslekleri ile coğrafi işaretli tarımsal ürünler çevreye daha duyarlı üretilir algısı arasında anlamlı bir ilişki vardır.
H_{5k}: Tüketicilerin meslekleri ile coğrafi işaret tarımsal ürünlerin organik olduğunu ifade ediyor algısı arasında anlamlı bir ilişki vardır.
Çalışmada elde edilen Ki-Kare testi sonuçlarına göre %5 (p=0.05) anlamlılık düzeyinde kurulan hipotezler desteklenmemiştir. Yani tüketicilerin meslekleri ile coğrafi işaretli tarımsal ürünlere yönelik algıları arasında anlamlı bir ilişki bulunmamıştır.

3.1.5.6. Tüketicilerin Sosyo-Demografik Özelliklerinden Eğitim Durumları ile Coğrafi İşaretli Tarımsal Ürünlere Yönelik Algıları Arasındaki İlişkiler

Çalışmada tüketicilerin sosyo-demografik özelliklerinden eğitim durumları ile coğrafi işaretli tarımsal ürünlere yönelik algıları arasındaki ilişkiler Ki-Kare İlgi Analizi ile test edilmiştir. Bu amaçla kurulan hipotezler aşağıda tanımlanmıştır:
H_6: Tüketicilerin eğitim durumları ile coğrafi işaretli tarımsal ürünlere yönelik algıları arasında anlamlı bir ilişki vardır.
H_{6a}: Tüketicilerin eğitim durumları ile coğrafi işaretli tarımsal ürünlerin ne olduğunu bilmediğimi düşünüyorum algısı arasında anlamlı bir ilişki vardır.
H_{6b}: Tüketicilerin eğitim durumları ile coğrafi işaretli tarımsal ürünlerin varlığından haberdar olmadığımı düşünüyorum algısı arasında anlamlı bir ilişki vardır.
H_{6c}: Tüketicilerin eğitim durumları ile coğrafi işaretli tarımsal ürünler daha kalitelidir algısı arasında anlamlı bir ilişki vardır.
H_{6d}: Tüketicilerin eğitim durumları ile coğrafi işaretli tarımsal ürünler daha lezzetlidir algısı arasında anlamlı bir ilişki vardır.
H_{6f}: Tüketicilerin eğitim durumları ile coğrafi işaretli tarımsal ürünlerin üretiminde hile yoktur algısı arasında anlamlı bir ilişki vardır.
H_{6g}: Tüketicilerin eğitim durumları ile coğrafi işaretli tarımsal ürünlerin diğer ürünlerden farklı olduğunu düşünüyorum algısı arasında anlamlı bir ilişki vardır.
H_{6h}: Tüketicilerin eğitim durumları ile coğrafi işaretli tarımsal ürünlerin gereğinden daha pahalı olduğunu düşünüyorum algısı arasında anlamlı bir ilişki vardır.
$H_{6ı}$: Tüketicilerin eğitim durumları ile coğrafi işaretli tarımsal ürünlerin sağlıklı olduğunu düşünüyorum algısı arasında anlamlı bir ilişki vardır.
H_{6i}: Tüketicilerin eğitim durumları ile coğrafi işaretli tarımsal ürünlerin güvenilir olduğunu düşünüyorum algısı arasında anlamlı bir ilişki vardır.
H_{6j}: Tüketicilerin eğitim durumları ile coğrafi işaretli tarımsal ürünler çevreye daha duyarlı üretilir algısı arasında anlamlı bir ilişki vardır.
H_{6k}: Tüketicilerin eğitim durumları ile coğrafi işaret tarımsal ürünlerin organik olduğunu ifade ediyor algısı arasında anlamlı bir ilişki vardır.
Çalışmada elde edilen Ki-Kare testi sonuçlarına göre %5 (p=0.05) anlamlılık düzeyinde kurulan hipotezlerdenH_{6b} hipotezi desteklenirken diğer hipotezler desteklenmemiştir. Yani tüketicilerin eğitim durumları ile "Coğrafi işaretli tarımsal ürünlerin varlığından haberdar olmadığımı düşünüyorum"algısı arasında anlamlı bir ilişki bulunmuştur.

Tablo 23. Tüketicilerin Eğitim Durumları ile "Coğrafi işaretli tarımsal ürünlerin varlığından haberdar olmadığımı düşünüyorum" Algısı Arasındaki İlişki

H_{6b}		Coğrafi işaretli tarımsal ürünlerin varlığından haberdar olmadığımı düşünüyorum						Ki-Kare Testi	
		1	2	2	4	5	Toplam		
İlköğretim	n	7	7	8	5	15	42	X^2=42.938 df=20 P=0.002	KABUL
	%	16,7%	16,7%	19,0%	11,9%	35,7%	100,0%		
Orta öğretim	n	6	12	15	7	31	71		
	%	8,5%	16,9%	21,1%	9,9%	43,7%	100,0%		
Lise	n	39	35	46	26	69	215		
	%	18,1%	16,3%	21,4%	12,1%	32,1%	100,0%		
Önlisans	n	33	17	37	20	27	134		
	%	24,6%	12,7%	27,6%	14,9%	20,1%	100,0%		
Lisans	n	38	23	28	20	43	152		
	%	25,0%	15,1%	18,4%	13,2%	28,3%	100,0%		
Lisansüstü	n	7	7	2	0	0	16		
	%	43,8%	43,8%	12,5%	,0%	,0%	100,0%		
Toplam	n	130	101	136	78	185	630		
	%	20,6%	16,0%	21,6%	12,4%	29,4%	100,0%		

3.1.5.7. Tüketicilerin Sosyo-Demografik Özelliklerinden İkamet Ettikleri Semt ile Coğrafi İşaretli Tarımsal Ürünlere Yönelik Algıları Arasındaki İlişkiler

Çalışmada tüketicilerin sosyo-demografik özelliklerinden ikamet ettikleri semt ile coğrafi işaretli tarımsal ürünlere yönelik algıları arasındaki ilişkiler Ki-Kare İlgi Analizi ile test edilmiştir. Bu amaçla kurulan hipotezler aşağıda tanımlanmıştır:

H_7: Tüketicilerin ikamet ettikleri semt ile coğrafi işaretli tarımsal ürünlere yönelik algıları arasında anlamlı bir ilişki vardır.

H_{7a}: Tüketicilerin ikamet ettikleri semt ile coğrafi işaretli tarımsal ürünlerin ne olduğunu bilmediğimi düşünüyorum algısı arasında anlamlı bir ilişki vardır.

H_{7b}: Tüketicilerin ikamet ettikleri semt ile coğrafi işaretli tarımsal ürünlerin varlığından haberdar olmadığımı düşünüyorum algısı arasında anlamlı bir ilişki vardır.

H_{7c}: Tüketicilerin ikamet ettikleri semt ile coğrafi işaretli tarımsal ürünler daha kalitelidir algısı arasında anlamlı bir ilişki vardır.

H_{7d}: Tüketicilerin ikamet ettikleri semt ile coğrafi işaretli tarımsal ürünler daha lezzetlidir algısı arasında anlamlı bir ilişki vardır.

H_{7f}: Tüketicilerin ikamet ettikleri semt ile coğrafi işaretli tarımsal ürünlerin üretiminde hile yoktur algısı arasında anlamlı bir ilişki vardır.

H_{7g}: Tüketicilerin ikamet ettikleri semt ile coğrafi işaretli tarımsal ürünlerin diğer ürünlerden farklı olduğunu düşünüyorum algısı arasında anlamlı bir ilişki vardır.

H_{7h}: Tüketicilerin ikamet ettikleri semt ile coğrafi işaretli tarımsal ürünlerin gereğinden daha pahalı olduğunu düşünüyorum algısı arasında anlamlı bir ilişki vardır.

$H_{7ı}$: Tüketicilerin ikamet ettikleri semt ile coğrafi işaretli tarımsal ürünlerin sağlıklı olduğunu düşünüyorum algısı arasında anlamlı bir ilişki vardır.

H_{7i}: Tüketicilerin ikamet ettikleri semt ile coğrafi işaretli tarımsal ürünlerin güvenilir olduğunu düşünüyorum algısı arasında anlamlı bir ilişki vardır.

H_{7j}: Tüketicilerin ikamet ettikleri semt ile coğrafi işaretli tarımsal ürünler çevreye daha duyarlı üretilir algısı arasında anlamlı bir ilişki vardır.

H_{7k}: Tüketicilerin ikamet ettikleri semt ile coğrafi işaret tarımsal ürünlerin organik olduğunu ifade ediyor algısı arasında anlamlı bir ilişki vardır.

Çalışmada elde edilen Ki-Kare testi sonuçlarına göre %5 (p=0.05) anlamlılık düzeyinde kurulan hipotezlerdenH_{7c} veH_{7k} hipotezi desteklenirken diğer hipotezler desteklenmemiştir. Yani tüketicilerin ikamet ettikleri semt ile "Coğrafi işaretli tarımsal ürünler daha kalitelidir" ve "Coğrafi işaret tarımsal ürünlerin organik olduğunu ifade ediyor"algıları arasında anlamlı bir ilişki bulunmuştur.

Tablo 24. Tüketicilerin İkamet Ettikleri Semt ile "Coğrafi işaretli tarımsal ürünler daha kalitelidir" Algısı Arasındaki İlişki

H_{7c}		Coğrafi işaretli tarımsal ürünler daha kalitelidir						Ki-Kare Testi	
		1	2	3	4	5	Toplam		
Konyaaltı	n	14	3	47	33	94	191	X^2=15.705 df=8 P=0.047	KABUL
	%	7,3%	1,6%	24,6%	17,3%	49,2%	100,0%		
Muratpaşa	n	11	8	35	60	112	226		
	%	4,9%	3,5%	15,5%	26,5%	49,6%	100,0%		
Kepez	n	10	12	35	52	104	213		
	%	4,7%	5,6%	16,4%	24,4%	48,8%	100,0%		
Toplam	n	35	23	117	145	310	630		
	%	5,6%	3,7%	18,6%	23,0%	49,2%	100,0%		

Tablo 25. Tüketicilerin İkamet Ettikleri Semt ile "Coğrafi işaret ürünün organik olduğunu ifade eder" Algısı Arasındaki İlişki

H_{7k}		Coğrafi işaret ürünün organik olduğunu ifade eder						Ki-Kare Testi	
		1	2	3	4	5	Toplam		
Konyaaltı	n	14	16	32	29	100	191	X^2=16.090 df=8 P=0.041	KABUL
	%	7,3%	8,4%	16,8%	15,2%	52,4%	100,0%		
Muratpaşa	n	36	12	43	33	102	226		
	%	15,9%	5,3%	19,0%	14,6%	45,1%	100,0%		
Kepez	n	21	18	40	46	88	213		
	%	9,9%	8,5%	18,8%	21,6%	41,3%	100,0%		
Toplam	n	71	46	115	108	290	630		
	%	11,3%	7,3%	18,3%	17,1%	46,0%	100,0%		

3.1.5.8. Tüketicilerin Sosyo-Demografik Özelliklerinden Hangi Bölgeden Oldukları ile Coğrafi İşaretli Tarımsal Ürünlere Yönelik Algıları Arasındaki İlişkiler

Çalışmada tüketicilerin sosyo-demografik özelliklerinden hangi bölgeden oldukları ile coğrafi işaretli tarımsal ürünlere yönelik algıları arasındaki ilişkiler Ki-Kare İlgi Analizi ile test edilmiştir. Bu amaçla kurulan hipotezler aşağıda tanımlanmıştır:

H_8: Tüketicilerin hangi bölgeden oldukları ile coğrafi işaretli tarımsal ürünlere yönelik algıları arasında anlamlı bir ilişki vardır.

H_{8a}: Tüketicilerin hangi bölgeden oldukları ile coğrafi işaretli tarımsal ürünlerin ne olduğunu bilmediğimi düşünüyorum algısı arasında anlamlı bir ilişki vardır.

H_{8b}: Tüketicilerin hangi bölgeden oldukları ile coğrafi işaretli tarımsal ürünlerin varlığından haberdar olmadığımı düşünüyorum algısı arasında anlamlı bir ilişki vardır.

H_{8c}: Tüketicilerin hangi bölgeden oldukları ile coğrafi işaretli tarımsal ürünler daha kalitelidir algısı arasında anlamlı bir ilişki vardır.

H_{8d}: Tüketicilerin hangi bölgeden oldukları ile coğrafi işaretli tarımsal ürünler daha lezzetlidir algısı arasında anlamlı bir ilişki vardır.

H_{8f}: Tüketicilerin hangi bölgeden oldukları ile coğrafi işaretli tarımsal ürünlerin üretiminde hile yoktur algısı arasında anlamlı bir ilişki vardır.

H_{8g}: Tüketicilerin hangi bölgeden oldukları ile coğrafi işaretli tarımsal ürünlerin diğer ürünlerden farklı olduğunu düşünüyorum algısı arasında anlamlı bir ilişki vardır.

H_{8h}: Tüketicilerin hangi bölgeden oldukları ile coğrafi işaretli tarımsal ürünlerin gereğinden daha pahalı olduğunu düşünüyorum algısı arasında anlamlı bir ilişki vardır.

H_{8i}: Tüketicilerin hangi bölgeden oldukları ile coğrafi işaretli tarımsal ürünlerin sağlıklı olduğunu düşünüyorum algısı arasında anlamlı bir ilişki vardır.

H_{8i}: Tüketicilerin hangi bölgeden oldukları ile coğrafi işaretli tarımsal ürünlerin güvenilir olduğunu düşünüyorum algısı arasında anlamlı bir ilişki vardır.

H_{8j}: Tüketicilerin hangi bölgeden oldukları ile coğrafi işaretli tarımsal ürünler çevreye daha duyarlı üretilir algısı arasında anlamlı bir ilişki vardır.

H_{8k}: Tüketicilerin hangi bölgeden oldukları ile coğrafi işaret tarımsal ürünlerin organik olduğunu ifade ediyor algısı arasında anlamlı bir ilişki vardır.

Çalışmada elde edilen Ki-Kare testi sonuçlarına göre %5 (p=0.05) anlamlılık düzeyinde kurulan hipotezlerdenH_{8a} ve H_{8j} hipotezi desteklenirken diğer hipotezler desteklenmemiştir. Yani tüketicilerin hangi bölgeden oldukları ile "Coğrafi işaretli tarımsal ürünlerin ne olduğunu bilmediğimi düşünüyorum" ve"Coğrafi işaretli tarımsal ürünler çevreye daha duyarlı üretilir"algıları arasında anlamlı bir ilişki bulunmuştur.

Tablo 26. Tüketicilerin Bölgeleri ile "Coğrafi işaretli tarımsal ürünlerin ne olduğunu bilmediğimi düşünüyorum"Algısı Arasındaki İlişki

H_{8a}		**Coğrafi işaretli tarımsal ürünlerin ne olduğunu bilmediğimi düşünüyorum**						**Ki-Kare Testi**	
		1	**2**	**3**	**4**	**5**	**Toplam**		
Akdeniz Bölgesi	n	103	76	111	49	134	473		
	%	21,8%	16,1%	23,5%	10,4%	28,3%	100,0%		
Ege Bölgesi	n	17	6	6	4	10	43	X^2=51.443	K
	%	39,5%	14,0%	14,0%	9,3%	23,3%	100,0%	df=28	A
İç Anadolu Bölgesi	n	13	5	12	2	10	42	P=0.004	B
	%	31,0%	11,9%	28,6%	4,8%	23,8%	100,0%		U
Marmara Bölgesi	n	10	7	2	1	10	30		L
	%	33,3%	23,3%	6,7%	3,3%	33,3%	100,0%		
Karadeniz Bölgesi	n	1	4	3	3	5	16		
	%	6,2%	25,0%	18,8%	18,8%	31,2%	100,0%		
Doğu Anadolu Bölgesi	n	0	4	2	3	5	14		
	%	,0%	28,6%	14,3%	21,4%	35,7%	100,0%		
Güneydoğu Anadolu Bölgesi	n	2	4	2	3	1	12		
	%	16,7%	33,3%	16,7%	25,0%	8,3%	100,0%		
Toplam	n	146	106	138	65	175	630		
	%	23,2%	16,8%	21,9%	10,3%	27,8%	100,0%		

Tablo 27. Tüketicilerin Bölgeleri ile "Coğrafi işaretli tarımsal ürünler çevreye daha duyarlı üretilir" Algısı Arasındaki İlişki

H_{8j}		**Coğrafi işaretli tarımsal ürünler çevreye daha duyarlı üretilir**						**Ki-Kare Testi**	
		1	**2**	**3**	**4**	**5**	**Toplam**		
Akdeniz Bölgesi	n	36	33	114	94	195	473		
	%	7,6%	7,0%	24,1%	19,9%	41,4%	100,0%		
Ege Bölgesi	n	3	3	12	13	12İ	43		K
	%	7,0%	7,0%	27,9%	30,2%	27,9%	100,0%	X^2=46.465	A
İç Anadolu Bölgesi	n	2	6	13	7	14	42	df=28	B
	%	4,8%	14,3%	31,0%	16,7%	33,3%	100,0%	P=0.016	U
Marmara Bölgesi	n	2	1	7	4	16	30		L
	%	6,7%	3,3%	23,3%	13,3%	53,3%	100,0%		
Karadeniz Bölgesi	n	2	6	3	3	2	16		
	%	12,5%	37,5%	18,8%	18,8%	12,5%	100,0%		
Doğu Anadolu Bölgesi	n	2	1	5	0	6	14		
	%	14,3%	7,1%	35,7%	,0%	42,9%	100,0%		
Güneydoğu Anadolu Bölgesi	n	0	0	4	2	6	12		
	%	,0%	,0%	33,3%	16,7%	50,0%	100,0%		
Toplam	n	47	50	158	123	252	630		
	%	7,5%	7,9%	25,1%	19,5%	40,0%	100,0%		

4. Sonuç ve Öneriler

Antalya merkez ilçeden ikamet eden tüketicilerle yapılan bu araştırma sonucunda coğrafi işaretle tescil edilen tarımsal ürünler arasında en fazla duyulan ve kullanılan tarımsal ürünler sırasıyla %94,1 oranında **"Antep Fıstığı"**, %90,1 oranı ile **"Anamur Muzu"** ve %88,5 oranı ile **"Finike Portakalı"** olarak belirlenmiştir. Coğrafi işaretle tescil edilen tarımsal ürünlerden "Çelikhan Tütünü", (%68,6) "Ege Pamuğu" (%55,3) ve **"Safranbolu Safranı"** (%55,3) en fazla duyulan ancak kullanılmayan tarımsal ürünlerdir.

Araştırmaya katılan tüketicilerincoğrafi işaretle tescil edilmiş tarımsal ürünlere yönelik algıları"**kaliteli","lezzetli"**ve**"sağlıklı"** olduğu yönündedir.

Tüketicilerin sosyo-demografik özellikleri ile coğrafi işaretli tarımsal ürünlere yönelik algıları arasındaki ilişkilerin analizinde en fazla ilişkinin bulunduğu demografik özellik gelirdir. Buna göre tüketicilerin gelir durumu ile coğrafi işaretli tarımsal ürünlerin lezzeti,fiyatı, güvenilirliği, organik olması ve üretiminde çevreye duyarlı olup hilesiz üretildiği algıları arasında anlamlı ilişkiler bulunmuştur.

Coğrafi işaret tescili kırsal kalkınmayı ve sürdürülebilir kırsal kalkınmayı destekleyen bir araç olarak kullanılmalıdır.Bu tescil tarım-gıda ürünlerine artı bir değer katarak yenilikçilik ve girişimcilik alanlarında yeni fırsatlar yaratabilecek potansiyele sahip bir kalkan olarak düşünülmelidir. Coğrafi işaretle tescil edilmiş ürünler niş bir pazar alanı olarak değerlendirilerek bu tescile sahip ürünler önemli bir pazarlama aracı olarak kullanılmalıdır.Coğrafi işaret tescili paydaşlar arasında sosyal ağları ve işbirliğini teşvik ederek geleneksel, kültürel bilginin korunmasını ve sürdürülmesini sağlamada etkin bir yol olarak değerlendirilmelidir. Bu tescil sürdürülebilir istihdama katkı sağlayarak işsizlik sebebiyle yaşanan göçü azaltabilir niteliktedir. Coğrafi işaret tescili ile koruma altına alınmış ürünler gerektirdiği işgücü tipi sebebiyle kadın istihdamının arttırılması yolunda etkiliolabilecektir. Orta ve uzun vadede ise oluşturulan niş pazarların kırsal ekonomiye kazandırılmaları kırdankente gerçekleşen göçü azaltmak amacıyla kullanılabilecektir.

Türkiye'nin zengin potansiyeli dikkate alındığında coğrafi işaret tescili ile koruma altına alınan her bir ürünün, hem yöresel hem de geleneksel ürün yelpazesinde üretim, tüketim, kırsal kalkınma ve turizm ekseninde çalışılması önem arz etmektedir.Türkiye'nin pazarlanabilirliğinde coğrafi işaretle tescil edilmiş her bir tarımsal ürün için markalaşmaya yönelik çalışmalar arttırılmalıdır. Tüketicilerin coğrafi işaret tescili ile koruma altına alınmış tarımsal ürünlere yönelik tüketici algılarının geliştirilip, tutuma dönüştürülmesi için sivil toplum kuruluşları, yerel yönetimler ve üniversiteler farkındalık ve tutundurma faaliyetlerine yönelmelidir.

Coğrafi işaretli tarımsal üretim alanında faaliyette bulunan işletmecilerin tarımsal ürün ve üretim sürecine yönelik bilinç düzeylerinin arttırılması konusunda ilgili bakanlıklara bağlı kurumlar ve üniversitelerin ilgili bölümleri farkındalık ve eğitim çalışmaları planlamalıdır. Ayrıca politika yapıcılar bu tür ürünlerin üretim ve pazarlanmasında üreticiye yönelik tarımsal destek ve teşviklere yönelik uygulamalarını geliştirmelidir. KOSGEB tarımsal alanlarda üreticilere vermiş olduğu hibe destekleri arasına coğrafi işaretli tarımsal ürün başlığını da eklemedir. Bu tür desteklerle bu kategorideki ürünlerin üretimi artarak yaygınlaşması sağlanabilecektir.

Türkiye'nin farklı yöreleri ile anılan tarımsal ürünler olmasına rağmen bu ürünlere yönelik tescilin olmadığı görülmektedir. Bu ürünlerin tescil ile koruma altına alınması da ürüne yönelik olarak tüketici tercihlerinde fark yaratarak yöre, bölge ve ülke ekonomisine katkı sağlayacaktır.

Referanslar

Albayrak, K., 2014. Avrupa Birliği ve Türkiye'de Geleneksel Gıda Ürünlerinde Coğrafi İşaret, Ankara Üniversitesi Avrupa Toplulukları Araştırma ve Uygulama Merkezi (ATAUM), Dönem Ödevi, Ankara.

Albayrak, K., Albayrak, M., ve Taşdan, K., (2016). Coğrafi İşaret Olarak Antep Fıstığının Menşe Adının Korunması, XII. Ulusal Tarım Ekonomisi Kongresi, 25-27 Mayıs 2016, 1839-1848.

Altunışık, R., Çoskun, R., ve Yıldırım, E., (2005). Sosyal Bilimlerde Araştırma Yöntemleri (SPSS Uygulamalı), Sakarya Kitabevi, Sakarya.

Can, A., (2017). SPSS ile Bilimsel Araştırma Sürecinde Nicel Veri Analizi, 5.Baskı, Ankara, Türkiye: Pegem Akademi, ss.26-389.

Dimara, E. Petrou, A., and Skuras, D., 2004, Agricultural policy for quality and producers' evaluations of quality marketing indicators: a Greek case study, Food Policy, 29(5), 485-506. http://82.220.2.60/images/stories/publications/IP5/report_IP5_GI_Value_2009.pdf

Dimara, E., and Skuras, D. (2003). Consumer evaluations of product certification, geographic association and traceability in Greece. European Journal of Marketing, 37 (5/6), 690-705. Doi: 10.1108/03090560310465099

Esen, Ş., Bir Farklılaşma Stratejisi Olarak Coğrafi İşaretler ve Türkiye İncelemesi, Bartın Üniversitesi İ.İ.B.F. Dergisi, 7(14), 447-464.

Filippi, M. ve Triboulet, P. (2005). Traditional Products and Industrialization Processes: The Coherence of Geographical Indications, Workshop 1 Food System: Food Quality and Safety for Sustainable Rural Development, pp. 69-84.

Gürel, E., Gürler, A.Z., Nabalı, B., Ayyıldız, B., (2016). Coğrafi İşaretlerin Kırsal Kalkınma Açısından Değerlendirilmesi: Tokat İli Örneği, XII. Ulusal Tarım Ekonomisi Kongresi, 25-27 Mayıs 2016, 1049-1058.

Ilıcalı, G., 2005. Coğrafi İşaretler, Coğrafi İşaretlerde Denetim ve Denetimde İşaretlerin" Kullanımı: İzmit Pişmaniyesi Örneği, Anatolia: Turizm Araştırmaları Dergisi, Cilt 21, Sayı 2, Güz: 243-254.

Josling, T., 2005, What's in a name? The economics, law and politics of geographical indications for foods and beverages, paper presented to the Institute for International Integration Studies, Trinity College, Dublin, 28s.

Kan, M.,ve Gülçubuk, B., (2008). Kırsal Ekonominin Canlanmasında Ve Yerel Sahiplenmede Coğrafi İşaretler. Uludağ Üniversitesi Ziraat Fakültesi Dergisi, 22 (2), 57-66.

Kurtuluş, K. (2004). Pazarlama Araştırmaları, Literatür Yayıncılık, Yayın No:114, İstanbul.

Marangoz, M., ve Akyıldız, M., (2006). Doğal ve Kültürel Mirasın Korunması Açısından Coğrafi İşaretlerin Önemi Ve Buldan Bezi Örneği Buldan Sempozyumu, 29-31 Kasım 2006, 285-297.

Marescotti A. (2003). Typical products and rural development: Who benefits from PDO/PGI recognition?, 83rd EAAE Seminar Food Quality Products in the Advent of the 21st Century: Production, Demand and Public Policy, Chania (Crete), Sep-tember 4-7.

Menapace, L., and Moschini, G., (2012). Quality Certification by Geographical Indications, Trademarks and Firm Reputation. European Review of Agricultural Economics' 39 (4), 539-566. Doi:10.1093/erae/jbr053.

Orhan, A. (2010). "Yerel Değerlerin Turizm Ürününe Dönüştürülmesinde Coğrafi İşaretlerin Kullanımı: İzmit Pişmaniyesi Örneği", Anatolia: Turizm Araştırmaları Dergisi, 21(2), 243-254.

Pacciani A., Belletti G., Marescotti A., Scaramuzzi S. (2001), I prodotti tradizionali e tipici nell'agricoltura e nel sistema agro-industriale della Toscana. Opportunità di valorizzazione e problemi di mercato, Terzo Rapporto dell'Osservatorio AgroIndustriale per la Toscana, INEA, Firenze, Forthcoming.

Réviron S., Thévenod-Mottet E., El Benni N. (2009). Geographical Indications: creation and distribution of economic value in developing countries. NCCR Trade Regula-tion, Swiss National Centre of Competence in Research, Working Paper No. 2009/14, March. Available at

Rippon, M.J., (2014). What is the geography of geographical indications? Place, production methods and protected food names. Area, 46 (2), 154-162. Doi: 10.1111/area.12085

Şahin,G., 2013. Coğrafi İşaretlerin Önemi ve Vize (Kırklareli)'nin Coğrafi İşaretleri Pamukkale Üniversitesi Sosyal Bilimler Enstitüsü Dergisi Sayı 15, 2013, Sayfa 23-37

Şahin, A., Meral, Y. 2012. Türkiye'de Coğrafi İşaretleme Ve Yöresel Ürünler, Türk Bilimsel Derlemeler Dergisi 5(2), 88-92.

Tekelioğlu, Y., Demirer R., 2008. Küreselleşme Sürecinde Yöresel Ürünler ve Coğrafi İşaretlerin Geleceği. Küreselleşme, Demokratikleşme ve Türkiye Uluslararası Sempozyumu Bildiri Kitabı, Akdeniz Üniversitesi, Gazi Kitabevi, Ankara, 715-730s.

Toklu İ.T., Ustaahmetoğlu E., Öztürk Küçük, H. (2016). "Tüketicilerin Coğrafi İşaretli Ürün Algısı ve Daha Fazla Fiyat Ödeme İsteği: Yapısal Eşitlik Modellemesi Yaklaşımı", Yönetim ve Ekonomi, Manisa Celal Bayar Üniversitesi, İİBF Dergisi, 23 (1): 145-162.

TPE (2014). 1871'den günümüze sınai mülkiyet hakları: Coğrafi işaretler, Türk Patent Enstitüsü,

TPE, (2015). Ulusal Coğrafi İşaret Strateji Belgesi ve Eylem Planı 2015-2018. TPE Yayınları. Ankara

Tregear, A. (2001), "What is a 'typical local food'?", Working Paper No. 58 (Centre for Rural Economy, University of Newcastle, Newcastle upon Tyne, UK).

http://www.yucita.org/

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IMPACT OF MICRO-FINANCING ON HOUSEHOLD FOOD SECURITY OF FEMALE ENTREPRENEURS

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Abstract

Women are acknowledged as an imperative part of economies worldwide as they have proved their significant role repeatedly. The same is the case in Pakistan. This significant role is well supported by micro-financing is facilities. This study aimed to assess the role of micro-financing in improving household food security of female entrepreneurs. Multistage sampling technique was used to collect data from 200 female entrepreneurs (100 loanees and 100 non-loanees). Dietary intake assessment method was applied to measure household food security. Two variants of regression model were applied to assess the indirect impact of micro-finance on household food security of women entrepreneurs. It was found that 27.5% of the respondents were food insecure while the loanee entrepreneurs were slightly better off (26% food insecure) than non-loanees (28% food insecure). Furthermore, micro-financing had positive impact on women entrepreneurs' income which had a positive but meager impact household food security.
Keywords: Food security, micro-finance, women entrepreneurs.

CONSUMER FOOD WASTE IN LITHUANIA: CONCERNS AND CAUSES

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Abstract

This study aimed to identify and analyse concerns and behaviour towards consumer food waste in Lithuania, to examine the extent and uncover the main causes of consumer food waste in Lithuanian households. To reach this aim, in 2016, the web survey in a sample size of 559 respondents older than 18 years was conducted. The reason for choosing this sample was twofold, firstly, these respondents were responsible for decisions they made as regards food purchases, and, secondly, they maintained themselves. The analysis of collected data was performed using the methods of mathematical statistics. The results revealed that the majority of Lithuanians recognized the problem of food waste and its linkages to economic, environmental and social problems. The main reasons of consumer food waste accrued due to lack of planning and management of purchase, preparation of food and meals. Coupled with the relatively high food prices, consumers tended to buy too much food when it was discounted. Plate waste from partially eaten meals regarding larger portions was also recorded. The results of the analysis indicated that women, younger and less educated respondents were least likely to perceive the food waste issues. The food waste averaged just 5% in 39.2% of households. The largest share of food waste, i.e. more than half of purchased food was indicated by 2.3% of respondents. This behaviour of respondents might be resulted of the Lithuanian habits formed in planned economy and also in regards to low income of households as compared to other developed countries.

Keywords: Consumer food waste, households, Lithuania.

THE NATURE OF INNOVATIONS IN THE FOOD MARKETS IN THE LIGHT OF THE CURRENT CONSUMER TRENDS

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Abstract

The paper discusses the issue of innovations with regard to the food product markets in the context of currently observed consumer trends. At the beginning definitions of innovation starting from Schumpeter [1939], through Tirole [1988], and ending with the current approach presented by the OECD (Oslo Manual) are briefly examined with reference to the food sector in general. Next, the key consumer trends viewed as changes in style and taste, which have been going for a long time [Vejlgaard, 2008], reflecting the changing consumer preferences as aggregated dominant consumer wants and wishes, are highlighted. With reference to this background information, the main paper goal is to analyze recent product innovation trends shaping globalized food markets in the main world regions and several selected countries. The analysis is based on data regarding recent trends in food product innovations provided by XTC World Innovation Panorama (2015). The data describes segmentation of each food product launched in 2014 and 2013. Each new product is precisely depicted regarding innovative features and then positioned on the XTC trends tree. Applying index of percentage similarity this dataset was used firstly to compare intensity of occurrence of the 15 distinguished trends in such world regions as Asia, Europe, Latin America, Middle East & North Africa, and North America. Next, the dataset was transformed in order to show relative importance of the trends in the particular regions and 14 selected countries. Although intensity of occurrence of the food product innovation trends was quite similar, interesting differences were found in terms of relative importance of particular trends across the world regions and countries considered. This leads to general conclusion that the process of development and diffusion of food product innovations is globally driven, however, in spite of a strong impact of globalization forces there are world region and country specific factors influencing food producers responses in terms of product innovations.Still, features and attributes of the innovative food products offered are from the marketing standpoint in compliance with consumer expectations. Results of the carried out analysis allow not only to highlight regional and cross-country differences in occurrence and importance of the recently observed food product innovation trends, but also to contribute to better understanding of the nature of the contemporary monopolistic competition in global food markets, as being driven by consumer trends.
Keywords: Innovations, food products, consumer preferences.

ANALYSIS OF HOUSEHOLD FOOD DEMAND AND ITS IMPLICATIONS ON FOOD SECURITY IN KENYA: AN APPLICATION OF QUAIDS MODEL

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Abstract

This paper evaluates household food security situation in Kenya in terms of access to food, using cross sectional data from the Kenya Integrated Household Budget Surveys (KIHBS). By estimating price and income elasticities, which provides an indication of the sensitivity of households to market shocks and thus the degree of household's constraint to access food. The empirical approach involve estimation of demand system analysis the QUAIDS model. Existing research focuses on disaggregate food items and other developing countries, but none has specifically used the QUAIDS model for the aggregated food groups to analyse food consumption patterns nationally for the Kenyan context. The empirical results show positive expenditure elasticities while all compensated and uncompensated price elasticities show negative results. While their magnitudes vary; expenditure elasticities for meat and fish, and essential condiments are elastic (sensitive to changes) and are considered as luxuries as their elasticities are greater than one. Whereas cereal and bread, dairy products, fruit and vegetables and other condiments, have both inelastic price and expenditure elasticities; they are considered to be normal goods with values less than one. With respect to low income households, rural households and those highly dependent on the consumption of own produced food ("auto-consumption"), a reverse relationship is exhibited where meat and fish expenditure are inelastic hence perceived as normal foods, which is somewhat unexpected. However, in Kenya this finding may be attributed to the fact that a majority of the households in the survey depend on their own domesticated animals for meat and fish consumption. Hence they are not largely involved in the formal market services and prices. Further analysis shows that household size, regional differences, the ratio of food expenditure to total income and the ratio of auto-consumption are statistically significant, and hence have a great impact on food consumption expenditure. The results are broadly consistent with microeconomic theory, however exceptions indicate an unusual pattern (less sensitivity to income changes) for the rural and low income households' meat and fish consumption. Interestingly, the low income households in our sample show that the food income elasticity for meat and fish to be less than one. These results should inform the design of policies aimed at improving the nutritional status of the poor, children and other vulnerable individuals.

Keywords: Food security, food demand, QUAIDS, elasticity, Kenya.

DRIVERS AND PATHWAYS OF SHIFTING FROM FOSSIL-BASED TO A SUSTAINABLE BIO-BASED ECONOMY

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Abstract

The main drivers of shifting from fossil-based to a sustainable bio-based economy are global, European and national.

Using content analysis of documents and research articles the main global drivers, such as depletion of natural resources, increasing population, increasing environmental pressures and climate change, were identified.

The content and case study analysis revealed that there are five European drivers of bio-based economy. Thirst driver is common EU bio-economy policy, strategy and action plan. Policy and strategy is based on the global challenges and goals of EU development. Action Plan is based on three pillars: the development of new technologies and processes, the strengthening of markets and competitiveness of the bio-economy sectors and the promotion of closer inter-sectoral cooperation among all stakeholders. Sustainable development of bio-economy in the Baltic Sea region is also impossible without coordination of actions between the countries of this region. Second driver is assurance of biomass availability and sustainability and efficient biomass value chain. The basis for efficient biomass value chain is using cascading principle, minimizing waste, using waste as biomass, replacement of one type of biomass by another, and searching for alternative forms of biomass. Third driver is the need to strengthen markets and competitiveness of the bio-economy sectors. Using public and green procurements, motivating business to market new bio-products, development of short supply chains and promoting exports for higher value-added bio-products are the complex means which have to be strategically oriented. Fourth driver is the necessity of close cooperation among all stakeholders – politicians, business people, scientists and the public. Strengthening policy interaction and participation of all stakeholders are necessary for the development of sustainable bio-economy. Fifth driver is the need of the development of new technologies and processes, especially industrial biotechnology. This development is impossible without close cooperation between the scientists and business, and first of all at the European level. Advances in bio-economy research and implementation of innovation would create conditions for Europe to improve the management of biological resources, open up new and more diverse markets of food and biotechnology products.

The statistical data analysis showed that since 2010 Lithuania has been among leaders of bioeconomy growth in the EU in all biomass production and fully bio-based manufacturing subsectors, also, has a good research and development potential in the field. Identified subsectors are closely interrelated, because several activities use a part of the same biomass, while bio-products of one subsector become biomass of another subsector.

The pathways of shifting towards bio-based economy could be quite different, and they depend on the focus of technology, sustainability requirements and participation of stakeholders. The bioeconomy will contribute to a more sustainable future if certain requirements will be met. An internationally agreed set of criteria, indicators for measuring progress towards sustainability will have a significant impact on the biomass potential that can be produced sustainably. The pathway should not be too reliant on technology: social sciences should be developed and different societal stakeholders should be involved.

Keywords: Bio-economy, strategy, drivers, pathways, biomass, cascading, food security, sustainability.

COMPARATIVE ASSESSMENT OF PRODUCTIVITY AND EARNINGS OF DOMESTIC VERSUS FOREIGN GUEST WORKERS IN U.S. AGRICULTURE

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Abstract

The U.S. (United States) agricultural sector has a long history of dependence on foreign workers. In recent years, a shrinking supply of both domestic and "newcomer" (and mostly undocumented) migrant workers, coupled with aggressive enforcement of U.S. immigration laws have pushed agricultural employers to recruit an increasing number of foreign agricultural guest workers through the H-2A visa program. The H-2A program allows employers to hire foreign workers to perform seasonal or temporary agricultural work when insufficient numbers of qualified U.S. workers are available at the place and time needed. As the H-2A program gains momentum among US growers, immigration policies that permit foreign nationals to work in the United States continue to be a topic of heated discussion. There remains the concern that the importing of foreign-workers may adversely affect the employment and wages of U.S. citizens who work in similar positions. On the other hand, many agricultural employers demand revised guest worker programs to simplify the hiring of foreign workers to ensure continuing supply of farm labor. Simultaneously, worker advocates argue that there must be stronger enforcement of recruitment, housing, and wage protections to ensure that foreign workers are not exploited.

Despite their growing numbers, H-2A foreign guest workers constitute a relatively unknown group of farm workers in the United States. This study aims to shed some light on the earnings and productivity differences between foreign guest workers and domestic workers in U.S. agriculture. The empirical application utilizes recent data on 307 Florida citrus harvesters collected by the author in 2016 growing season. Foreign guest and domestic workers are compared in terms of their demographic and occupational characteristics, providing much needed descriptive data for these legal groups of farm workers. Earnings equations for both H-2A guest workers and domestic workers are estimated to test whether there are productivity and earnings differentials among agricultural workers with different visa statuses.

Preliminary results suggest that guest workers exhibit significantly higher levels of productivity and earnings compared to domestic farm workers in Florida citrus industry. The H-2A program is a costly endeavor for growers; nevertheless, it appears the program will continue to be a viable strategy to reduce uncertainty in labor availability, as high costs of the program are counterbalanced with productivity gains from utilizing this group of legal migrant workers. Implications of the results for the ongoing immigration debate in the United States and the state of Florida will be discussed.

Keywords: Agricultural labor, foreign guest workers, earnings equation, productivity, Florida agriculture.

ANALYSIS OF INCOME ON CHICKEN CRISPY PROCESSING BUSINESS BASED ON MICRO SCALE IN MAKASSAR CITY, SOUTH SULAWESI PROVINCE, INDONESIA

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Abstract

This study aimed to analyze the income level of processing and marketing of chicken crispy from three sales outlets on various sales scale. The research was conducted at three locations of chicken crispy selling business, namely A, B and C. The research method was case study. Sampling using "stratified random sampling". The scale of business is the number of chickens processed, which is for scale I (7 heads/day) (outlet A), scale II (5 heads/day) (outlet B) and scale III (3 heads/day) (outlet C). Method of processing and data analysis using descriptive analysis previously conducted normality test data by Kolmogorov Smimov. The results showed that the average monthly fixed costs for outlets A, B and C respectively were IDR 964,334; IDR 826,834 and IDR 368,500. Variable cost IDR 11,797,000; IDR 8,744,500; and IDR 5,186,000. Benefits permonth IDR 6,642,667; IDR 4,288,667 and IDR 2,299,500. The B/C ratio is 1.52; 1.45 and 1.41 and BEP was IDR 2,459,830; IDR 2,672,138 and IDR 1,258,621. The result of this research can be concluded that there were real difference of profit from three types of outlets (three level of business scale). The number of fried chicken products produced in large quantities equally affects profits. Increased business scale significantly increases monthly income.
Keywords*:* Income, broiler, chicken crispy, business scale, profil.

1. Introduction

The growth of the global market for poultry meat is an opportunity and a challenge for a producer. The growth of poultry meat market in developing countries is very different in developed countries (Parrott and Walley, 2017). Chicken meat is one of the most consumed meat types by the people of Indonesia. In 2011-2015, Indonesia is the tenth sequence of the average chicken consumed in the world that is 1,559,000 tons (1.88%). The highest consumption is the United States 13,941,000 tons (16.79%), China (13,108,000 tons) (15.79%); Brazil (9,176,000 tons) (11.05%); Mexico (3,617,000 tons) (4.36%); Russia (3,445,000 ton) (4.15%), India (3,419,000 tons) (4.12%); Japan (2,197,000 tons) (2.65%); Argentina (1,721,000 tons) (2.07%) and South Africa (1,718,000 tons) (2.07%)(Anonymous, 2015). In the United States, efforts to improve aspects of production of chicken meat is increasing.

The life cycle assessment (LCA) concept is always evaluated to improve the quality of chicken meat (Putman *et al*., 2017) .

In Indonesia, chicken meat is a type of meat is quite popular. This is because the price of chicken meat is relatively cheaper than other types of meat such as cattle, buffalo, sheep and goats. In addition, some people have considered that chicken meat is safer for consumption than other meats. In Indonesia, high consumption of chicken meat encourages an increase in chicken livestock population. The results of identification indicate that there has been an increase in chicken livestock population over the last five years.

Structurally, chicken meat is one of the products of livestock classified as white meat (poultry meat). This is because chicken meat has a higher white fiber ratio, whereas, beef is classified as red meat (Abustam, 2012). Processing of chicken meat is relatively simple compared to beef. This is because chicken meat has a texture that is more tender than beef. Processing before consumption does not take a long time. This causes chicken meat to be one type of processed meat that is favored by people in Indonesia.

In Indonesia, the business of selling fried chicken is one type of business that has a very bright business prospects. This product is very liked by the community, from children, adolescents and adults. The marketing activity of chicken fried chicken crispy is one of community service activity in the Faculty of Animal Husbandry of Hasanuddin University. This community service activity is part of the science and technology program scheme for ‘’Ipteks bagi Inovasi dan Kreativitas Kampus (IbIKK)’’ which has been implemented by Institute for Research and Community Service of Hasanuddin University. This activity is an implementation of the results of research and development of meat processing technology at the Meat and Egg Processing Technology Laboratory, Faculty of Animal Science, Hasanuddin University, Makassar.

In carrying out these business activities, of course, required good financial management skills. The function of the use of funds should be done efficiently, therefore it is certainly necessary a good financial analysis (Wibowo, 2002). The financial aspect needs to be analyzed in more depth to increase sales turnover as well as to develop into a potential business with a larger scale. The purpose of this research was to analyze the income level of the processing and selling of chicken crispy on a micro scale in Makassar City, South Sulawesi Province, Indonesia.

2. Research Methods

This research object used 3 locations of micro-scale sales outlet in Hasanuddin University campus area, that is outlet A, outlet B and outlet C. Research method using case study method. The sampling method uses "stratified random sampling". The scale of business is the number of chickens processed (head). Outlet A (scale I) (7 heads/day); outlet B (scale II) (5 heads/day) and Outlet C (scale III) (3 heads/day).

The chicken crispy products was produced from broilers with an average weight of 1.5-1.6 kg/head. Broiler obtained from the Poultry Slaugterhouse in Biringkanaya Sub-District, Makassar City. Chicken meat was processed in the form of carcass hygienically and halal certified. Each chicken was divided into 10 pieces to be processed into chicken crispy. The basic process of making chicken crispy is leaching, marination, seasoning and frying.

The analysis in this study uses equations as applied by Hadiyanti (2014). The basic data used in the calculation of this analysis are total cost (TC), total fixed cost (TFc), total variable cost (TVc), total revenue (TR), total benefit (TB). The formula used; TC = TFc + TVc; and TB = TR-TC; R/C Ratio = TR/TC; BEP (IDR) = TFc/1- (TVc/TR) (Soekartawi, 2003). Method of processing and data analysis using descriptive analysis. Before the analysis process, data normality test by Kolmogorov Smimov was done.

3. Results and Discussion

3.1. Fixed Cost

Fixed costs (Fc) are costs incurred from a fixed-amount business and are not affected by volume changes. Fixed costs do not depend on the level of goods or services generated by the business (Mitchell and Price, 2003). Data on the fixed cost of the three outlets was presented in Table 1.

Table 1. Data of the Fixed Cost Amount of the Sales Business of Processed Chicken Meat (Chicken Crispy) from 3 Different Types of Business Scale (Outlets)

Description	Outlet A (7 heads/day) (IDR)	Outlet B (5 heads/day) (IDR)	Outlet C (3 heads/day) (IDR)
Outlet	7,000,000	5,500,000	500,000
Freezer	2,200,000	2,200,000	2,200,000
Marina cooler tank	275,000	275,000	275,000
Pan fried	450,000	450,000	450,000
Kitchen set	100,000	100,000	100,000
Rice cooker	275,000	275,000	275,000
Gas holder + regulator	220,000	220,000	220,000
Total	10,520,000	9,020,000	4,020,000
Overhead/month (12 month)	876,667	751,667	335,000
Depreciation (10%/years)	87,667	75,167	33,500
Fixed cost/month	964,334	826,834	368,500

Based on the data in Table 1 shows that the increase in the fixed costs of each outlet was caused by the difference in the price of investment goods. One of them is a sales outlet that has a price difference. The price of the third outlet has the cheapest price compared to the others.

Depreciation costs are the costs to be incurred and are used as a substitute for fixed cost investments. The fee is at a certain time can not be used or damaged. Depreciation costs are calculated annually during the economic life of a tool so that the depreciation cost is calculated as a fixed cost (operating expenses). In financial analysis the depreciation cost is calculated as a fixed cost.

3.2. Variable Cost

The variable cost (Vc) is the cost that changes in proportion to the business activity. The variable cost is basically the amount of marginal cost to all units produced (Garrison *et al*., 2009). It can also be considered a normal cost. Fixed costs and variable costs form two components of the total cost. Comparison of the variable cost of the three different outlets was presented in Table 2.

Table 2 shows that the use of variable costs for each outlet varies. This is related to the scale of business on each outlet. Variable costs represent costs incurred based on the amount of production costs required during business activities carried out. Chicken meat is the largest variable cost than any other in the business of selling chicken crispy. For the business scale of 7 head/day, the total cost for the purchase of meat reached IDR 6,160,000/month.

Table 2. Data of the Variable Cost Amount of the Sales Business of Processed Chicken Meat (Chicken Crispy) from 3 Different Types of Business Scale (Outlets)

Description	Outlet A (7 heads/day) (IDR)	Outlet B (5 heads/day) (IDR)	Outlet C (3 heads/day) (IDR)
Broiler meat	6,160,000	4,400,000	2,640,000
Palm oil	1,375,000	962,500	550,000
Seasoned flour	1,100,000	770,000	440,000
Packaging (box + paper bag)	352,000	660,000	330,000
Gas fuel (LPG)	1,320,000	660,000	330,000
Rice	990,000	792,000	396,000
Labor	500,000	500,000	500,000
Total	11,797,000	8,744,500	5,186,000

3.3. Total Cost

The total cost of production process of each business scale of chicken crispy sale was presented in Table 3.

Table 3. Data of the Total Cost (Tc) of the Sales Business of Processed Chicken Meat (Chicken Crispy) from 3 Different Types of Business Scale (Outlets)

Description	**Outlet A (7 heads/day) (IDR)**	**Outlet B (5 heads/day) (IDR)**	**Outlet C (3 heads/day) (IDR)**
Fixed cost (Fc)	964,334	826,834	368,500
Variable cost (Vc)	11,797,000	8,744,500	5,186,000
Total cost (Tc)	12,761,334	9,571,334	5,554,500

Based on Table 3, it can be seen that the total cost used for the three outlets shows different amounts. Total cost is an accumulation of the total production costs that must be incurred in the process of marketing chicken crispy. Production costs in chicken crispy sales business include fixed costs and variable costs. Depreciation of equipment was estimated at 10% of the value of equipment to be paid in each month.

3.4. Revenue

The amount of revenue (TR) received from the sale of chicken crispy obtained from each outlet was presented in Table 4.

Table 4. Data of the Revenue Amount of the Sales Business of Processed Chicken Meat (Chicken Crispy) from 3 Different Types of Business Scale (Outlets)

Description	**Outlet A (7 heads/day) (IDR)**	**Outlet B (5 heads/day) (IDR)**	**Outlet C (3 heads/day) (IDR)**
Chicken Crispy + Rice White	19,404,000	13,860,000	7,854,000

Based on Table 4 it can be seen that the amount of revenue from chicken crispy sales business is in line with the scale of business. The smaller the business scale, the smaller the amount of revenue. Total revenue from chicken crispy sales is proportional to the scale of the existing business. Based on the data, it can be seen that the sales effort with scale 7 heads/ day shows the highest amount of revenue compared to the others.

3.5. Benefit

The results of benefit of chicken crispy sales obtained from three different outlets were presented in Table 5.

Table 5. Data of the Benefit of the Sales Business of Processed Chicken Meat (Chicken Crispy) from 3 Different Types of Business Scale (Outlets)

Description	Outlet A (7 heads/day) (IDR)	Outlet B (5 heads/day) (IDR)	Outlet C (3 heads/day) (IDR)
Total Benefict (TB)/month (IDR)	6,642,667	4,288,667	2,299,500
R/C Ratio	1,52	1,45	1,41
Break Even Point (BEP) (IDR)	2,459,830	2,672,138	1,258,621

Based on Table 5 it can be seen that the level of monthly profit obtained from each outlet shows significant results. Increase in profits is directly proportional to the scale of the business being carried out. Large production costs and balanced with the scale of business will generate a large income as well (Triana *et al*., 2007).

Based on the data it is also seen that the R/C ratio >1. This shows that the total revenue from the three business scales is still higher than the total cost incurred. Therefore, it can be said that this business is quite feasible to be developed continuously.

4. Conclusion

Differences in the scale of business applied to each outlet produce different benefits. The business of chicken crispy sales is done by all outlets by showing favorable results with value of R/C ratio >1. The amount of chicken crispy production done simultaneously affects the profit. Increased business scale significantly increases monthly profit, but does not significantly increase the value of BEP.

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References

Abustam, E. (2012). Ilmu Daging. Aspek Produksi, Kimia, Biokimia dan Kualitas. Masagena Press, Makassar.

Anonymous. (2015). Outlook. Komoditas Pertanian Sub Sektor Peternakan. Daging Ayam. Pusat Data dan Sistem Informasi Pertanian. Sekretariat Jenderal Kementerian Pertanian RI.

Garrison, R., Noreen E.W & Brewer P.C. (2009). Managerial Accounting (ed. 13e). McGraw-Hill Irwin.

Hadiyanti, F.R. (2014). Analisis kelayakan usaha tahu bandung kayun-yun Desa Cihideung Ilir Kecamatan Ciampea Kabupaten Bogor. [Skripsi]. Bogor (ID): Institut Pertanian Bogor.

Mitchell, J & Price A. (2013). Economics: Principles in action. (pp.111). Upper Saddle River, New Jersey 07458: Pearson Prentice Hall.

Parrott, P & Walley, K. (2017). Consumer Attitudes to Poultry Meat: A Comparative Study of the UK and China, In Woodhead Publishing Series in Food Science, Technology and Nutrition, Chapter

13-edited by Massimiliano Petracci and Cécile Berri, Woodhead Publishing, (pp.313-334). Poultry Quality Evaluation, ISBN 9780081007631

Putman, B., Thoma. G, Burek, J & Matlock, M. (2017). A retrospective analysis of the United States poultry industry: 1965 compared with 2010. Agricultural Systems. 157:107-117,

Soekartawi. (2003). Teori Ekonomi Produksi. PT. Raja Grafindo Persada, Jakarta.

Triana A., T. Salam & M. Muis. (2007). Analisis Pendapatan Usaha Peternakan Ayam Ras Petelur Periode Layer di Kecamatan Cenrana, Kabupaten Maros. Jurnal Agrisistem. 3(1):11-15.

Wibowo, S. (2002). Petunjuk Mendirikan Perusahaan Kecil. Penebar Swadaya, Jakarta.

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IMPROVING SUSTAINABILITY OF FIELD CROP PRODUCTION BY INTEGRATING REMOTELY COLLECTED DATA

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Abstract

Sustainability of field production could be improved ifthe amount of data collected is greatly increased. Mass data collection could allow for following much more closely crop and pest development together with tracking the effects exerted by abiotic stresses. This could further provide for better crop management with optimized pesticide, water, and fertilizer applications.

Remote data collection is possible in a number of different ways (i.e. ground-, air-, and space-based). Each of these approaches has its benefits and limitations and the current report discusses some of them. It further elaborates on the use of “copter” drones for real-life applications. Examples of the actual application of such drones in various settings are presented and discussed. Possibilities opened by dynamic tracking of the crop condition are demonstrated in relation to the monitoring of water and nutritional regime. The capacity to track in near real-time of the presence and development of weeds, emergency and spreading of diseases, damages from insects, rodents, etc. is discussed as related to the estimation of actual crop density – mostly in closed canopy crops(i.e. winter cereals and rapeseed). Sustainable crop production is presented as depending on the possibility to determine the total volume of the biomass accumulated during the vegetation/year (particularly in wood species) and thus – the capacity to adequately plan for timely ceasing of applications of agrochemicals and for harvesting the crop.

Further discussion on the possibilities to develop prognostic and response applications of drone systems and what benefits they can bring to real-life farming is provided.
Keywords: Precision agriculture, hexacopter drones, sustainable farm management.

1. Introduction

Sustainability of field production could be improved ifthe amount of data collected is greatly increased. Mass data collection could allow for following much more closely crop and pest development together with tracking the effects exerted by abiotic stresses. This could further provide for better crop management with optimized pesticide, water, and fertilizer applications.

Optimized and efficient crop management requires good knowledge of crop development. Data can be remotely collected in a number of different ways (i.e. ground-, air-, and space-based). However, each of these approaches has its benefits and limitationsand they should be taken into account before selecting the most appropriate one in each particular case. Satellites, for example, are collecting datawith relatively low resolution (on the multi-meter scale), thus providing general overview of large areas(Ahamed, Tian, Zhang, & C. Ting, 2011). Even with the latest developments in the resolutions achieved it still is in the meter-decameter range (Sousa, Gonçalves, & da Silva, 2017). While very useful at regional/state scale their usability for on-farm applications is limited by the fixed intervals at which data is collected. Yet another usability restriction for satellite-based data acquisition is that in

many cases it can be compromised by the presence of cloud coverage over particular fields, therefore creating data collection gaps.

Ground-based data acquisition, on the other hand, can provide high precision (in the centimeter range) by attaching sensors to GPS guided agricultural machinery, or by directly integrating GPS data modules in hand-held data collection appliances. First of these two approaches is often preferable as the GPS guidance systems for the machinery are already adjusted for high precision positioning – a rather significant investment that is mandatory if precision agriculture is to be implemented at farm level. While providing for very good precision and for integration of data collection with other farm activities, this approach is limited by the fact that data is collected only when the machinery actually is in the particular field to be observed. This limits both the number of passes for data collection and the areas over which it can be done as the machinery has limited speeds and area coverage due to the main purpose it is implemented for at any particular moment.

Unmanned Aerial Vehicles (UAVs) have several advantages over satellites and piloted aircraft: they can be deployed quickly and repeatedly; they are less costly and safer than piloted aircraft; they are flexible in terms of flying height and timing of missions; and they can obtain imagery at sub-decimeter resolution (Rango et al., 2009). The first UAV to take photography for aerial reconnaissance was the Radioplane in 1955 in the United States. Similar capabilities were developed by the French in the later 1950s, the Italians in the 1960s, and the Russians in the early 1970s (Newcome, 2004). Most unmanned aerial platforms allow the operation height to be very low (e.g. 30m), enabling low-altitude aerial photography (LAAP) (Verhoeven, 2009)to acquire image data that can resolve thefinest details.

UAVs, also called small Unmanned Aircraft Systems (sUAS) or drones(Mulero-Pázmány et al., 2017)can be divided in two main groups, depending on the propelling/lifting principle. Fixed wing drones are using the airplane principle of creating lifting force from the differences in pressure above and below the wings of the appliance (relatively) fast moving through the air. The quick deployment and the ability to fly for extended times, unobstructed by the cloud coverage, are two of the main benefits of using this approach. However, sharing the benefits of such approach (i.e. low energy/kg equipment in the field and ability to cover large areas in a limited amount of time), means sharing also its limitations. Some of the most relevant to agricultural settingsof them include the requirement for alevelled landing strip and the difficulties of precise positioning when side- and gusty winds are occurring during the flight.

Multi-rotor UAVs (MRUAV) are propeller-lifted(or “copter”) drones that on the other hand do not require any specific take-off/landing path preparation. They are better at dealing with gusty winds and have lower relative ground speed, thus providing for a more precise following of the pre-defined observation path. As a consequencethey meet the critical requirements of optimum resolution, which makes them ideally suited for identifying within-field variations in vegetation health and condition resulting from non-optimal growing conditions(Houborg, Fisher, & Skidmore, 2015). On the negative side, using the energy of propellers to generate not just forward thrust, but lifting force as well, they have higher energy/kg equipment ratio, which converts to shorter flying times and lower area coverage capacity per flight.

With the quick developments in satellite, aerial and ground-based remote sensing systems they have to be regularly compared and decisions made based on the spatial and temporal resolutions of imagery to be adopted for site-specific management(Ahamed et al., 2011).

Taking into account benefits and limitations of different systems and aiming to provide a solid foundation for choosing the right technology the current report concentrates on the use of multi-rotor UAVs (MRUAV) for real-life farm applications. Main advantages and disadvantages of such systems are presented, followed by the examples of the actual application of such UAVs in various settings.

2. Materials and Methods

2.1. Equipment

For the purposes of evaluating the potential of MRUAVs6-rotor BUTEO drone (ProDroneSys, Sofia, Bulgaria) was used that was assembled as follows:

- Weight, including sensors and batteries – 4.2 kg;

- Diagonal size – 660 mm;
- Satellite positioning systems – GPS & GLONASS;
- NIR/RGB combined camera:
  - NIR sensor: photographing spectrum 780-800nm
  - RGB sensor – 8 Mpx with fixed lens
  - Matrix resolution: 3280 × 2464 pixels
  - Combined sensor size 3.68 x 2.76 mm (4.6 mm diagonal)
  - Lens focal length –3.04 mm
  - Pixel size – 1.12 µm x 1.12 µm
  - Horizontal angle – 62.2 degrees
  - Vertical angle – 48.8 degrees.
- Damping system for vibrations absorption

The fully loaded system has maximum speed of 22 m/s and can reachmaximum flight height (from take-off position)of 1000 m with a climbing speed of up to 3 m/s. The equipment operates in the temperature rangeof -10°Cto +40°C and can resist sustained winds at up to 18 m/s. Maximum flight durationis 45 min.

Duringdatacollection ground speed of 6 m/s was usedwith a flight duration in observation mode of 30 min.

For the fertilizer application a tractor John Deere model 6130 was used equipped with GreenStar 2630 navigation display and assembled with Kubota DSX-W GEOspread applicator.

2.2. Survey Area

Observation area is situated in Sredna Gora Mountain, “Karach” ground, at 400 m altitude where sunflower was grown in 2015-2016. For the 2016-2017 season wheat variety Avenue was planted at 600 plants/m^2 with seeds of C1 grade.

3. Results and Discussion

Before planting the crop for the 2016-2017 season soil samples were taken and a number of fertility parameters determined (Table 1). Sampling was done following W-shape tracks trough the fields and the results were averaged per plot.

Table 1. Results from fertility parameters’ analysis of soil samples taken before planting (05.09 2016).

Total area 22.8 ha	pH	N (ppm)	Zink (ppm)	Na (ppm)	K (ppm)	P (ppm)	S (ppm)	Fe (ppm)	Mo (ppm)	Cu (ppm)	B (ppm)	Mn (ppm)	Mg (ppm)	Ca (ppm)	Cation exchange capacity (meq/100g)
Area M01	7.1	14	1.4	30	211	9	1	188	0.23	9.8	1.02	192	400	6959	32 2
Area M02	7.0	9	1.3	29	189	5	1	251	0.17	8 1	1.08	126	398	5075	23.6

As a result, from soil analyses the plots were divided into two groups for fertilizer application (denoted M01 and M02 – Figure 1). Diammonium phosphate (DAP – $(NH_4)_2HPO_4$) was used as pre-sowing fertilizer. Based on fertility parameters of the plots DAP was evenly applied at 150 kg/ha for M01 and 200 kg/ha for M02.

To assure proper near-infrared (NIR) measurements data on soil reflectance was collected with the BUTEO drone after the last pre-sow treatment in both RGB (Figure 2) and NIR specters.

Figure 1. Area Denotation as a Result from Soil Fertility Analysis.

Figure 2. Areal View of the Test Site. Three Arable Plots Used (Total Area 22.8 Ha), Surrounded Byuncultivated Land, are Visible

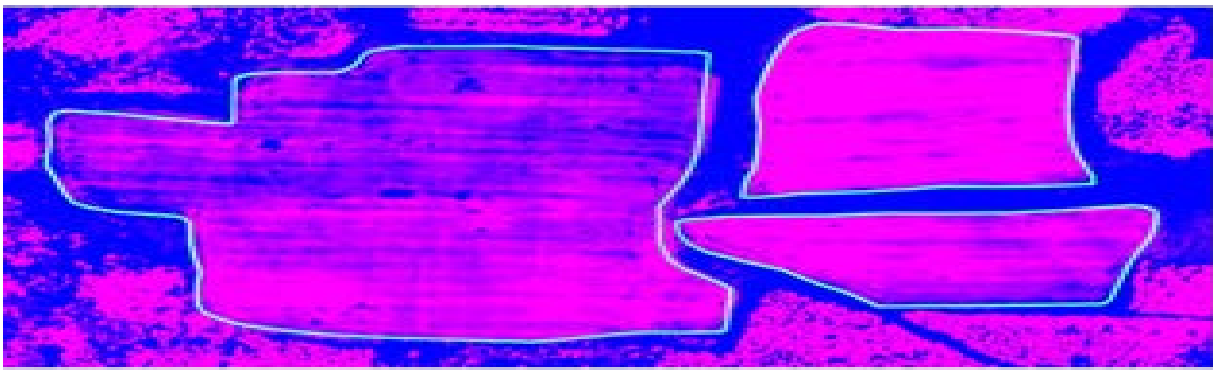

Figure 3. Near Infrared (NIR) observation of the Wheat Crop in Early Spring. Data Collected on March 7, 2017.

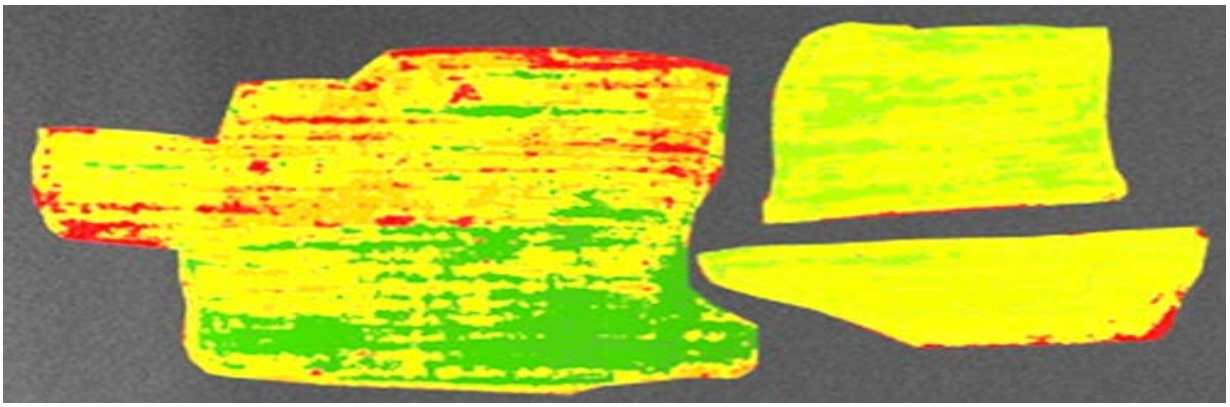

Figure 4. Variable Rate Application (VAR) Map Delivered to the Greenstar 2630 Navigation Display. Areas in Red are With Lowest NDVI and Thus Received the Highest N Fertilizer Rate (250 Kg/Ha), While the Areas in Green Received the Lowest (150 Kg/Ha).

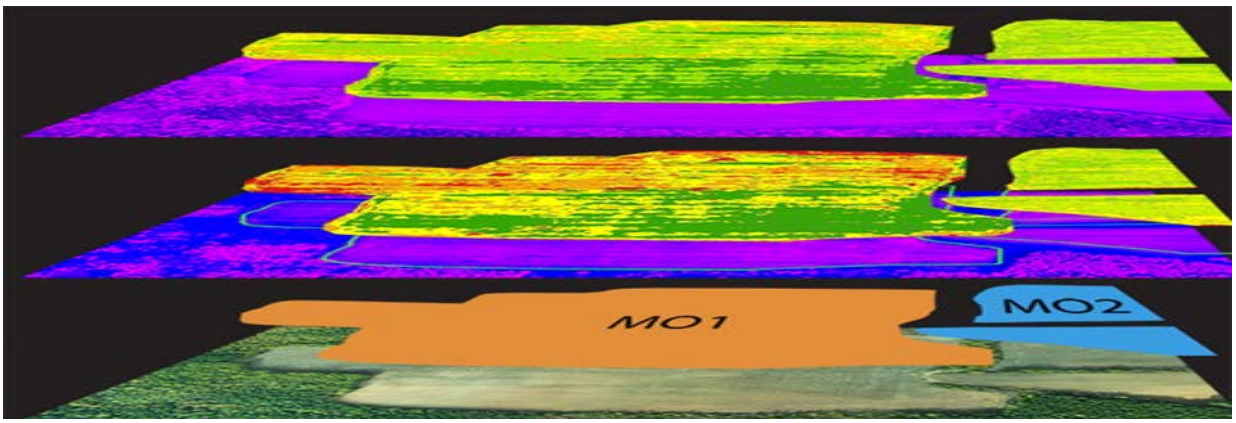

Figure 5. Overlaying Soil, Fertilizer and Pest Maps.

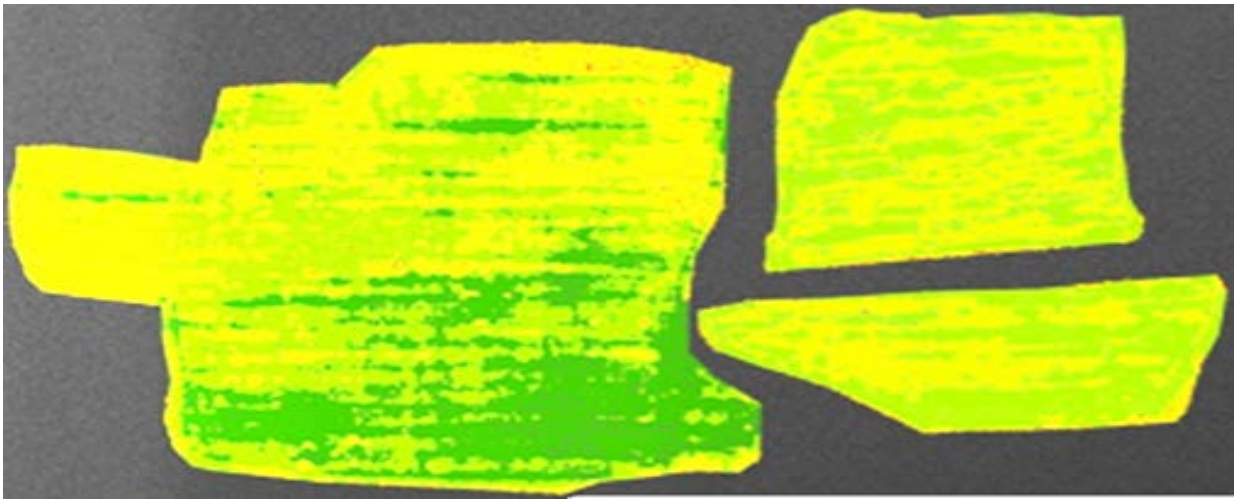

Figure 6. VRA Map Calculated as a Result from Field Observation in the Third Decade of May, 2017.

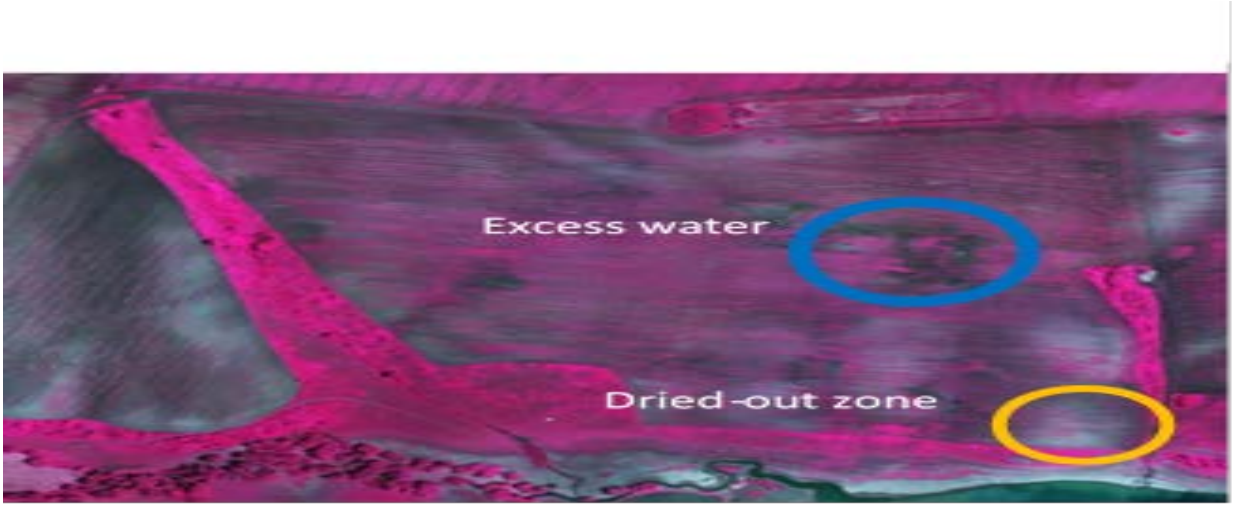

Figure 7. Data Collected from NIR Camera can be Used for Identification of Zones of Excess or Insufficient Water Supply (Areas with Different Water Availability to Plants)

During the vegetation period data was collectedmultiple times using both RGB and NIR cameras to follow the crop development in near real-time. When a variation in the vegetation growth was detected (i.e. in early spring – 07 March, Figure 3),normalizeddifference vegetation index (NDVI) was obtained according toJ.W. Rouse, Jr., Haas, Schell, Deering, & Harlan (1973) and J. W. Rouse, Jr., Haas, Shell, & Deering (1973), as further developed by Tucker(1979) and Panda, Ames, & Panigrahi(2010). It was used to produce variable rate application (VRA) map (Figure 4)that was uploaded to the GreenStar 2630 navigation display of the tractor guiding the Kubota DSX-W GEOspread fertilizer applicator.We considered the correction of nitrogen supply as the first response becauseimportant synergies of data in the visible to near-infrared and thermal domain for the estimation of plant pigments were suggested as closely linked to leaf nitrogen and productivity(Elarab, Ticlavilca, Torres-Rua, Maslova, & McKee, 2015). Based on the calculated vegetation indices the first vegetation fertilizer application was varied throughout the field in the rate of 150-250 kg/ha ammonium nitrate.Due to the more precise fertilizer distribution, the total amount of fertilizer delivered to the fields was reduced by 400 kg, thus reducing the cost for acquiring fertilizers by ~150 euro.

With the progression of the vegetation observations of the fields continued and in April, 2017 two more fertilizer applications were administered – one with leaf fertilizer containing micronutrients to supplement the deficits, identified during initial soil sampling, and about 10 days later a second N application, based on the calculated NDVIs and the third VRA map generated.

It has been speculated that phenolic concentration may contribute to the assessment of vegetation stress and species discrimination (Houborg et al., 2015). Determination of these specific constituents appears possible by measuring changes in a unique absorption feature near 1.66 μ in spectra of leaves and plants (Kokaly & Skidmore, 2015). BUTEO drone however is not equipped with such a sensor, so changes in NDVI were used instead for monitoring both pest and weed infestations. In our study, sudden changes in NDVIs (within 2-3 days from the previous field observation) were used as indicators of pest/disease/weed development and triggered emergency visits of the agronomists to the crop site. Upon determination of the specific causative agent for the NDVI fluctuation, appropriate plant protection treatments were applied. Furthermore, the plant protection products were only applied to the areas with modified NDVI indices (reduced – incase of pest and increased – in case of weed infestation).This allowed for maintaining the crop in a good condition throughout the rest of the season with reduced both machinery and plant protection products use, thus reducing also soil compaction and the number of working hours needed to assure high productivity. Altogether, this resulted in expense reduction that was estimated to amount to about 20-22 euro/ha.

Field maps, resulting from different surveys were accumulated throughout the season, which allowed for analyzing key elements of the crop development during the vegetation period. The ability to overlay different maps (Figure 5) gives the agronomists and farm managers ability to trace not only

short-term effects of nutritional regime / pest development, but also to get a better idea of the interplays between them.

The results from the differential application of the fertilizers, in combination with timely application of pest and weed control formulations (all of them based on the observations of fluctuations in NDVI) during the vegetation were clearly visible at the final stages of crop development. After the fast vegetative growth phase and the flowering of the crop were completed and grain formation has well advanced the crop condition continued to be in very good state as indicated by calculated VRA map (Figure 6).

As demonstrated in the present report the use of MRUAVs was the only adequate approach when quick-response action is needed at farm/field level. In regions like Central and Eastern Europe, where cloud cover is frequent and the fields are relatively small this severely impairs applicability of satellite-based systems (Machwitz et al., 2014).

The use of ground-based equipment was inadvisablebecause it is incapable of covering all the fields on an average-sized farm (500-2000 ha) every two-three days. When weather conditions favor rapid disease/pest spreading, longer time gaps may compromise the entire crops on the farm and thus are unacceptable.Furthermore, in many crops entrance of machinery at the late stages of crop development is impossible – either due to the tall stature of the crop (i.e. maize and sunflower) or because of the closed crop stand (i.e. wheat, barley, and canola) that cannot recover from mechanical damage after certain developmental stage.

While fixed wing drones could be used for quick deployment and large area observations, irregularities often experienced in the path followed by the vehicle, varying altitude, and camera attitude (Mancini et al., 2013) lead to an lower average precision that can be achieved by these systems – in the range of ~25 cm (Dunford, Michel, Gagnage, Piégay, & Trémelo, 2009). Furthermore, high shutter speeds are needed to combat the blurring effect of relative ground speed that occurs at lower altitudes in the case of airplane (Verhoeven, 2009).The enhanced cm-scale spatial detail that BUTEO drone can achieve was acknowledged to allow for the separation of soil and canopy contributions and reduce obfuscating effects of soil background, structure, and shadow (i.e., by isolating pure vegetation signals), providing an improved capacity to remotely sense and model vegetation traits and function(Houborg et al., 2015). As vegetation indices are vague in quantitative biophysical meaning, and most of them were formulated to minimize the effect of non-vegetation factors on spectral data (Baret &Guyot, 1991) this capacity is of crucial importance for identifying exact crop condition. Several propositions exist to overcome the abovementioned problems. Jin & Eklundh(2014)for example proposed a new index, named the plant phenology index (PPI), which is derived from radiative transfer equations. PPI is approximately linear to green leaf area index (LAI), and has the same unit as LAI ($m^2 \cdot m^{-2}$). The authors argue that, as LAI is the most dynamic visible canopy variable during the phenological cycle, linearity with green LAI is a fundamental property of a phenology vegetation index. It is for this reason that the index can be used for representing canopy green foliage dynamics for any green terrestrial vegetation. Several other vegetation indices (VIs) were also proposed (i.e. Baret & Guyot, 1991; Houborg et al., 2015; Jin & Eklundh, 2014) as well as ways to incorporate them into crop growth models (Machwitz et al., 2014) and yield prediction neural networks (Panda et al., 2010). Remote data collection could also be used to assess soil conditions both by direct measurement of soil reflectance (Dunford et al., 2009; Mancini et al., 2013; Panciera et al., 2009) and by inference from plant responses – as our own data shows (Figure 7) and discussed by Rango et al.(2009) and Yin, Udelhoven, Fensholt, Pflugmacher, & Hostert(2012).

Remote sensing will be best used by providing accurate, site-specific data that can be converted into information used by decision support systems (Shaw, 2005).In case of the MRUAVs, major advantages include the ability to operate close to the groundand use these devices for photographic situations where low amounts of reflected radiation need to be recorded (Verhoeven, 2009). By providing both higher resolution and longer daytime operational duration than other air- and satellite-based systems,MRUAVs provide two other crucial data streams for the decision support. The first one is the capacity to produce 3-dimensional field topography maps (Mancini et al., 2013) in the centimeter range, thus providing a possibility for erosion prediction and prevention. The second one is the near real-time measurement of the biomass accumulation in the crops (Ahamed et al., 2011; Dunford et al., 2009; Sousa et al., 2017). They were used for example as a low-altitude remote sensing

(LARS) platform to acquire quality images of high spatial and temporal resolution in order to estimate yield and total biomass of a rice crop (Swain, Thomson, & Jayasuriya, 2010).

4. Conclusions

Present report summarizes the results from actual application of propeller-lifted drones in precision agriculture that include:

- Dynamic tracking of the crop condition throughout the season and supporting decision-making process in near real-time
- Monitoring of nutritional regime (zones of excess or insufficient nutrient availability)combined with the capacity to follow water availability to plants
- Near real-time tracking of the presence and development of weeds, emergency and spreading of diseases, damages from pests, etc.

Due to the complexity of factors involved the total direct and indirect economic benefits were difficult to precisely calculate, but were estimated to amount to at least 30 euro/ha. Combined with the lower amounts of fertilizers and pesticides used throughout the season this provides strong evidence that the use of MRUAVs can significantly contribute to the sustainability of the crop production.

It further presents the potential of the multi-rotor unmanned air vehicles to:

- Estimate actual crop density (number of plants/m^2 or ha) in closed canopy crops, i.e. winter cereals and rapeseed.
- Possibility to determine the total volume of the biomass accumulated during the vegetation/year

References

Ahamed, T., Tian, L. F., Zhang, Y., & C. Ting, K. (2011). A review of remote sensing methods for biomass feedstock production. *Biomass Bioenergy, 35*(7), 2455-2469.

Baret, F., & Guyot, G. (1991). Potentials and limits of vegetation indices for LAI and APAR assessment. *Remote Sensing of Environment, 35*(2), 161-173.

Dunford, R., Michel, K., Gagnage, M., Piégay, H., & Trémelo, M. L. (2009). Potential and constraints of Unmanned Aerial Vehicle technology for the characterization of Mediterranean riparian forest. *International Journal of Remote Sensing, 30*(19), 4915-4935.

Elarab, M., Ticlavilca, A. M., Torres-Rua, A. F., Maslova, I., & McKee, M. (2015). Estimating chlorophyll with thermal and broadband multispectral high resolution imagery from an unmanned aerial system using relevance vector machines for precision agriculture. *International Journal of Applied Earth Observation and Geoinformation, 43,* 32-42.

Houborg, R., Fisher, J. B., & Skidmore, A. K. (2015). Advances in remote sensing of vegetation function and traits. *International Journal of Applied Earth Observation and Geoinformation, 43,* 1-6.

Jin, H., & Eklundh, L. (2014). A physically based vegetation index for improved monitoring of plant phenology. *Remote Sensing of Environment, 152,* 512-525.

Kokaly, R. F., & Skidmore, A. K. (2015). Plant phenolics and absorption features in vegetation reflectance spectra near 1.66μm. *International Journal of Applied Earth Observations and Geoinformation, 43,* 55-83.

Machwitz, M., Giustarini, L., Bossung, C., Frantz, D., Schlerf, M., Lilienthal, H., Wandera, L., Matgen, P., Hoffmann, L., &Udelhoven, T. (2014). Enhanced biomass prediction by assimilating satellite data into a crop growth model. *Environmental Modelling & Software, 62,* 437-453.

Mancini, F., Dubbini, M., Gattelli, M., Stecchi, F., Fabbri, S., & Gabbianelli, G. (2013). Using Unmanned Aerial Vehicles (UAV) for High-Resolution Reconstruction of Topography: The Structure from Motion Approach on Coastal Environments. *Remote Sensing, 5*(12), 6880.

Mulero-Pázmány, M., Jenni-Eiermann, S., Strebel, N., Sattler, T., Negro, J. J., & Tablado, Z. (2017). Unmanned aircraft systems as a new source of disturbance for wildlife: A systematic review. *PLOS ONE, 12*(6), e0178448.

Newcome, L. R. (2004). *Unmanned aviation : a brief history of unmanned aerial vehicles* (1st ed.). Reston, Va: American Institute of Aeronautics and Astronautics.

Panciera, R., Walker, J. P., Kalma, J. D., Kim, E. J., Saleh, K., & Wigneron, J.-P. (2009). Evaluation of the SMOS L-MEB passive microwave soil moisture retrieval algorithm. *Remote Sensing of Environment, 113*(2), 435-444.

Panda, S. S., Ames, D. P., & Panigrahi, S. (2010). Application of Vegetation Indices for Agricultural Crop Yield Prediction Using Neural Network Techniques. *Remote Sensing, 2*(3), 673-696.

Rango, A., Laliberte, A., Herrick, J. E., Winters, C., Havstad, K., Steele, C., & Browning, D. (2009). Unmanned aerial vehicle-based remote sensing for rangeland assessment, monitoring, and management. *3*(1), 15.

Rouse, J. W., Jr., Haas, R. H., Schell, J. A., Deering, D. W., & Harlan, J. C. (1973). *Monitoring the vernal advancement and retrogradation (green wave effect) of natural vegetation*. Retrieved from https://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/19750020419.pdf

Rouse, J. W., Jr., Haas, R. H., Shell, J. A., & Deering, D. W. (1973). *Monitoring vegetation systems in the Great Plains with ERTS*. Paper presented at the 3rd Earth Resources Technology Satellite Symp., NASA SP-351. Washington, D.C.

Shaw, D. R. (2005). Translation of remote sensing data into weed management decisions. *Weed Science, 53*(2), 264-273.

Sousa, A. M. O., Gonçalves, A. C., & da Silva, J. R. M. (2017). Above-Ground Biomass Estimation with High Spatial Resolution Satellite Images. In D. J. S. Tumuluru (Ed.), *Biomass Volume Estimation and Valorization for Energy*: InTech.

Swain, K. C., Thomson, S. J., & Jayasuriya, H. P. W. (2010). Adoption of an Unmanned Helicopter for Low-Altitude Remote Sensing to Estimate Yield and Total Biomass of a Rice Crop. *Transactions of the ASABE, 53*(1), 21.

Tucker, C. J. (1979). Red and photographic infrared linear combinations for monitoring vegetation. *Remote Sensing of Environment, 8*(2), 127-150.

Verhoeven, G. J. J. (2009). Providing an archaeological bird's-eye view – an overall picture of ground-based means to execute low-altitude aerial photography (LAAP) in Archaeology. *Archaeological Prospection, 16*(4), 233-249.

Yin, H., Udelhoven, T., Fensholt, R., Pflugmacher, D., & Hostert, P. (2012). How Normalized Difference Vegetation Index (NDVI) Trends from Advanced Very High Resolution Radiometer (AVHRR) and Système Probatoire d'Observation de la Terre VEGETATION (SPOT VGT) Time Series Differ in Agricultural Areas: An Inner Mongolian Case Study. *Remote Sensing, 4*(11), 3364-3389.

ANALYSIS OF INCOME DETERMINANTS AMONG FARM HOUSEHOLDS IN THE UPLAND SHALLOT PRODUCTION CENTER IN MALANG DISTRICT, INDONESIA

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Abstract

Poverty in rural areas is still a problem in economic development in Indonesia and shallot is an important agricultural commodity in the food security where shallot is one of the main ingredients in almost all Indonesian cuisine. To overcome imports, government encourages the cultivation of shallot to upland area whereas it is known that the cultivation of shallot in this area faces several problems. The purpose of this study is to analyze the income patterns and factors that determine the income level of farm households in the center of shallot production. The main data used in this study is primary data collected from farm household samples through interviews using structured questionnaires as well as observations. Sampling method used is purposive sampling with representative consideration to population diversity. Descriptive statistics and multiple regression analysis are the major analytical tools employed for the study. The results of analysis show that farmers in the study area, in addition to cultivating shallot as well as various horticultural commodities, food and livestock integrated in cropping pattern. Shallot farm income contributes the most to household income, followed by income from livestock and chili farming. Human capital in the form of education level, household size, number of labor; natural capital in the form of farm and agroforestry land size; physical capital in the form of livestock ownership; financial capital in the form of access to credit; as well as social capital in the form of cropping patterns are the variables that significantly affect household income of farmers.

Keywords: Capital, cropping pattern, household income, income pattern, poverty.

1. Introduction

1.1. Background and Problem of the Research

Although poverty reduction has always been a priority development issue in every era of government implemented through various development programs, but poverty is still a problem of economic development in Indonesia, especially poverty in rural areas. In March 2017, the poverty rate in rural areas is 13.93% while in urban areas is only 7.72% and despite the poverty level in the five years (2013-2017) has decreased, but very slowly and volatile where the level of poverty in rural areas in March 2013 is 14.32% (BPS, 2018). In general, activities in the agricultural sector are a source of income for most people in rural areas.

Shallot is one of the strategic and important commodities for the economy in Indonesia. Shallot farming is a source of income and employment that contributes high enough to regional economic development (Department of Agriculture, 2005). Almost every Indonesian cuisine uses shallot as one of the main ingredients. Shallot can be cultivated on various types of land or plateau, both uplands and lowlands. Therefore, to overcome imports, government encourages the cultivation of shallot to upland area where shallot is commonly cultivated in lowland areas. Shallot plants can still grow and bulb in upland areas, but the planting time becomes longer 0.5-1 months and the tuber yield is lower (Agricultural Ministry, 2005). Generally shallot is flowering well in the uplands than in the lowlands (Jasmin et al., 2013). According to Sumarni and Soetiarso (1998), flowering initiation required 9-

12°C temperature, growing umbel required 17-19°C temperature, while the fruiting and shallot required 35°C temperature. The optimal altitude for the growth and development of the shallot is 0-450 meters above sea level (Sutarya and Grubben 1995). The flowering and seed production rate in the highlands was greater than in lowland, whereas the quality of the seed produced in the lowlands was better than in the highlands. The implication of this research is that the highlands are very potential for the development of shallot seed production, where onion seeds can produce seed bulbs that are much better than the bulbs in the market (Hilman et al., 2014). The problems faced by farmers to obtain optimal shallot production and income in rainy season in upland area are pests and diseases, falling prices due to imported onion, and limited capital for purchasing fertilizers and pesticides (Basuki, 2014).

Although shallot is one of the high value commodities that can bring a big profit for farmers, but also high risk level. The cost of shallot farming is relatively high, while climatic conditions greatly affect the level and production. The influence of seasons not only affects the fluctuation of production but also causes price fluctuations. The nature of perishable toxic products causes prices to fluctuate and price changes very quickly (Asmara and Ardhiani 2010). The price of shallot is very fluctuating depending on market conditions. Price fluctuations are highly dependent on shallot demand and supply.

According to Nurkse (1954) in Kuncoro (2004) poverty causes inability to own or access to capital so that poverty never ends and forms "The Vicious Circle of Poverty". High rate of poverty indicates that development in the rural areas does not optimally utilize various types of resources (Hayami, 2001) and although the components of the three capitals of development, i.e., human capital, natural capital, and social capital, are mostly located in rural areas (Fauzi, 2010). Thus looking at the various problems faced by farmers in the center of shallot production in the uplands area, it is necessary to identify the type of capital that is able to encourage the improvement of welfare.

1.2. Research Objective

In general, principle objective of this study is to assess the factors of household capital/assets that are associated with household income as an indicator of the economic household welfare. Specifically, the purpose of this study is:

(1) to describe statistically the capital or asset of farm households in shallot production center in upland area

(2) to describe the cropping pattern and analysis the contribution of the shallot farming to household income (income pattern) of the farmer in shallot production center in upland area

(3) to analysis which of the identified factors of household capital/assets are highly associated with farm household income in shallot production center in upland area

2. Research Method

2.1. Location, Data Collection and Sampling Method

The research was conducted in Malang District, East Java Province which is one of the center of shallot production in upland area, the area of this shallot production center is in about 870 meters above sea level. Because this research is conducted by survey method, the main data used in the study is primary data collected through interviews using questionnaires to farm household samples as well as through focus group discussions. There are 60 farmer households sampled in this study in which the sampling method applied is purposive sampling considering the diversity of the population, especially in terms of ownership and accessibility to various capital.

2.2. Framework, Analysis Method and Model

The study used income to measure economic welfare, as it capture the means by which households can achieve welfare (Strengmann-Kuhn, 2000; Wagle, 2007). In most empirical studies, income is the indicator used for household welfare and resources (Wagle, 2007). In general, at the international and national levels, poverty level is measured by household income where poverty describe economic

welfare condition of the society. Poverty as a multi-dimensional phenomenon is determined by a wide range of factors one of which is the non-equity in distribution and scarcity of assets/capital in development opportunities.

Households assets/capital have been found to shape a households capacity to generate income through agricultural production and diversification.In general, household assets include Natural, physical, Financial, Human and Social capital. Scoones (1998) identified four assets/capital categories namely natural, financial, human and social capital. To complete the asset categories, Ellis (2000) added a fifth category which is the physical capital. Natural capital (NC) captures resources such as total amount of land owned by the household, total area under cultivation (irrigated and non irrigated), source and access to water for irrigation and other uses including its availability. Physical capital (PC) captures resources that include among others productive and consumable assets such as treadle pumps, drip kits used for production and radio, television as consumables. Human capital (HC) can describe the level of human capital that is influenced by factors such as sex of household head, the highest education level of the household head or any member of a household, age of household head, household size, number of adults in a household representing the household's labour force, number of extension visits to a household. In general, under human capital, household characteristics are considered as outlined above among others. Financial capital (FC) is household's finances to support production and other transaction in a household's quest for income generation from various sources. This can be through access to credit, cash at hand, value of the loan accessed and savings. Social and institutional capital (SC)is that captures a household's involvement in economic activities though social networks. This can be represented access to the nearest market (distance to the nearest market), membership to social groupings in the area etc.Thus, the relationship described above can generally be represented as;

$$Y = f(NC, PC, HC, FC, SC \quad (1)$$

Where;

Y = Household income,

Taking into consideration the model specified above and the respective variables representing each asset/capital category, equation 1 can then be econometrically specified as shown in Equation 2.

$$Y = \alpha_0 + \alpha_1X_1 + \alpha_2X_2 + \alpha_3X_3 + \alpha_4X_4 + \alpha_5X_5 + \alpha_6X_6 + \alpha_7X_7 + \alpha_8X_8 + \alpha_9X_9 + \varepsilon \quad (2)$$

Note:

Y : Household percapita income per month

Human capital (HC):

X_1 : Household size (person)

X_2 :Education of household head (years)

Natural Capital (NC):

X_3 : Harvesting area of shallot cultivation (hectare) X_8

X_4 : Government forest land (1=yes; 0=no))

Physical capital (PC):

X_5 : Shallot productivity (ton/hectare)

Financial Capital (FC):

X_6 : Access to credit (1=yes; 0=no)

X_7 : Share of nonfarm income

Social Capital (SC):

X_8 : Cooperative membership (1=yes; 0=no)

X_9 : Cropping patern (1=intercropping tumpangsari; 0: monoculture)

α = a parameter for factor i to be estimated

ε = a random disturbance term on observations made on household i in the survey

The natural log was chosen in this function to control for skewness in income and to meet the OLS assumption of linearity which was not the case with untransformed total income as a dependent variable.

3. Result and Discussion

3.1. Descriptive Statistics of Farm Households Capital/Assest

The descriptive statistics of household capital/assets of the farmer in shallot production center in upland area is presented in Table 1 and Table2. Table 1 describes human and natural capital of farm household and Table 2describes physical, financial and social-institutional capital of farm households.

Human capital in this study includes the level of education and age of household head, size of household, farming experience and family members involved in farming (Table 1). In general, the education level of household head is relatively low, the majority (65.1%) heads of household are only primary school graduates and no household heads of high educated (universities). Generally, head of households are relatively old with an average age of 46 years. This is because the youth are commonly no longer interested to work in the agricultural sector. Only 25.6% of household heads are less than 40 years old. Since most household heads are relatively old, the number of family members is relatively small, on average only 3 per household; while the average farming experience is relatively long ie 23 years and family members who can be involved in farming is relatively small considering most of their children are married. Nevertheless, it is common for each household, the couple (both husbands and wives) is actively involved in farming activities.

Table 1. Descriptive Statistics of Human and Natural Capital of Farm Households

Kind of Capital	Household (%)	Mean	Min	Max	Standard Deviation
A. Human Capital					
1. Education of household head (years)		7	-	12	3
a. Primary school b. Junior high school c. Senior high school	65.1 18.6 16.3				
2. Age of household head (years)		46	26	79	11
3. Household size (person)		3	2	6	1
4. Farming experience (years)		23	5	65	13
5. Unpaid family worker (person)		2	1	4	1
B. Natural Capital					
6. Harvesting area of shallot cultivation (hectare)		1	0,04	6,00	1,29
7. Wetland area owned (hectare)	46.5	0,12	0	1,00	0,21
8. Dryland area owned (hectare)	74.4	0,36	0	2,00	0,44
9. Government Forestry land (hectare)	65.1	0,30	0	1,50	0,38
10. Size of farmland ownership (hectare)		0,47	0	2,13	0,51
a. ≤ 0.5 hectare b. 0.5 - ≤ 1.0 hectare c. > 1.0 hectare	67.4 18.6 14.0				
11. Size of farmland tenure (hectare)		0,78	0,04	3,38	0,70
d. ≤ 0.5 hectare e. 0.5 - ≤ 1.0 hectare f. > 1.0 hectare	62.8 9.3 27.9				

Natural capital in this study consists of the ownership of land that includes a wetland and dry land; land tenure that includes the land owned and cultivated land that is not owned and total harvested area of shallot (Table 1). Land ownership by farmers includes wetlands and dryland, but not all households own both types of land, only 46.5% of households own wetland and 74.4% of households own dry land. Most households (67.4%), land ownership (wetland and dryland) are less than 0.5 hectares so this farmer is referred to as "gurem farmer (peasants)"; only 18.6% of households own land of more than 0.5 to 1 hectare (small farmer) and only 14% of households own land more than one hectare

(large farmer). The average land ownership is 0.47 hectares with a maximum ownership of 2.13 hectares. Approximately 65.1% of farm households in the study area have an opportunity to expand their cultivated land by borrowing government-owned forest land with a very cheap land rent of Rp 250,000 per hectare per year. That average land cultivated by the farmers is 0.30 hectares with a maximum area of 1.5 hectares and a minimum of 0.25 hectares. In the study area, farmers generally cultivate shallot in both wetland and dryland, one to two times a year. Therefore, although the maximum land ownership is only 3.38 hectares, the harvested area of shallot can reach up to 6 hectares.

Physical capitalin this study consists of number of dairy cattle and shallot productivity (Table 2). Dairy cattle in addition to produce milk, manure can be used as organic fertilizer which can then be used in a various farming activities;while the yield of shallot production during no harvest failure, some of the production is usually used by farmers for seeds. This means that the productivity of shallot (production per hectare) which is higher can result in higher seed availability, so it is possible to obtain a relatively large production and income. This means that the productivity of shallot (production per hectare) which is higher can result in higher seed availability, so it is possible to obtain a relatively large production and income. This means that the productivity of shallot (production per hectare) which is higher can result in higher seed availability, so it is possible to obtain a relatively large production and income. This means that the productivity of shallot (production per hectare) which is higher can result in higher seed availability, so it is possible to obtain a relatively large production and income. Most households (65.1%) have dairy cattle with an average of 2 dairy cattle and a maximum of 8 dairy cattle per household. The productivity of shallot is relatively low, on average only 3.49 tons per hectare with maximum productivity of 6.40 tons per hectare and minimum productivity of 2 tons per hectare. According to Agricultural Ministry (2005), the tuber yield of shallot cultivation in upland area is lower than lowland area. Productivity of shallot minimum is very low, in addition to harvest failure due to pests and diseases of plants, also occurs because shallot cultivation in government forest land can not be done optimally considering the annual crop has grown.

Table 2. Descriptive Statistics of Physical, Financial and Social-Institutional Capital of Farm Households

Kind of Capital	Households (%)	Mean	Min	Max	Standard Deviation
C. Physical capital:					
12. Number of dairy cattle	65.1	2	-	8	2
13. Shallot productivity (ton/hectare)		3,49	2,00	6,40	1,35
D. Financial capital:					
14. Access to credit	55.8				
15. Share of non farm income	39.5	16.6	0	97	26.8
16. Share of farm income	100.0	83.4	3	100	26.8
E. Social-Institutional Capital					
17. Cooverative membership: a. YES b. NO	46.5 53.5				
18. Farmer group membership: a. YES b. NO	67.4 32.6				
19. Cropping pattern					
Intercropping Monoculture	88.4 11.6				

Financial capital in this study consists of accessibility to credit and share of income which include share of non farm income and share of farm income (Table 2). Income is a source of savings, which is also a source of capital formation. Only a small proportion of households (39.5%), which have non-farm income sources other than farm income. Since only a small percentage of households have non-

farm income, the contribution or share of nonfarm income to total income is relatively small on average, only about 16.6%; while the contribution of farm income reaches 83.4%. However, there is a farmer whose share of nonfarm incomes is very large, reaching 97%. Apparently, access to credit of farm households in the study area is relatively large, reaching 55.8%. However, according to Table 3, most farm households (91.75) access relatively expensive credit institutions where 54.2% farm households access microfinance institutions; 37.5% of farm households access cooperative and 16.6% of farm households access village financial institution and farmer group. The interest rate in that financial instituon is about 2% to 3.5% per month. Only 8.3% farm households can access cheap credit (Bank) with an interet rate of 0.67% per month, due to limited adequate ownership of collateral, especially land certificates. Most farmers do not have land certificates.

Table 3. Sources of Credit and Their Interest Rate in Shallot Production Center

Source of credit		**Household (%)**	**Interest Rate (%) per month**
a.	Bank	8.3	0.67
b.	Microfinance institution	54.2	3 – 3.5
c.	Cooperative	37.5	2.5
d.	Village financial institution	8.3	2.5
e.	Farmer group	8.3	2.0

Social-institutional capital in this study consists of cooperative membership, farmer group membership and cropping pattern (Table 2).Although most farm households (65.1%) have dairy cattle, only 46.5% of them are members of the milk producer cooperative. The motivation to become a member of this cooperative is mainly for marketing milk of dairy cattle and to get a loan money in which one of the cooperative business unit is a saving and loan. Most farm households samples (67.4%) are members of farmer groups, but in fact most of the farmers in the study area are not members of the farmer group. Cropping pattern is a culture that enters into social-institutional capital. In this case, most of the farm household (88.4%) cultivate shallot in intercropping and simultaneously in crop rotation and only 11.6% of farm household conduct shallots cultivation in monoculture.

3.2. Pattern Income of the Farm Householdin the Upland Shallot Production Center

In the study area, especially in the shallot production center in upland area, all farmers cultivate shallot. Shallot is planted in paddy fields (wetland) and or on dryland. In general, shallot is cultivated intercropping and rotation with other crops in each year as a strategy to get the benefit of maintaining the soil fertility and obtain optimal farm income. In wetland area, shallots are planted after rice harvest which is intercropped with cabbage and chilli. Shallot can be harvested in about 2 months, while Chilli continues to grow and can be harvested continuously until the age of about 7 months before planting the next paddy. In dry land, shallot is planted at the beginning of the rainy season, it can be planted once or twice intercropped with cabbage, chilli and ginger.

As is common in upland areas, farmers in addition to planting a variety of commodities that grow well in upland areas, also many farmers who raise dairy cattle so that the income of farm households are contributed by various types of agricultural commodities and a small percentage of farmers have nonfarm income (Table 4). By distinguishing between poor farm household and non poor farm household, the income patterns of both households are relatively similar. In both the poor and non-poor farm households, farm income contributes very dominantly to the total household income of 90.7% and 91.6%, respectively. Result of this study is supported by study of Fadipe et al. (2014) resulting that farm income is the most important source of income for rural households (Fadipe et al., 2014). However, for poor farm households, farm income that contributes relatively large, apart from the shallot income is from working as a hired laborer in the farm. As for non-poor farm households, farm income that contributes relatively large, apart from shallot income is from dairy cattle and chilli (other horticulture) income.

Table 4. Farmer's Income per Year According to the Source of Income (Rp and %)

Sources of Income	Level of income (Rp)		Contribution of each income sources (%)	
	Poor Farmer	**Non Poor Farmer**	**Poor Farmer**	**Non Poor Farmer**
1. Farm income				
a. Shallot	4,391,427	28,883,118	41.7	44.9
b. Other horticulture	979,383	13,058,514	9.3	20.3
c. Food crop	179,027	2,251,468	1.7	3.5
d. Annual crop	-	192,983	0	0.3
e. Livestock (dairy cattle)	431,771	13,637,463	4.1	21.2
f. Hired farm workers	3,570,009	900,587	33.9	1.4
2. Non farm income	979,383	5,403,523	9.3	8.4
Total Income	10,531,000	64,327,656	100	100

Note: on March 2017: 1$ = Rp 13,326 (Central Bank of Indonesia)

Referring to the national poverty line for rural areas, March 2017 of Rp 361,496 (per capita monthly expenditure), about 23.3% of farm households are included in the category of poor farm household (Table 5). Per capita income of poor farm household per month is much lower than the non-poor farm household, each Rp 249,354 and Rp 1,478,060 with a relatively large standard deviation, especially for the non-poor farm households. The maximum per capita income per month for poor farm households is Rp 346,725; while for non poor farm household is Rp 4,466,250. This fact indicates that income inequality between income groups is relatively high and this is in line with the study results of Rizky et al (2017) thatever since the rapid transformation of a decentralization system in Indonesia, income distribution in the country has become much more unequal as shown by an increase of consumption-based Gini coefficient from 0.31 in 2001 to 0.4 in 2016.

Table 5. Descriptive Statistics of Per Capita and Total Income of the Poor and Non Poor Households

	Households Type		
	Poor Households	**Non Poor Household**	**Total**
1. Number of households (%)	23.3	76.7	100
Percapita income per month (Rp)			
a. Mean	249,354	1,478,060	1,131,624
b. Min	122,625	469,861	122,625
c. Max	346,725	4,466,250	4,466,250
d. Standart deviation	84,235.0	1,139,908.7	1,124,534
Total household income per year (Rp)			
a. Mean	10,531,000	64,327,656	49,177,159
b. Min	2,943,000	12,275,000	2,943,000
c. Max	20,803,500	213,860,000	213,860,000
d. Standart deviation	6,083,683.9	52,308,138.1	51,134,356

Note: on March 2017: 1$ = Rp 13,326 (Central Bank of Indonesia)

3.3. Analysis of the Impact of household capital/assets on Farm Household Income

In this study, the regression model of the impact of household capital on household welfare proxyed by household percapita income is estimated by OLS. Based on statistical tests (R2 and F test) which can be seen in Table 6 and the classical assumption test (normality, heteroscedasticity, multicollinearity and autocorrelation) that have been done show that the regression model built is good and feasible to use.

In general, the results of the regression analysis show that of nine household capital variables suspected to affect farm household income, only land area of government forest has no significant

effect (Table 6). All of influential household capital variables (education of household head, harvesting area of shallot cultivation, shallot productivity, access to credit, share of farm income, cooperative membership and cropping pattern), except household size have a positive effect. Financial capital, particularly the share of farm income is the strongest influence on farm household income, followed by human capital (household size) and social capital.

Human capital that have significant effect on farm household income in this study is household size and education ofhousehold head.However, the effect of household size in this study is not as expected, the negative effect which means that the higher number of household members will lead to lower farm household income. This indicates that a large number of household members not be an asset or a source of labor, but rather a burden on households. This is possible because although the number of household members is relatively large, but only both husband and wife are actively working in the farm while their children generally go to school. The negative impact of household size is also found in the Ogloblin and Brock (2006) study which showed that rural families who have children are clearly worse off in terms of household income per person and also is found in Baiyegunhi, (2013) and Tenzin et al. (2013) studies. In contrast to household size, education of the household head as expected gives a positive influence on farm household income. Similar results are found in many studies (Ogloblin and Brock, 2006; Ghafoor et al. 2010; Baiyegunhi, 2013, Tenzin et al., 2013: Fadipe et al., 2014).

Table 6. Regression Result: Impact of Household Capital/Asset on Farm Household Income

Variable	**Statistics Test**		
	Coef	p>|t|	Standart Error
Human Capital:			
Household size	-0.2332658***	0.000	0.0175039
Education of household head	0.0110591***	0.000	0.0063631
Natural Capital:			
Harvesting area of shallot cultivation	0.0747808***	0.001	0.020818
Government forest land	0.038935	0.504	0.0576571
Physical Capital:			
Shallot Productivity	0.0000205**	0.014	7.88e-06
Financial Capital:			
Access to Credit	0.0668428*	0.091	0.0383445
Share of Farm Income	0.8059205***	0.000	0.0083918
Social Capital:			
Cooperative membership	0.1028879**	0.013	0.0393355
Cropping Patterns	0.1407466**	0.035	0.063872
Constant	0.0378159	0.806	0.1524802
No. of obs	60		
R2	0.6980		
Adj R2	0.6775		
Prob> F	0.0000		

Note:*** = Significance level at 1%; ** = Significance level at 5%; * = Significance level at 10%

Of the two NC variables that are supposed to influence, only the harvesting area of shallot cultivation has a significant effect to farmhousehold income. It's impact is positive which indicates that the higher planting area of shallot hence the level of farm household income will be higher also. This is possible because the shallot has a relatively high economic value, although the cost of shallot cultivation is also large. Therefore, the shallot income gives the largest contribution to farm household income both in the poor farm household and non poor farm household, 41.7% and 44.9% respectively (Table 6). The results of this study are supported by the study of Tenzin et al. (2013).

For PC variable proportioned by shallot productivity, it has a significant and positive effect on farm household income.This means that the increase of shallot productivity can increase the farm income of household.This fact indicates that the increase in shallot productivity or increase yield / production per

hectare followed by increased in production efficiency considering one of the factors that determine the productivity of shallot is the level of the use of seed.The findings are reinforced by the study of Hasan et al. (2016) and Urgessa (2015). Study results of Hasan et al (2016) show that the estimation of stochastic frontier production function indicates that shallot production is influenced by farm size, fertilizer, and the amount of seed having coefficient sign in conformity with expectation. If farm size, fertilizer cost, and amount of seed increase (decrease), farm production will increase (decrease), ceteris paribus.

There are two FC variables that are expected to affect farm household income, which is dummy of access to credit and share of farm income and both have a significant and positive effect on farm household income.This means that households who have access to credit have higher farm household income.This is possible because generally the credit is used to increase or overcome the need for production capital of shallot and or chilli in particular which generally require a relatively large capital related to the procurement of inputs such as seed, fertilizer and labor.The use of shallot seed and high fertilizer can produce high productivity of shallot (Hasan et al, 2016) which in turn can increase revenue of shallot and farm household income. The impact of access to credit is in line with Mwanza (2011) and Urgessa (2015) studies. Considering the very dominant share of farm income to farm household income, the increase of farm income share can increase the farm household income. This indicates that it is not easy to develop non farm income in rural areas

Two SC variables that are expected to affect farm household income in this study, namely cooperative membership and cropping pattern, both have a positive effect. The positive effect of social capital is shown by the study of Tenzin et al. (2013).n farm household income.The impact of dummy cropping pattern in accordance with the expectation that the cultivation of shallot by intercropping and rotation provide a higher impact on farm household income.The impact of cropping pattern is in line with the results of Hasan et al.(2016). Dummy cooperative membership also gives an expected impact, being a member of the cooperative can provide a higher farm household income considering it can guarantee market of milk dairy cattle and get money loan to be used as additional capital for farming, although with relatively high interest rate.The positive effect of social capital is shown by the study of Tenzin et al. (2013).

4. Conclusion and Recommendation

The characteristics of farm households in upland shallot production centers related to household capital / assets covering HC, NC, PC, F and SC are that the human capital farm household is relatively low where most of household head are primary education level and old age with average household size which is relatively small. The condition of the natural capital, particularly the ownership of farmland is also low, most farm households own less than 0.5 ha of land but have the opportunity to expand their land by borrowing the government forest land. Quite a lot of farm households that maintain dairy cattle (physical capital) because in addition can play a role as a source of daily income, can also act as savings and sources of organic fertilizer procurement. In the case of financial capital, about half of households can access the credit of formal financial institutions, but most of the households access relatively expensive credit due to the limited ownership of collateral. Although there are quite a number of farm households with dairy cattle, but not all are members of the cooperative and only a small percentage of farm households are members of farmer groups since the formation of farmer groups is still more top down and biases to the rich farmers.

All farm households in the area of the study conduct shallot cultivation in wetland and/or dryland which is commonly planted in intercropping androtationwith other crops as a strategy to maintain soil fertility and optimize farm income. The pattern of income of poor farm household and non poor farm household is relatively the same, which is dominated by farm income and shallot income is the biggest contributor, followed by income from working as a laborer for poor farm household and followed by income milk of dairy cattle and chilli for non poor farm household.Based on the national level poverty line, there are 23.3% farm household samples that are classified as poor and the standard devaluation of income is relatively large

The results of the econometric analysis show that of the nine types of capital are supposed to influence the farm household income as a proxy for household welfare level, only the area of government forest land that does not affect significantly.All household capital variables that have a

significant effect on farm household income except household size (education of household head, harvesting area of shallot cultivation, shallot productivity, dummy access to credit, share of farm income, dummy cooperative membership and cropping pattern)have a positive impact

Based on the conclusion of the study that has been proposed to increase the welfare of farm household in upland shallot production center and also to support food security, the main government policy should be to improve farm household accessibility to cheap credit and provide non formal education in farming management.With these two policies enabling farmers to be able to increase the use of important production inputs so as to encourage increased productivity and expand the shallot growing field.Besides, the performance of cooperatives should be improved in order to provide more favorable milk prices and provide relatively large loans with relatively low interest rates.

References

Agricultural Department. (2005). Prospect and Development Direction of Shallot Agribusiness. Agricultural Department, Jakarta.

Asmara, R &Ardhiani, R. (2010). Market Integration in Marketing System of Shallot. AGRISE 10(3): 164-176.

Baiyegunhi, L.J.S. (2013). Rural households' social capital and welfare: A case study of Msinga, KwaZulu-Natal, South Africa. Journal of Agriculture and Rural Development in the Tropics and Subtropics 114 (2): 123–132

Basuki, RS. (2014). Problems Identification and Shallots Farming Analyze in the Highland at Rainy Season in Majalengka District. Journal of Horticulture 24(3):266-275

[BPS] Biro PusatStatistik. (2017, October, 16). Percentage of Poor People by Provinces 2007 - 2017.https://www.bps.go.id/dynamictable/2016/08/18/1219/persentase-penduduk-miskin-menurut-provinsi-2007---2017.html

Ellis, F. (2000). Rural Livelihoods and Diversity in Developing Countries. Oxford: Oxford University Press.

Fadipe, A.E.A. Adenuga, A.H. &LawalTrakia, A. (2014). Analysis of Income Determinants among Rural Households in Kwara State, Nigeria. Journal of Sciences 4: 400-404

Fauzi, A. (2010). The cornerstone of rural development: Rural development in the context of public welfare improvement. Jakarta: IPB Press

Ghafoor. Hussain, M. Naseer, K. Ishaque, M. & Baloch, M.H.(2010). Factors Affecting Income and Saving of Small Farming Households in Sargodha District of the Punjab, Pakistan. Pak. J. Agri., Agril. Engg., Vet. Sci., 26 (2): 27-35

Hayami, Y. (2001). Development Economics: From the Poverty to the Wealth of Nations: From the Poverty to the Wealth of Nations. Oxford: Oxford University Press.

Hilman, Y.Rosliani, R. &Palupi, ER.(2014). The Effect of Altitude On Flowering, Production, and Quality of True Shallot Seed. Journal of Horticulture 24(2):154-16.

Jasmin, Sulistyaningsih, E. &Indradewa, D.(2013). PengaruhVernalisasiUmbiTerhadapPertumbuhan, HasildanPembungaanBawangMerah (Allium cepa L., Agregatum group) diDataranRendah. IlmuPertanian 16(1), 42-57.

Mwanza, J.F. (2011). Assessment of Factors of household capital/assets that influence income of smallholder farmers under International Development Enterprises (IDE) in Zambia. Thesis. Ghent University, Belgium.

Ogloblin, C. & Brock, G. (2006). Household Income and the Role of Household Plot in Rural Russia. Applied Econometrics and International Development 6 (1): 59-76.

Rizky, M. Zuhdi, A. Tyas, V.&Dartanto, T. (2017). Corruption, Governance, and Inequality in Indonesia. Paper Presented in the Development Study Forum, 31 October 2017, SEMERU Research Institute, Jakarta.

Scoones, I. (2003). Sustainable Rural Livelihoods; a framework for analysis; ID working paper 72

Strengmann-Kuhn, W. (2000). Theoretical Definition and Empirical Measurement of Welfare and Poverty: A Microeconomic Approach. Paper presented in the 26th General Conference of International Association for Research in Income and Wealth, 27 August - 2 September 2000, Cracow, Poland.

Sumarni, N. &Setiarso, T.A.(1998). Effect of Planting Time and Size of Seed on Growth, Production and Cost of Shallot Production. Journal Horticulture 8(2): 1085-1094.

Sutarya, R. & G.Grubben. (1995). Guidance for Vegetables Cultivation in Lowland Area. Prosea Indonesia –Horticultural Research CenterLembang: GadjahMada University Press.

Tenzin, G. Otsuka, K. &Natsuda, K. (2013).Impact of Social Capital on Poverty: A Case of Rural Households in Eastern Bhutan. RCAPS Working Paper (RWP)-13004. Ritsumelkan Center for Asia Pacific Studies.

Urgessa, T. (2015). The Determinants of Agricultural Productivity and Rural Household income in Ethiopia. Thesis. Addis Ababa University School of Graduate Studies, Ethiopia.

Wagle, U. R. (2007). "Poverty in Kathmandu: What do Subjective and Objective Economic Welfare Concepts Suggest?" Journal of Economic Inequality, 5: 73-95.

AN ECONOMETRIC ANALYSIS OF WILLINGNESS-TO-PAY FOR SUSTAINABLE DEVELOPMENT: A CASE STUDY OF LAKE URMIA

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Abstract

Lake Urmia is the largest lake inside Iran, one of the most important salt lakes in the world and one of the saturated salt lakes in the world. It is similar to the Great Salt Lake in the United States and the Dead Seain Jordan. Having beautiful beaches and many tourist islands, a place with water sports such as swimming, boating and skiing became this lake to a beautiful place and tourist attraction. The purposeof this studyisestimating therecreational value ofLake Urmia. For estimating recreation function the contingent valuation method (single bounded dichotomous choice) was considered and a logitmodelwas usedtoestimate thewillingness to pay. Datawerecollectedusing questionnaire in Azerbaijan province. The results showed that recreational willingness to pay for each visit was 0.48 dollars annually. With regards to the numberof visitors from Lake Urmia,recreational value of thelakewasestimated at 756000 dollars in a year. Preservation of the lakecanplayan important rolein attracting domestic and foreign tourists. Considering sustainable development goals of the country, this lake could also create economic benefits, business expansion and employment in the region.
Keywords: Recreation Value, CVM, Willingness to Pay, Logit Model, Lake Urmia.

1. Introduction

Increase in population growth, expansion ofagricultural land, transfer of industrial,agricultural and domestic contamination by the rivers leading to lakes are the major threats for lakes and wetland ecosystems.In recent years, Lake Urmia has faced with an unprecedented ecological crisis. Lake Urmia is the largest lake inside Iran, third largest salt lake in the world and one of the saturated salt lakes in the world. It is similar to the Great Salt Lake in the United States and Dead Seain Jordan. At the time of doing this study, the length of Lake Urmia was approximately 140 Km, its width was between15 and 50Km, its maximum depth was about13 meters and its area was between 5000 to 6000 square kilometers. Because of unique ecological characteristics, Lake Urmia and several islands inthis lake,were introduced as a protected national park since 1970. This lake was introduced and recorded as a biospherere serve in Man and Biosphere Program of UNESCO since 1975. The lake was recorded in the list of convention wetland since 1975 because of having international standards of the convention of protection of wetlands (Ramsar, 1971). The lake was also recorded in the list of wetlands that are at risk of ecological changes.

Having beautiful beaches and 102 tourist islands, a place with water sports such as swimming, boating and skiing became this lake to a beautiful place and tourist attraction in the country. The number of the largest islands in Lake Urmia are such as Shahi, Arezoo, Kaboodan, Espir. Sharafkhane Port was the largest port in the northern coast of this lake, a unique location for tours of water treatment and sludge treatment. Many researchers by investigating on sludge and salts properties in Lake Urmia have been able to develop modern treatment protocols. Tourism coastal and recreation parks in west and north of the lake made this lake as favorable environment for tourists. However, in recent years due to the critical situation of the lake, the number of tourists and visitors have decreased and many opportunities in attracting tourists has lost which should be seriously considered and evaluated.

Figure 1. Location of Lake Urmia in the Middle East (Iran)

2. Background and Purpose of the Research

The purpose of this study is to estimate the recreational value of Lake Urmia. Nowadays economic valuation is used as a tool to improve them an agement of environmental resources such as wetlands. In estimating the economic benefits of natural resources we need to recognize ecosystem valuation methods. Therefore, in this section some of studies about valuation of lakes, wetlands and national parks are briefly introduced as follows. Zoysa (1996) evaluated Lake Erie in Ohio State using CVM method.The results showed that the value of peracre of lake was 155 $ and the total value of the Lake was 5.07 million dollars. Byström (2000) estimated regulatory function of Baltic Lake in Sweden through reducing nitrogen pollution from agricultural activities. The results showed that the lake can reduce costs related to the elimination of nitrogen by 30 percent.

Levchuck (2003) in a study on Sivash wetlands in Ukraine using the contingent valuation method estimated willingness to pay at 32$ peracre. Gurluk et al.(2006) estimated the recreational value of Apollonia Lake in Turkey using willingness to pay of households. Willingness to payper household was estimated at 33.35$ and also present value (PV) of the lake for20 years was estimated at17 million $. Ahmedet al.(2006) estimated recreational value of Isahaya Bay in Japan using CVM method. AverageWTP perhouse hold was estimated6560 JPY and the total value of the Bay was estimated at 1,100million JPY. Ragkos et al.(2006) evaluated regulatory function of Zazari Lake in Greece using contingent valuation method and the willingness to pay was estimated at 125£ per person. Sargsyan (2007) evaluated recreationalvalue of Lake even in Armenia. The results showed that WTP for native people was 34 $ and for non-indigenous people was 64$ for each visit. Mahmoudi et al. (2009) estimated recreational value of Anzali wetland located in Iran by CVM. Average willingness to pay was estimated at about 0.59$ and the annual recreational value was equal to 59600$. Manafi Molayosefi (2010) estimated recreational value of the Lake Maharlu Shiraz in Iran by CVM. Average willingness to pay and the annual recreational value of the lake were estimated at 0.13$ and 47480$, respectively. Bagherzadeh (2012) estimated recreational value of LakeUrmia national park using production and household cost function method. The results showed that recreation demand function had positive relationship with environmental quality, income and level of education of visitors and

negative relationship with shadow price of leisure. The shadow price of leisure for every minute of trip in the park and total values of the park were estimated at 0.02$ and 110000$, respectively.

3. Research Method

Contingent valuation method (CVM) is used to measure people's willingness to pay for environmental goods and services. This technique considers a hypothetical market for non-priced (non-market) goods and services based on which people's demand for such goods and services can be evaluated through their declared needs and the data derived from the questionnaires. In other words, this evaluation technique requires contacting people for determining the value of non-market goods and services. This technique was first used by Gracy in 1947 to measure the benefits derived from soil erosion prevention. In 1963, Davis adopted the technique of CVM in his study and many economists have used the achievements of Davis afterwards and numerous CVM studies have been done in different countries and on various subjects. Researchers have mainly focused on improving the CVM techniques (Smith, 1996). One of the main objectives of using this technique isto estimate the value of public and nonmarket goods. The obtained results can be used in cost-benefit analyses and public policies such as granting subsidies and pricing the non-market goods and services. Data of dichotomous choice questionnaires are used in a differential patterns of satisfaction to estimate consumer's surplus which determines the willingness to pay of people for different goods. In a dichotomous choice questionnaire, the respondents face a Yes/No choice for a bid. While, in a double-bounded dichotomous questionnaire, the respondents face several bids and would be given further bids according to their response to a certain bid. In fact, further bids depend on their “Yes” or “No” replies or the respondents' reaction to the earlier bid. Some believe that it is better to use double-bounded dichotomous questionnaires for a better estimation of people's willingness to pay (Marta-Pedroso et al., 2007). In a differential pattern of satisfaction, the indirect satisfaction of an individual (U) is a function of their income level, personal characteristics and the quality of the environmental goods which is valuated. One is willing to pay for preserving environmental resources if his/her satisfaction at the time of preserving the resource and paying for it is greater than his/her satisfaction when not preserving it. Equation (1) is its algebraic expression (Lee and Han, 2002).

$$U(1, INC - Bid; S) + \varepsilon_1 \geq U(0, INC; S) + \varepsilon_0 \quad (1)$$

Where U is the indirect utility an individual receives when visiting for example a park. Income (INC) is people's monthly income and Bid is the amount that an individual subtracts from his/her income to pay for preservation of a certain resource. "S" denotes other stochastic variables (people's socio-economic characteristics) with the mean value of zero which are distributed equally and independently. In the indirect utility function U(0), zero is related to the time when a resource has no utility for an individual and therefore,he/she does not allocate money for preserving it. Number one is related to the opposite situation, when a resource is useful to an individual and he/she is willing to pay for preserving it. Therefore, the utility difference (ΔU) is also a function of income, S and Bid, which is shown as equation 2 (Lee and Han, 2002).

$$\Delta U(1, Income - Bid; S) - U\ (0, Income; S) + (\varepsilon_1 - \varepsilon_.) \quad (2)$$

If (ΔU) is greater than zero, preserving the park provides utility for people and they maximize this utility by allocating money for preserving the park. The variables of income, S and bid are factors influencing the rejecting or accepting of allocating money for preserving the park. Finally, there will be an econometric model whose dependent variable is composed of zero and one. Logit model is generally used to estimate such regression models with dependent variables of zero and one (Greene, 2002). Logit cumulative probability distribution is shown in equation 3 (Green, 2002).

$$P_i(Y = 1) = \frac{1}{1 + \exp(-\beta X)} \quad (3)$$

Where P_i is the probability of accepting the bid; X is the explanatory variables and β shows the parameters of the model. Based on this logit model, the probability of P_i (an individual's accepting one of bids) is expressed as equation(4)(Hanememann,1994).

$$P_i = F_\eta(\Delta U) = \frac{1}{1+\exp(-\Delta U)} = \frac{1}{1+\exp\{-(\alpha - \beta.Bid + \gamma.Income + \theta.S)\}} \quad (4)$$

Where Fη(ΔU) is the cumulative distribution function with a standard logistic difference, θ, ϒ, β are the estimated coefficient which are predicted as θ>0, ϒ>0, β≤0. The parameters of the logit model are estimated using a Maximum Likelihood Estimator (MLE) (Judge et al., 1988). Then the expected value of willingness to pay is calculated via numerical integration within the range of zero and the highest bid (M) as shown in equation 5 (Lee and Han, 1994).

$$E(WTP) = \int_{\cdot}^{M} F_\eta(\Delta U) dBid = \int_{\cdot}^{M} \left(\frac{1}{1+\exp\{-(\alpha_{\cdot} + \beta.Bid)\}}\right) dBid \quad (5)$$

Where E(WTP) is the expected value of people's willingness to pay, (α_0) is the modified intercept which has been added to the main intercept (α) via the socio-economic term. In order to evaluate the influence of changing each of the independent variables (X_{ik}) on the probability of accepting a bid, the partial derivative of the previous equation is calculated so that the marginal impacts of the variables are known (Judge et al., 1988).

$$E(WTP) = \int_{\cdot}^{M} F_\eta(\Delta U) dBid = \int_{\cdot}^{M} \left(\frac{1}{1+\exp\{-\alpha_{\cdot} + \beta.Bid)\}}\right) dBid \quad (6)$$

Finally, the elasticity of the K_{th} explanatory variable is also derived from equation 7 (Judge et al., 1988).

$$E(WTP) = \int_{\cdot}^{M} F_\eta(\Delta U) dBid = \int_{\cdot}^{M} \left(\frac{1}{1+\exp\{-(\alpha_{\cdot} + \beta.Bid)\}}\right) dBid \quad (7)$$

As it is shown in equation 7, the elasticities are not constant and depend on the value of the explanatory variables. Finally, equations 8 and 9 are used to estimate the household's conservation value ($PV_{household}$) and its annual conservation value per hectare (PVhousehold).

$$PV_{household} = E(WTP) \times N_m \quad (8)$$

$$PV_{household} = \frac{TPV}{A} \quad (9)$$

4. Results

In this study, the data including discrete and continuous variables were collected from Azerbaijan province. Gender, education and income are discrete variables and age and number of household members are continuous variables which are shown as follows.

Table1. Statistical Analysis of Continuous Variables

Variable	Average	Mean	Standard deviation	Maximum	Minimum
Age(years)	42.2	41	11.3	72	20
Income	221.2	218	44	32	880
Education(years)	12.5	11	3.5	23	3
Number ofhousehold members	4.1	4	1.29	7	2
Number ofViews	3.34	4	1.96	6	0
Duration of eachvisit	3.42	3	2.37	11	0

Source: Research findings.

In this study 170 questionnaires were collected. Based on the collected data, 45 people of the respondents were women with a frequency of 26.47 percent and 125 people of respondents were male with a frequency 73.52 percent.

Satisfaction of individuals has been evaluated that are reported in the following table. Especially compared with several years ago, nowadays because of environmental problems, growth of this lake has declined. Satisfaction about facilitiesin Lake Urmia has relatively normal distribution with a tendency toward dissatisfied. The reason for this can be construction of two large coastal parks in this lake, unfortunately because of the drying up the lake; all of these parks have almost no use.

Table 2.Satisfaction Level of Individuals about Lake Urmia Status (Percentage)

Satisfaction	Satisfaction about current status ofthe lake	Satisfaction about facilities in Lake Urmia
CompletelyDissatisfied	59.41	49.42
Dissatisfied	29.41	25.29
Relativelydissatisfied	9.18	17.8
Satisfied	2	7.58

Source: Research findings.

4.1. Estimating the Recreational Value of the Lake

In this section the logit model is estimated usingShazamsoftware then the results of estimating the willingness to pay will be shown.The results show that variables of gender, age, income, education, number ofviews and satisfaction have positive signs whilenumber of household members and bid have negative signs. According to t-Statistic, income, education, bid and number of views are significant. Econometrics criteria including percentage of correct predictions (90%), Log likelihood (89.49) and coefficients of determined showed that a good model was estimated. Based on the results, the model variables multicollinearity was not observed between explanatory variables.

Table 3.Results of Logit Model to Estimate the Recreational Value of Lake Urmia

Variables	Coefficients	t-statistics	Elasticity	Marginal effect
Intercept	-3.31	-1.4	-	-
Sex	0.15	0.22	0.0079	0.0016
Age	0.026	0.95	0.075	0.01
Income	0.82	2.83	0.17	0.053
Education	1.4	3.71	0.3	0.093
Number ofhousehold members	-0.28	-1.18	-0.082	-0.018
Bid	-0.00044	-2.52	-0.22	-0.00028
Number ofViews	0.64	3.5	0.14	0.041
Satisfaction	0.06	0.13	0.0063	0.0039
Percentage of right prediction		0.9		
Log likelihood		89.49		
Probability		0.000		
Estrella R^2		0.52		
MaddalaR^2		0.4		
R^2 McFadden		0.51		

Source: Research findings.

In order to calculate the expected value of WTP numerical integrationranging from zero to maximum bid (A) is used. According to the following equation the expected value of WTP was estimated as follows:

$$E(WTP) = \int_0^{10000} F_u(\Delta U)dA = \int_0^{10000} \left(\frac{1}{1+\exp[-(\alpha^* + \beta A)]}\right)dA = 0.63\$$$

The mean WTP for recreational value of Lake Urmia was calculated at 0.63$ per visit annually.

5. Discussion

The objective of this study is estimating recreational value of Lake Urmia. In order to achieve the objective the data were collected through completing questionnaires and contingent valuation method for Azerbaijan province was used. In this study at first socio-economic variables were analyzed and then WTP was estimated. The results show that variables of gender, age, income, education, number ofviews and satisfaction have positive signs. In other words, being man, high age, high income, higher education, increase the number of views and satisfaction increase the probability of acceptance of the bid. Number of household members and bid have negative signs. Itmeans that increase of number ofhousehold members and bid reduce probability of acceptance of the bid. Among these variables, education and bid are effective variables with elasticity of 0.3 and -0.22. Indeed if level of education increase 1%, acceptance probability will increase 0.3%. If Bid increases by 1%, the probability of acceptance of the bid will be reduced by 0.22%. Recreational willingness to pay was estimated at 0.63$ per visit annually. At the time of doing the study and based on information collected from local Tourism Organization in Azerbaijan province on the number of visitors of Lake Urmia, total recreational value of Lake Urmia was estimated at 756000$annually. The recreational value for per square Km was estimated at 151.2$. If the results of this study is compared with other previous studies (Bagherzadeh, 2012), it is clear that estimated value is greater than other studies. Recreational value of Lake Urmia showed the importance of the lake in expansion of tourism in Azerbaijan region in Iran. Conservation of this lake has important role for attracting national and international tourists from other countries. Considering sustainable development goals of the country, this lake could also create economic benefits, businessexpansion and employment in the region.

References

Amirnejad, H. andS. Khalilian (2006), Estimating the existence value of north forests of Iran using a contingent valuation method. Journal of Agricultural and Natural Resources Science, 2: 144-154.

Amirnejad, H. (2007), Natural Resources Economics. JavdanehPublication.

Bagherzadeh, A. (2012), Environmental value ofLakeUrmia national park using production and household cost functionmethod. Journal of Environmental Researches, 5: 3-12.

Manafi, M. and B. Hiaty (2009),Estimating the recreational value of Lake Maharloo by using CVM method, Journal of Iran Natural Resources, 3: 291-302.

Mahmoodi, N. andM. Saboohi (2008), Estimating the recreational value of Anzali wetland by using CVM method. Journal of Environment, 54: 51-58.

Ahmed, S.U. and K. Gotoh (2006), Cost-benefit analysis of environmental goods by applying the contingent valuation method. Nagasaki University, 29-50.

Amirnejad, H., S. Khalilian andM.H. Assareh (2006), Estimating the existence value of north forests of Iran by using a contingent valuation method. Ecological Economics, 584: 665-675.

Boyle, K.J., F.R. Johnson, D.W.Mccollum, W.H. Desvousges, R.W. Dunford and S.P. Hudson(1996), Valuing public goods: Discrete versus continuous contingent valuation responses. Land Economics. Vol. 73, No. 3, 381-396.

Byström, O. (2000), The replacement value of wetlands in Sweden. Environmental and Resource Economics. 16: 347–362.

Cameron, T.A. and J.Quiggin (1994), Estimation using contingent valuation data from a dichotomous choice with follow-up questionnaire. Journal of Environmental Economics and Management, Vol. 27, 218-234.

Gurluk, S., and E. Rehber (2006), Evaluation of an integratedwetland management plan: Case of Uluabat Apollonia Lake, Turkey. Wetlands, Vol. 26. 1: 258–264.

Haneman, W.M. (1984), Welfare evaluation in contingent valuation experiments with discrete responses. American Journal of Agricultural Economics, 713: 332-341.

Judge, G., C. Hill, W. Griffiths, T. Lee, and H. Lutkepol (1982), Introduction to the theory and practice of econometrics, New York: Wiley.

Lee, C. and Han, S. (2002), Estimating the use and preservation values of national parks tourism resources using a contingent valuation method. Tourism Management, 23: 531-540.

Levchuck, S. (2003), Economic valuation of the Sivash wetlands Crimea, Southern Ukraine. Master Thesis. University of Wageningen.

Ragkos, A., P. A. Christofi and A. Theodoridis (2006), Using a functional approach to wetland valuation: The case of Zazari–Cheimaditida. Regional Environmental Change, 6(4): 193–200.

Sargsyan, V. (2007), Lake Sevan in Armenia. Environmental Security in Harbors and Coastal Areas, 439–449.

Walsh, M.P. and G.L. Poe (1998), Elicitation effect in Contingent Valuation: Comparisons to amultiple bounded discrete choice, Journal of Environmental Economics and Management. Vol. 36, 170-185.

Ready, R.C.,J.C. Buzby and D. Hu. (1996), Differences between continuous and discrete contingent value estimates. Land Economics. Vol. 72, No 3, 397-411.

Mitchell, R. C and R. T. Carson (1989), Using surveys to value public goods, The contingent valuation method. Resources for the Future.

Zoysa, D. A., and N. Damitha (1996), A benefit evaluation of programs to enhance groundwater quality, surface water quality and wetland habitat in Northwest Ohio. Ph.D. dissertation, The Ohio State University.

Ramsar Convention Secretariat (2007), Ramsar Handbooks for the Wise Use of Wetlands.Ramsar Information Paper No. 11.

STUDY THE VOLATILITY EFFECT OF AGRICULTURAL EXPORTS ON AGRICULTURE'S SHARE OF GDP THE CASE OF EGYPT

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Abstract

This article aims to examine the long and short run relationship between agricultural exports and agriculture's share of GDP. Links between series considered are assessed by co-integration analysis by using Johansen co-integration technique and ECM- GARCH. Results indicate a positive link in the short and long term between agricultural exports and agriculture's share of GDP, as well as the co-integration between the pairs of series used also can be found; increases in agricultural exports have followed by increases in agriculture's share of GDP, Agriculture exports and agriculture's share of GDP elasticities are being 0.62. Evidence of that past shocks and agricultural exports contribute to increase agriculture's share of GDP volatility is also found. To implement some of the policies that could be used to increase the export of agricultural products, it is relevant that the problems faced by farmers to export their products should be solved. The most important of these problems was the lack of commitment exporters' of the forward contracts; thus such these contracts need to be controlled by the government and the application of fines for breach of the contracts.
Keywords: Agricultural exports, agricultural economic growth, co-integration analysis, Johansen co-integration, ECM-GARCH.

1. Introduction

The Egyptian economy depends basically on agriculture, Suez Canal revenues, tourism, taxation, cultural and media production, natural gas exports and remittances of more than three million Egyptians abroad (mostly in the Gulf State). Agriculture played a vital role in Egyptian economy, working in the agricultural sector about 30% of the total labor force, contributing about 14.8% of GDP, and agricultural exports contribute about 20% of total good exports, making the agricultural sector a significant national income resource (State Information System, 2012). Agriculture can salvage the prevailing economic situation under instability (Raza et al., 2012; Shirazi and Manap, 2004; Jatuporn et al., 2011; Haleem et al., 2005).

Before 2011, The Egyptian economy is evolving and this evolution only appeared on the rich and did not reach the poor, whose suffer from poverty and lack of food availability. According to State Information System (2012) the poverty increased by 50%, leading to socioeconomic and political instability. These situations led to the explosion of a popular revolution on January 25, 2011.

After two revolutions in 25th of January, 2011 and 30th of June, 2013 (Arab Spring revolutions), Egypt suffering from very bad economic situation and characterized by high food and energy prices, high unemployment inflation rates, and decline in economic growth rate in most relevant sectors. These political events showed the fragility of the Egyptian economy, where the Egyptian GDP growth rate decreases from 5.1% in 2010 to 2.2% in 2014, also the inflation increases from 7.1% in 2012 to 10.1% in 2014 (World bank, 2014). Egyptian food prices increased by 17.7% from the 1st week of January 2011 till the 1stweek of December 2013 (Egyptian Food Observatory, 2013). Egypt had before these two revolutions $36 billion of the foreign reserves which has been decreased in 2016 to be $16.5 billion (Africanews, 2016). It became necessary that the Egyptian government working to increase the

cash flow of foreign by giving more attention to focus on exporting goods, especially the export of agricultural products.

Recently, Egyptian economy is suffering from a dollar shortage as a result of reduction and withdrawal a lot of investment from Egypt and demise of the tourism that guarantor of the depreciation of the currency inflows.

Most of recent studies assess the effects of agricultural export on economics have started to gain interest among economists. Many of studies found evidence that agricultural export variable has significant effects on economic growth, where it's one of the most important sources of foreign exchange income that ease the pressure on the balance of payments and create employment opportunities, thus agricultural export is considered as a very important one among economic growth contributors. Some economists seem to generally have agreed that exports can have high added value on economic growth, while others did not find much support to the export led economic growth hypothesis.

In this paper the Johansen (1988) co-integration technique based on error correction model have been used to investigate the relationship between agricultural exports and agriculture's share of economic growth in Egypt. The bivariate models for the pairs of series are modeled by means of a GARCH (1,1) specification in order to allow for time-varying and clustering volatility.

This paper is organized as follows. In the next section, a literature review of the effect of the exports and international trade on economic growth using time-series econometric techniques is presented. In section 2, the methodological approach is described. The fourth section is devoted to the empirical implementation to assess relationship between agricultural exports and agriculture's share of GDP. The last section in this article offers the concluding remarks and policy implication.

2. Literature Review

During the last two decades, the role of exports in economic growth has a wide range of literature. A large extent of these empirical researches has been conducted to explore the variable of the export effects on the economics growth rate. These studies have used either cross sectional data or time series data with vary conclusions. Some of these studies have used simple correlation coefficient technique in order to analyze the relationship between economic growth and exports e.g. (Chenery and Strout, 1966); Michaely (1977); Balassa (1978); Heller and Porter (1978); Tyler (1981); and Kormendi and Mequire (1985). They found evidence that the correlation between the growth of exports and economic growth rate were highly positive correlated.

The second part of these studies have used regression techniques to examine the relationship e.g. Voivades (1973); Feder (1983); Balassa (1985); Ram (1987); Sprout and Weaver; 1993); and Ukpolo (1994). They found a positive and highly significant effect of the product export on the GDP.

Several studies have addressed the links between exports and the national GDP by using Granger causality test which can examined the causality relationship between growth of export and economic growth e.g. Jung and Marshall (1985); Chow (1987); Serletis (1992); Dodaro (1993); and Jin and Yu (1995). These bulk of studies concluded that there existed some evidence of causality relationship between exports and economic growth.

Heiko (2008) examined the links between export diversification and economic growth. Provide robust empirical evidence of a positive effect of export diversification on per capita income growth. The study estimated a simple augmented Solow growth model and investigated the relationship between export diversification and income per capita growth. The findings of this paper was that the effects of export diversification on economic growth is potentially nonlinear with developing countries benefiting from diversifying their exports in contrast to the most advanced countries that perform better with export specialization. The evidence is strong that export concentration has been detrimental to the economic growth performance of developing countries in the past decades. Rangasamy (2009) Used modern econometric techniques within a multivariate framework attempted to ascertain whether the emphasis on export production is justified. The results showed that there is uni-directional Granger-causality running from exports to economic growth in South Africa. In addition, the gross domestic product (GDP) accounting identity underestimates the contribution of exports to economic growth.

Abou-Stait (2005) examined the export-led growth paradigm for Egypt, using historical data from 1977 to 2003. The study employed a variety of analytical tools, including cointegration analysis, Granger causality tests, and unit root tests, coupled with vector auto regression and impulse response function analyses. The paper sited three hypotheses for testing the ELG paradigm for Egypt, (1) whether GDP, exports and imports are cointegrated, (2) whether exports Granger cause growth, (3) whether exports Granger cause investment. First two hypotheses have been rejected, while third one accepted that exports Granger cause investment.

Most of the previous researches have focused on the total exports as the only source of growth, ignoring agriculture's share to total exports. This, at a time in which agriculture's exports play substantial role in under developed economies. This hypothesis also has been examined by various economists they argued that rising agricultural exports play important role in economic growth.

Mucahit and Murat (2014) investigated the causal relationship between variable of Turkish's export and the GDP through using Augmented Dickey Fuller test and Granger causality test. The obtained results concluded that there was a unidirectional causal relationship from the GDP to the export. The results revealed that the series were not stationary.

Bulagi (2015) analyzed causality between agricultural exports and its share of gross domestic product in South Africa from 1994 to 2011. The study used Granger analyses to study the relationship between agricultural exports and agricultural GDP contribution. The results of the Granger causality test of this study showed a unidirectional causality between exports and GDP. Gilbert (2013) has studded the impact of agricultural exports on economic growth in Cameroon found that the agricultural exports have mixed effect on economic growth. Coffee export and banana export has a positive and significant relationship with economic growth while cocoa export has a negative and insignificant effect on economic growth.

Ramphul (2013) investigated the causality between agricultural exports and agriculture GDP in India by using the Granger causality test. The study has found a unidirectional causal link running from farm exports to gross domestic product of agriculture. Which is indicate that agricultural products export Granger caused the growth in GDP of agriculture, which supports the export led growth hypothesis.

The studies by Noula et.al, (2013) have assessed the contribution of agricultural exports to economic growth in Cameroon. They employed an extended generalized Cobb Douglas production function model. All variables were non stationary and of an order I, and the Cointegration test was conducted for long run equilibrium. All the variables confirmed cointegration and as such the conventional vector error correction model was estimated using the Engle and Granger (1987) procedure. The findings of the study show that the agricultural exports have mixed effect on economic growth in Cameroon.

Muhammad (2012) explored and quantified the contribution of agricultural exports to economic growth in Pakistan. He has estimated the relationship between Gross domestic product GDP and agricultural and non-agricultural exports for Pakistan by using Johansen co-integration technique for the period 1972– 2008. The finding of this study is that the agricultural exports have negative and significant effect on economic growth while agricultural exports elasticity was 0.58. Moreover there was bidirectional causality in agricultural exports and real GDP. The same results have been found by Faridi (2012) who has studied the contribution of agricultural exports to economic growth in Pakistan. The results showed that the agricultural exports had negative and significant effect on economic growth while agricultural exports elasticity was 0.58. And there was bidirectional causality in agricultural exports and real GDP.

Lopez and Dawson (2010) quantified the contribution of agricultural exports to economic growth in developing countries. And they estimated the relationship between GDP and exports of agricultural and nonagricultural sector for 42 countries using panel cointegration methods. The Results showed that a long-run relationship existed; the agricultural export elasticity of agriculture's share on GDP was 0.07 whereas that of non-agricultural exports was 0.13. Haleem (2005) estimated of exports function for citrus fruit in Pakistan. The study result in importance of exports in the development of an economy cannot be denied. This is particularly true in case of a developing economy.

3. Methodology

Many empirical analyses have been introduced to assess how the international trade effect on the Growth Domestic Product (GDP) in developing countries. Most of these studies rely on two main methodological approaches they are structural analysis that can assess by rely on economic approaches, and econometric analysis of time series data that identify empirical regularities in the data. This paper analysis follows the second methodological approach. Analysis the time-series data requires study the statistical properties of these data. The most of research studies have found evidence that the presence of a unit root in the time series data and, when related, to share a tendency to co-move in the long-run (Myers, 1994).

This analysis uses error correction model by estimating johansen cointegration techniques and generalized autoregressive conditional heteroskedasticity (GARCH) models. Cointegration and error correction models (ECM) have been introduced in the literature (Engle and Granger, 1987) to characterize nonstationary and cointegrated data and inform both on their short and long-run dynamics. Time-varying and clustering volatility, another common characteristic of time-series, is typically modeled through generalized autoregressive conditional heteroskedasticity (GARCH) models. While the use of Johansen cointegration (1988, 1991, and 1995) methods is common within the financial economics literature, empirical analysis that uses Johansen (1988, 1991) cointegration to assess the link between agriculture international trade and agricultural GDP are very scarce.

The Johansen (1988) cointegration test provides a natural way to measure the relationship between two or more variables where the variables characterized by non-stationary variables, presence of unit root, and near integrated. The Johansen test considered as multivariate model and can be estimated by using maximum likelihood method. Since the Johansen's methodology based on the vector autoregression (VAR) that can be can be expressed as:

$$y_t = \sum_{i=1}^{k} A_i y_{t-i} + \varepsilon_t \tag{1}$$

Where y_t is an $n \times 1$ vectors of integrated variables of order one for $k > 1$, and ε_i are $n \times 1$ error terms. The equation (1) can be re-written as

$$\Delta y_t = \prod y_{t-1} + \sum_{i=1}^{k-1} \prod_i \Delta y_{t-i} + \varepsilon_t \tag{2}$$

Where

$$\prod = \sum_{i=1}^{k} A_i - I \; and \; \Gamma_i = -\sum_{j=i+1}^{k} A_j . \tag{3}$$

The coefficient matrix can be written as

$$\prod = \alpha \beta' \tag{4}$$

Where α are the adjustment parameters in the vector error correction model or speed of adjustment towards equilibrium and each column of β is considering as cointegrating vector.

Where $\prod$ is equal to zero that means the variables tested are not cointegrated, and the variables regard to be cointegrated where the rank of $\prod \neq 0$, where r is the number of cointegrating relationships, and If the rank of $\prod$ is reduced to be $r > n$ but is not equal to zero, then its determinant is zero. To overcome of this problem we can consider eigenvalues to be the estimators of the cointegrating vectors [1] (Sørensen B. E., 2005).

[1] Johansen tests (1998, 1991) are based on the eigenvalues of the transformation of the variables and can assess relationships among variables which have canoncial or maximum correlation that shows

Johansen tests divided into two likelihood ratio tests to assess the null hypothesis of no cointegration against the alternative of presence the cointegration of the canonical correlations; these two tests are: the trace test and the maximum eigenvalue test, represented in the equations (5) and (6), respectively. First, the trace test examines whether the null hypothesis of the rank $\prod = r$ coinegrating vectors relative to the alternative hypothesis of $r < \prod \leq n$ conatigrating vectors. Second, the maximum eigenvalue test assess the null hypothesis of $r = 0$ relative to the alternative that $r + 1 = 0$ (Hjalmarsson E. and Österholm P., 2007)

$$J_{trac} = -T \sum_{i=r+1}^{n} \ln(1 - \widehat{\lambda}_i) \tag{5}$$

$$J_{\max} = -T \ln(1 - \widehat{\lambda}_{r+1}) \tag{6}$$

The Augmented Dickey and Fuller (1979), Perron (1997) and KPSS (1992) tests used to test for unit roots are run on our data. Results support the presence of a unit root in both agricultural export and agricultural GDP. The two variables considered are also found to maintain equilibrium parity by implementing the Johansen (1988) cointegration test. The bivariate models for agricultural export and agricultural GDP pairs considered (AgExp, AgGDP) are consequently specified as an error-correction type of model (ECM) (equations 7 and 9). Model residuals are modeled by means of a bivariate GARCH (1,1)[1]specification in order to allow for time-varying and clustering volatility (equations 8 and 10).

$$\Delta EXP_t = \alpha_{EXP} + \lambda_{Exp}\delta_{t-1} + \sum_{i=1}^{2} \alpha_{EXPEXPi}\Delta EXP_{t-i} + \sum_{i=1}^{2} \alpha_{EXPGDPi}\Delta GDP_{t-i} + \varepsilon_{EXP,t} \tag{7}$$

$$\sigma^2_{EXP,t} = \omega_{EXP} + \omega_{EXP1}\varepsilon^2_{EXP,t-1} + \omega_{EXP2}\sigma^2_{EXP,t-1} \tag{8}$$

$$\Delta GDP_t = \alpha_{GDP} + \lambda_{GDP}\delta_{t-1} + \sum_{i=1}^{2} \alpha_{GDPEXPi}\Delta EXP_{t-i} + \sum_{i=1}^{2} \alpha_{GDPGDPi}\Delta GDP_{t-i} + \varepsilon_{GDP,t} \tag{9}$$

$$\sigma^2_{GDP,t} = \omega_{GDP} + \omega_{GDP1}\varepsilon^2_{GDP,t-1} + \omega_{GDP2}\sigma^2_{GDP,t-1} \tag{10}$$

where ΔGDP and ΔEXP is the first difference of logged agricultural GDP and agricultural export, respectively. $\alpha_{GDP,EXP}$ are short-run dynamic parameters that measure the influence of past agricultural GDP and agricultural export differences on current differences. The error correction term derived from the long-run equilibrium relationship is represented by δ_t, thus $\lambda_{GDP,EXP}$ measures the long-run agricultural GDP and agricultural export dynamics. $\varepsilon_{GDP,EXP}$ are normally distributed error terms. The Ljung-Box test applied to examine that the ECM-GARCH models are well specified.

4. Empirical Analysis

The analysis based on the dataset includes annual Egyptian agriculture's share on GDP and agriculture exports for the period from 1970 to 2013, yielding 44 observations. Agriculture's share of

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the maximum likelihood estimator of the cointegrating vector leads to find higher r canonical correlation of Δy_t by transforming the variable to lagged differences and deterministic variables (for more details follow Johansen, 1995 or Hjalmarsson E. and Österholm P., 2007).

[1]The number of lags used in ECM-GARCH models was determined based on statistical significance and parsimony.

GDP and agriculture exports are expressed in constant 2005 dollars (figures 1 and 2) data were obtained from the United Nations statistical database (UN database, 2016). Logarithmic transformations of agriculture GDP and agriculture exports series are used in the empirical analysis. Since ECM-GARCH modeling can only be applied to stationary data, the Augmented Dickey and Fuller (1979), Perron (1997) and KPSS (1992) unit root tests have been conducted and shown that none of the series is stationary and presence of the unit root (table 1). Thus we take the logged agriculture's share of the Egyptian GDP and agriculture exports series in first differences. Table 1 presents summary statistics for first differenced logged series used in the analysis.

We have applied the Johansen's (1988) cointegration to assess the existence of an equilibrium relationship between the pairs of series studied and to drive the error correction term in order to estimate ECM-GARCH bivariate model and evaluate the short run relationship between the agricultural exports and agriculture's share of the GDP.

Our findings suggest that there is a long-run relationship between agriculture exports and agriculture's share of the Egyptian GDP (see table 2). Existence of co-integration suggests the existence of trade flows from agriculture exports to agriculture's share of GDP. Since series used in the analysis are expressed in logarithms, co-integration parameters can be interpreted as agricultural exports and agriculture's share of GDP elasticity's. Agriculture exports and agriculture's share of GDP elasticities are being 0.62. It is not surprising to find high correlation between agriculture exports and its share on GDP. A chi-square test of weak exogeneity for long-run parameters within the Johansen's framework indicates that agriculture exports variable is endogenous for long-run parameters, agriculture's share on GDP is exogenous. This implies that the agriculture's share of GDP for maintaining such equilibrium by responding to the fluctuations that can occur by agriculture exports (see Table 2). As expected, the parameters representing long-run series used links suggest that an increase in agricultural exports will causes an increase in agriculture's share of GDP as well, which may result in higher acceptance and compatible with Mulagi (2015), and Lopez and Dawson (2010). This is not surprising since the agricultural economy in Egypt depends on agricultural exports, especially to the European market. Given that rice represents almost 40% of total Egypt's exports, the wellknown Egyptian cotton have imported to India, Pakistan and China. The European market is the major absorbs of potatoes and oranges; its represents 42% of the country's exports.

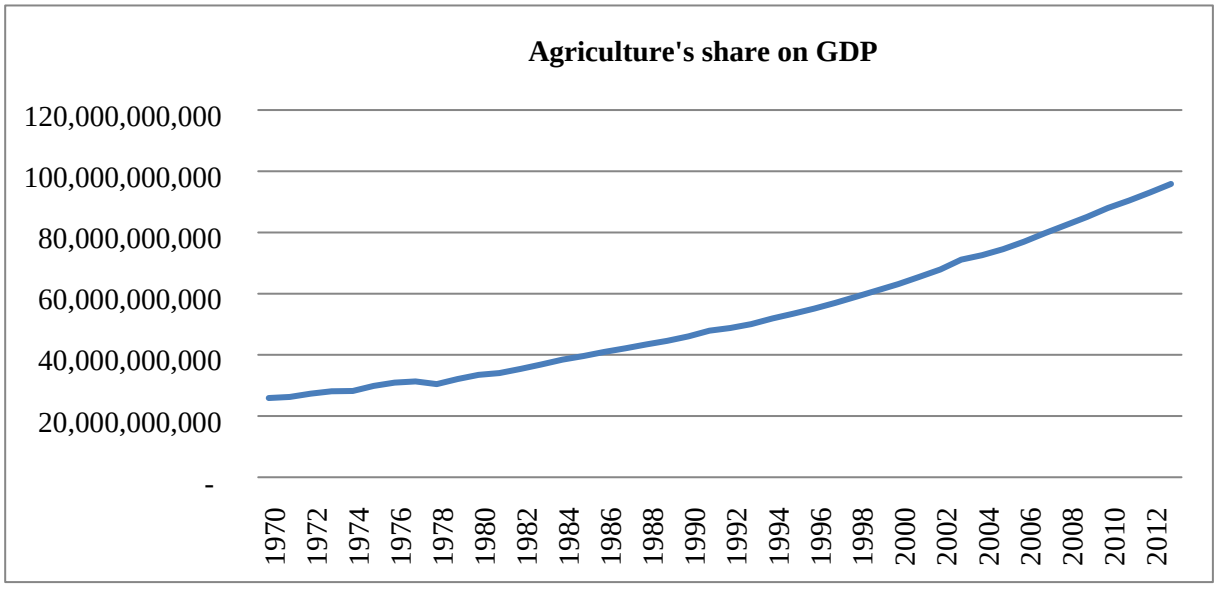

Figure 1.Annual Agriculture's Share on GDP Expressed in Dollars and Expressed in Constant 2005 $

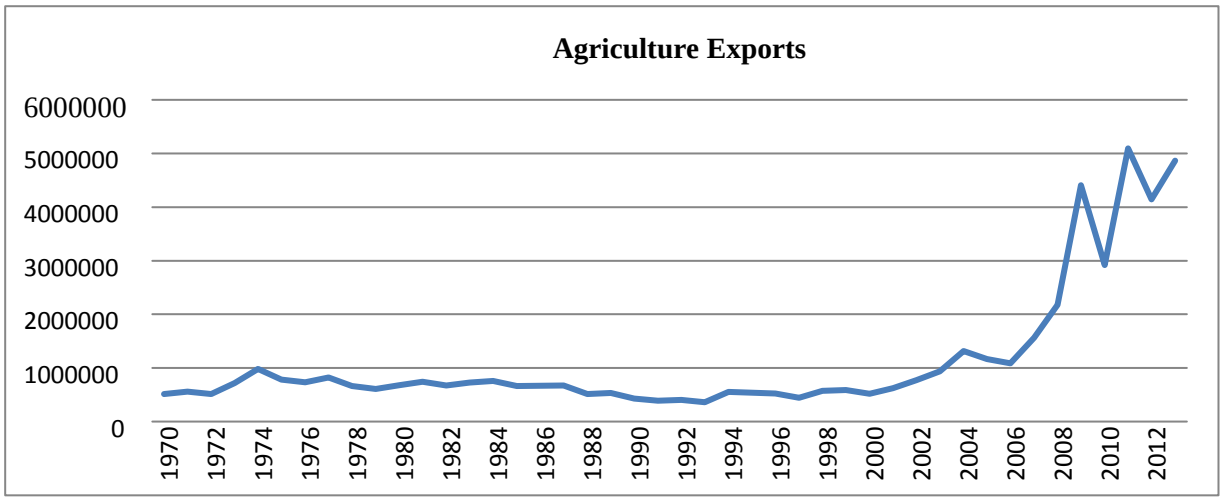

Figure 2. Annual Agricultural Exports Expressed in Dollars and Expressed in Constant 2005$

Results obtained from applied ECM-GARCH (1,1) bivariate model are presented in table 3. Short-run parameters show that current changes in agriculture's share on GDP have a negative relevant autoregressive component and also affected by agricultural exports which is supports the results mentioned above that agriculture's share on GDP found to be exogenous, while agriculture exports are weekly endogenous for long-run parameters.The speed of adjustment is negative and significant which implies that in the long run the agriculture's share on GDP has adjusted yearly by 4%. The conditional variance equation shows that past shocks contribute to increase agriculture's share on GDP volatility. Since $\omega_1 + \omega_2 < 1$, we can conclude that the GARCH process is stationary, being the unconditional long-run variance $\left(\sigma_i^2 = \omega_i /(1-\omega_{i1}-\omega_{i2})\right)$ around 5.701e-6.

Table 1. Summary Statistic For First Log-Differences Series.

Unit Root Testing on Logged Agriculture GDP and Agriculture Exports Series

	Agriculture GDP	**Agriculture Exports**
Perron	1.326	0.718
Critical values	-3.584 (1%)	-2.928 (5%)
Augmented Dickey-Fuller	2.902	3.179
Critical values	7.06 (1%)	4.86 (5%)
KPSS	1.201**	0.586*
Critical values 0.739 (1%)		0.463 (5%)

Summary Statistic for First Log-Differences Agriculture GDP and Agriculture Exports Series

	Agriculture GDP	**Agriculture Exports**
Mean	0.001	0.054
Standard Deviation	0.002	0.035
T-statistic	14.687	1.479
Skewness	-2.086	0.669
Kutosis (excess)	8.731**	0.461
Jarque-Bera statistic	167.803**	3.598
ARCH LM statistic	14.085**	11.632**
Number of observations		43

Note: *(**)indicates rejection of the null hypothesis at the 1% (5%) significance level. The skewness and kurtosis and their significance tests are from Kendall and Stuart (1958). The JarqueBera is the well known test for normality. The ARCH LM test of Engel (1982) is conducted using 5 lags**.**

Table 2. Johansen λ_{trace} Test for Cointegration and Cointegration Relationship

Agriculture GDP - Agriculture Export			
H_0	Ha	λ_{trace}	$P-value$
$r=0$	$r>0$	35.276	0.000
$r\leq 1$	$r>1$	2.865	0.614
		Agriculture GDP	**Agriculture Exports**
Chi-Square(r) **(P-values)**		29.416 (0.000)	0.688 (0.407)
Cointegration: Agriculture GDP -Agriculture Export			
$GDP_{Agr} - \underset{(-1.569)}{0.627}^{**} Exp_{Agr} - \underset{(-3.954)}{7.376}^{**} = \nu_{GDP_{Agr}Exp_{Agr},t}$			

Note: r is the cointegration rank. ** denotes statistical significance at the 5% level.

Table 3. Result for the Bivariate ECM-GARCH (1, 1) Model for Agriculture GDP - Agriculture Export

Variable	Agriculture GDP	Agriculture Export
C	-0.001 (0.021)	-0.557** (0.027)
$\Delta AgrGDP_{t-1}$	-0.186** (0.103)	0.438 (0.878)
$\Delta AgrGDP_{t-2}$	-0.347** (0.110)	-0.510** (0.910)
$\Delta AgrExp_{t-1}$	0.008** (0.004)	-0.076 (0.195)
$\Delta AgrExp_{t-2}$	0.006** (0.003)	0.213* (0.140)
$\nu_{GDP.Exp_{Agr},t}$	-0.004** (0.002)	-0.039 (0.002)
ω_i	1.580e-6 (0.032)	0.023** (0.008)
ω_{i1}	7.556e-4 (1.925)	0.467** (0.258)
ω_{i2}	0.972** (0.005)	0.030 (0.227)
Ljung-Box Q(15)	14.368	13.254

Note: (*) ** denotes statistical significance at the (10%) 5% level.

Current changes in the agricultural exports are influenced by past realizations of agricultural exports and negatively by the deviations from the long - run equilibrium, which indicates that the long run the agricultural exports have adjusted yearly by 4% , while the agricultural exports not influenced

by agriculture's share on the GDP (table 3). The conditional variance equation shows that past market shocks contribute to destabilize the agricultural exports. The bivariate GARCH (1,1) model process provides evidence of a stationary volatility process, and GARCH parameters lead to an unconditional variance $\sigma^2 = 0.047$.

The Ljung-Box test has been conducted to the bivariate model (ECM-GARCH) and the results does not allow rejecting the null hypothesis of no autocorrelated residuals from lags 1 to 15 at 5% level, which implies that the ECM-GARCH specified well.

5. Concluding Remarks and Policy Implications

While Egypt is one of the more African countries exporting agricultural products, but the current direction of the Egyptian government is that to pay more attention to industrial exports. This paper study the contribution of the agricultural exports to agriculture's share of GDP by using the Johansen (1988) cointegration technique to examine the relation between agricultural exports and agriculture's share on GDP. The ECM-GARCH bivariate model has been also conducted for the purpose to assess the short term relationship between agricultural exports and agriculture's share on GDP, which also allows for evaluate the time-varying and clustering volatility.

The analysis have based on the time series data, annual Egyptian agriculture's share on GDP and agriculture exports for the period 1970-2013, the results indicate that there is long-run equilibrium relationship between agricultural exports and agriculture's share on GDP. The agricultural export elasticity of agriculture's share on GDP was 0.62. The agricultural exports and agriculture's share on GDP have been influenced negatively by the speed of adjustment which indicates that in the long term the agricultural exports have adjusted agriculture's share on GDP yearly by 4%. Results also indicate that increases in agricultural exports will followed by increases in agriculture's share of GDP. The conditional variance equation shows that past shocks and agricultural exports contribute to increase agriculture's share on GDP volatility.

Currently, Egypt is experiencing high price of the dollar against the local currency, which requires increasing exports to provide a strong foreign reserves. According to our findings above increases in agricultural exports lead to increases in agriculture's share of GDP, and thus increases in the growth rate of the economy as a whole .

Therefore the application of some of the policies through the intervention of the Egyptian government or by the relevant bodies to increase agricultural crops exports could lead to the strengthening of the Egyptian economic performance. To implement some of the policies that could be used to increase the export of agricultural products, it is relevant that the problems faced by the farmers to export their products should be solved. The most important of these problems were the lack of commitment exporters' of the forward contracts; thus such these contracts need to be controlled by the government and the application of fines for breach of the contracts.

References

Balassa, B. (1978) 'Exports and growth: further evidence'. Journal of Development Economics, 5: 181–189.

Balassa, B. (1985) 'Exports, policy choices, and economic growth in developing countries after the 1973 oil shock. Journal of Development Economics, 18: 23–35.

Bulagi, M. B., Hlongwane, J. J. and Belete, A. (2014) 'Causality relationship between agricultural exports and agriculture's share of gross domestic product in South Africa: A case of avocado, apple, mango and orange from 1994 to 2011'. African Journal of Agricultural Research, 10(9): 990-994.

Chenery, H.B. and Strout, A. (1966) 'Foreign assistance and economic development'. American Economic Review, 56: 680-733.

Chow, P.C.Y. (1987) 'Causality between export growth and industrial development'. Journal of Development Economics, 26: 55-63.

Dickey, D.A. and Fuller, W.A. (1979) 'Distribution of the estimators for autoregressive time series with a unit root'. Journal of the American Statistical Association 74: 427-431.

Dodaro, S. (1993) 'Exports and Growth: A reconsideration of causality'. Journal of Developing Areas, 27: 227-244.

Egyptian Food Observatory. (2013) 'Food Monitoring and Evaluation System', *published by the Egyptian Cabinet's Information and Decision Support Center (IDSC) and World Food Programme (WFP),* Quarterly Bulletin, Issue 14, October-Decmber 2013. Available at: http://documents.wfp.org/stellent/groups/public/documents/ena/wfp263322.pdf(Accessed 25 February 2016).

Engle, R.F. (1982) 'Autoregressive conditional heteroscedasticity with estimates of the variance of UK inflation'. Econometrica 50: 987-1007.

Engle, R.F. and Granger, C.W.J. (1987) 'Cointegration and Error Correction: Representation, Estimation, and Testing'. Econometrica, 55: 251-276.

Feder, G. (1983) 'On exports and economic growth'. Journal of Development Economics, 12:59-73.

Fouad A. (2005) 'Are Exports the Engine of Economic Growth? An Application of Cointegration and Causality Analysis for Egypt, 1977-2003'. African Development Bank, Economic Research Working Paper, No. 76.

Haleem U, Mushtag K, Abbas A, and A.D Sheikh (2005) 'Estimation of Export Supply Function for Citrus Fruit in Pakistan'. The Pakistan Development Review, 44 : 659-672.

Heiko, H. (2008) 'Export Diversification and Economic Growth'. The International Bank for Reconstruction and Development, the Commission on Growth and Development, the World Bank, 21.

Heller, P.S. and R.C. Porter, (1978)' Exports and growth: an empirical reinvestigation'. Journal of Development Economics, 5: 191-193.

Hjalmarsson, E. and P. Österholm, (2007) 'Residual-Based Tests of Cointegration for Near-Unit-Root Variables', Manuscript, Board of Governors of the Federal Reserve System.

Jatuporn C, Chien LH, Sukprasert P, and S. Thaipakdee (2011) 'Does a Long-Run Relationship exist between Agriculture and Economic growth in Thailand'. International Journal of Economics and Finance, 3:123-135.

Jin, J.C. and E.S.U**.** Yu, (1995) 'The causal relationship between exports and income'. Journal of Economic Development, 20(1): 131-140.

Johansen, S. (1988) 'Statistical analysis of cointegration vectors'. Journal of Economics Dynamics and Control 12: 231-254.

Johansen, S., (1991) 'Estimation and Hypothesis Testing of Cointegration Vectors in Gaussian Vector Autoregressive Models'. Econometrica, 59 (6): 1551–1580.

Johansen, S., (1995) 'Likelihood-Based Inference in Cointegrated Vector Autoregressive Models'. New York: Oxford University Press.

Jung, W.S. and P.J. Marshall (1985) 'Exports, growth and causality in developing countries'. Journal of Development Economics, 18: 1-12.

Kormendi, R.C. and P.G. Mequire (1985) 'Macroeconomic determinants of growth: cross-country evidence'. Journal of Monetary Economics, 16(2): 141-163.

Kwiatowski, D., Phillips, P.C.B., Schmidt, P. and Y. Shin (1992) 'Testing the Null Hypothesis of Stationarity Against the Alternative of a Unit Root: How Sure Are We That Economic Time Series Have a Unit Root?', Journal of Econometrics 54: 159-178.

Michaely, M. (1977) 'Exports and growth: An empirical investigation'. Journal of Development Economics, 4: 49-53.

Mucahit, A. and S. Murat (2014) 'Relationship between GDP and export in Turkey. Annals of the Constantin Brâncuşi'. University of Târgu Jiu, Economy Series, Special Issue/2014- Information society and sustainable development.

Muhammad, Z. F. (2012) 'Contribution of Agricultural Exports to Economic Growth in Pakistan'. Pakistanian Jounal of Commerce and Social Science 6 (1): 133-146.

Myers, R. J. (1994) 'Time Series Econometrics and Commodity Price Analysis: A Review'. Review of Marketing and Agricultural Economics. Australian Agricultural and Resource Economics Society 62(02).

Noula, A. G. Sama, G. L. and M. D. Gwah (2013) 'Impact of Agricultural Export on Economic growth in Cameroon: Case of Anana, Coffee, and cocoa'. International Journal of Business and Management Review 1(1): 44-71.

Perron, P. (1997) 'Further evidence on breaking trend functions in macroeconomic variables'. Journal of Econometrics 80: 355-385.

Ramphul, O. (2013) 'Agricultural exports and the growth of agriculture in India'. Agricultural Economics (AGRICECON) 59 (5): 211–218.

Ram, R. (1987) 'Exports and economic growth in developing countries: evidence from time-series and crosssection data'. Economic Development and Cultural Change 36: 51-72.

Rangasamy, L. (2009) 'Exports and economic growth: The case of South Africa". Journal of International Development. 21: 603-617.

Raza S.A, Ali, Y, and Mehboob, F. (2012) 'Role of Agriculture in Economic Growth of Pakistan'. International Research Journal of Finance and Economics 83:1450-2887.

Serletis, A. (1992) 'Export growth and Canadian economic development'. Journal of Development Economics 38: 133-145.

Shirazi, N.S, T.A.A. Manap (2004) 'Export and Economic Growth Nexus: The case of Pakistan'. The Pakistan Development Review 43:563-581.

Sprout, R.V.A. and J.H. Weaver (1993) 'Exports and economic growth in a simultaneous equations model'.

Journal of Developing Areas, 27(3), 289-306.

State Information System (2012) 'State Information System Your Gate Way to Egypt'. Available at: http://www.sis.gov.eg/En/Templates/Articles/tmpArticles.aspx?CatID=1353#.VqIUaZorIb0(Accessed February, 2016)

Stiglitz, J.E. (2007) 'Making Globalization Work for Developing Countries'. W. W. Norton & Company, Inc., 500 Fifth Avenue, New York, NY 10110

Tyler, W. (1981) 'Growth and export expansion in less developed countries: some empirical evidence'. Journal of Development Economics 9: 121-130.

Ukpolo, V. (1994) 'Export composition and growth of selected low-income African countries: evidence from time-series data'. Applied Economics 26(5): 445-49.

Voivodas, C.S. (1973) 'Exports, foreign capital inflows and economic growth'. Journal of International Economics 22: 337-349.

World Bank. (2014) 'Egypt Overview'. Washington DC. TheWorld Bank. Available at:
http://www.worldbank.org/en/country/egypt(Accessed 20 May 6).

THE ECODEVELOPMENT OF PROTECTED AREAS IN POLAND – CHALLENGES AND OPPORTUNITIES

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Abstract

The area covered by protected areas in Poland amounts to 33,1%; the region with the highest percentage of areas covered by them is in the Swietokrzyskie Voivodeship – 62 %. These areas are usually landscape parks and protected landscape areas. The basic of development of protected areas should be based on the production of high quality food and food processing. This paper presents problem challenges and opportunities of ecodevelopment of protected areas in Poland. The work continue discusses theoretical issues of instruments and institutions with reference to polish protected areas. Following the topic, the role of inhabitants and institutions in ecodevelopment of protected areas has been analyzed. The problem of strategic management in the context of ecodevelopment has been raised in this paper. The research shows that challenges should undoubtedly include social problems among which the respondents especially point out unemployment particularly among young persons, problems with alcohol and lack of developmental perspectives as well as depopulation of these areas and aging society due to the fact that "young people left for England to find work there." The next challenge for the discussed area will be finding financial resources and potential investors providing workplaces (who will not open shops like Biedronka or Lidl).

Developmental possibilities for protected areas in Poland will result from the necessity of stricter environmental protection, which will enforce more and more pro-ecological economic activity. Tourism, craft and ecological agriculture as well as product innovations in this field should develop increasingly. Special attention is paid to the participation of the public institutions and the authorities in ecodevelopment of protected areas.

Keywords: Inhabitants, local development, rural areas, protected areas, ecodevelopment, Poland.

KNOWLEDGE LEVELS OF THE CANDIDATE GRADUATES OF AGRICULTURAL ECONOMICS ON CLIMATE CHANGE AND ITS IMPACTS ON AGRICULTURE

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Abstract

This study aimed to determine the factors influencing the candidate graduates' knowledge levels on the knowledge levels about global climate change and its effects on agriculture. A face-to-face survey with 506 candidate graduatesin the departments of agricultural economics from 16 universities in Turkey was used to collect the data. The knowledgeof climate change and its impacts on agriculture were determined by the candidate graduates' assessments based on a five-point likert scale. The factors affecting the candidate graduates' knowledge levels were analyzed by using orderedprobitmodel. The study reveals that the candidate graduate students' knowledge about climate change and its effects were found to be intermediate level. Probitmodel results show that gender,having knowledge of climate change from university and being student of technical departmentshad positive effects on the knowledge level of climate change and its effect on agriculture.To increase the graduates' knowledgeon climate change and its effects, the departments should put more compulsory courses on climate change in their undergraduate programs and employ more expert academic staff on climate change in the departments.
Keywords: Knowledge, climate change, impacts, candidate graduates, agricultural economics, ordered probit, Turkey.

FARM PRODUCTIVITY IN RURAL AREAS THROUGH THE APPLICATION OF LIQUID SMOKE ON BALI BEEF CATTLE FARMER IN BARRU REGENCY SOUTH SULAWESI INDONESIA

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Abstract

Application of science and technology for the community (IbM) in the form of Liquid Smoke Technology Application in Bali Cattle Farmers Group in Tanete Riaja Sub-district of Barru Regency has been made on two partners of IbM namely Sikapa Livestock Group and Group of Lempang Bwhich lasted for five months. This activity aims to improve the skills of livestock group members in the application of animal husbandry technology to problem-solvingto increase the productivity of cattle kept in cages. Balinese cattle sightings require the provision of feed in the form of cut and carry while forage feed availability during the year is uneven. The availability of forage is very low in the dry season and when the cultivation of rice. Feed processing and forage in abundance is the best solution for feed fulfillment especially forages throughout the year.The method of implementation was in the form of training (theory and practice), action research, and assistance to making theproduct. The application of feed products on Balinese cattle at cage was made. Preparation of feed in the form of urea, coconut water, liquid smoke, multinutrient block (UCSMB) and probiotic fermented rice straw is given to farmers in the form of training in both groups of partners. Feeding experiment UCSMB and straw fermented probiotic performed on 12 cattle for 26 days. Weighing the cattle was done before and after treatment to find out the value of average daily gain. Six cattle are slaughtered,and then muscle *Longissimus dorsi* quality analyzed regarding the shear force value raw and cooked meat (RMSF and CMSF), cooking loss (CL), flesh water binding ability (WHC) and the level of acidity (pH) of meat. The results showed that during the training the farmers were very enthusiastic about the material is given. Post-training of livestock groups has made the manufacture of UCSMB as much as 200kg and 300kg of fermented straw. The weight gain of Balinese cattle during maintenance at the cage 0.55kg / day, the quality of meat increased with increasing concentration of liquid smoke and maturation time. At the concentration of liquid smoke 20% of raw and cooking shear force (RMSF and CMSF) decreased to 3.23 and 3.68 kg / cm2 respectively, cooking loss decreased to 13.42%, WHC increased to 20.23, and pH decreased to 5.98. It can be concluded that the application of liquid smoke in UCSMB feed increases the productivity of Balinese cattle in rural livestock.
Keywords: Liquid smoke fermented straw, livestock group, meat quality, Bali beef cattle.

1. Introduction

Cattle farms in Indonesia in general and in particular in South Sulawesi is a community farm with theextensive maintenance of more than 90%. With the low level of application of technology has implications for low livestock productivity. The development of cattle farms in South Sulawesi is suspected by the important role of social capital that is abelief, norm, and linkage (Sri Lestari *et al*., 2017). The cattle nurtured the majority of local cattle where 55% of them are Balinese cattle (Bos sondaicus) (Bali Post, 2008). The level of ownership of cattle is quite low where the ownership of cattle with a scale of 1-4 tail reaches 92% (Sirajuddin *et al*., 2017). Meanwhile, Asnawi *et al*. (2017) found that the average breeder owns three cows, one of whom raises 27 cows. Sri Lestari *et al*. (2017) states that the average cattle ownership of 4 heads, indicating the cattle breeding business is small scale.

Placement of Bali cattle in the cageis an effort to improve the performance of cows through the introduction of technology that is more easily given to the maintenance system. Although it is known that Bali cattle can adapt well to apoor environment with low feed quality (Sastradipradja, 1990). The placement of Bali cattle in the cage raises problems in cut and carry feeding; take time to mow the lawn and give it to the cow in the cage. Where in the dry season and during the rice season becomes more severe again due to the availability of grass is diminishing.

Tanete Riaja Sub-district as the region with the second highest number of Bali cattle population reached 11,664 in 2012 in Barru district (BPS, 2013), has carried out cattle sightings with showroom terms. Breeders in groups do business breeding andfattening of Bali cattle.

The main problem posed by IbM partners to improve rural livestock production can be concluded the provision of feed. Consequences of livestock in the cages require farmers to feed cut and carry forage, cut elephant grass or rice straw and then go to cattle in the cage.

The application of probiotic fermentation of rice straw technology and supplement feeding in the form of Urea Coconut Water Liquid Smoke Multi Nutrient Block (UCSMB) has been made in previous research with very satisfactory results (Abustam *et al*., 2017). UCSMB is a modification of Urea Molasses Block (UMB). Kunju (1988) suggested that UMB formula consisting of molasses 45%, urea 15%, themineral mixture 15%, 8% salt, 4% calcite powder, 3% bentonite, and cottonseed meal 19%. While in UCSMB, molasses are replaced with coconut water and added liquid smoke as antioxidants and preservatives (Table 1). The preparation and delivery of UCSMB developed by using several concentrations of liquid smoke are expected to be capable of solving the solution to meet the availability of feed which will have an impact on increasing productivity of Bali cattle in therural area.

2. Method of Implementation

The application of science and technology to the community is given to a partner of Sikapa Livestock and Lempang B Farmer Group through the approach of training (theory and practice), action study, assistance and applying of feed product to Bali cow at the cage. This activity lasted for five months.

2.1. Training (Theory and Practice)

Training is designed in such a way that the technology inputs provided can be received quickly by members of both groups of livestock. For that matter other than presented directly also made in the form of atraining module that easy to understand by the trainee. There are several training modules provided include Liquid Smoke Application on Feed Block, Feed Technology UMMB To Increase Productivity of Beef Cattle, and Cow Fattening. After the presentation of the material proceed with the practice directly to the material presented earlier.

2.2. Assess the Actions

Assessment of the application of technology provided during the training is expected to increase the productivity of group members, which in turn the implementation of science and technology (IbM) will empower the business and increase the income of group members.

2.3. Accompaniment

The sustainability of the empowerment of both groups of livestock members as partners of IbM (Sikapa and Lembang B) in the implementation of technology (IbM) offered can be sustainable so that the assistance is done both in the production process and in marketing. Evaluation of the production and mentoring process is carried out by the implementing team, at least once a month during the IbM program.

2.4. Application of Feed Products

Feed products in the form of probiotic fermented rice straw and UCSMB produced by IbM partners were then given to Bali cattle at thecage for 26 days. Weight measurements are taken weekly to determine weight gain per day during feeding. The amount of feed given is limited to 5 kg of probiotic fermented rice straw and 500 grams of UCSMB per day.

2.5. Observation of Meat Quality

Observation of weight gain using 12 cows Bali. After feeding for 26 days, cattle were slaughtered,and meat sampling was done on the *Longissimusdorsi* muscle. Measurement of meat quality is done based on the completely randomized design of 3 x 3 factorial pattern where factor 1: liquid smoke concentration (0, 10, and 20%), factor 2: maturation time (0, 7, and 14 days). And the repetition is done for three times.

Measurement of shear force value of meat is intended to see the level of the tenderness of meat by using the CD Shear Force.Where the sample of meat in the form of a cylinder with a length of 1 cm and a diameter of 0.5 inches is placed in a shear force CD hole that uses a blade of 1 mm thick to cut the sample. The greater the burden to break the meat sample the more the meat will be tough. Shear force valueis expressed in kg / cm2 (Abustam *et al*., 2017).

The CL measurements were done by calculating the difference between sample weight before cooking and after cooking at 80^0C for 15 minutes (Soeparno, 2005; Abustam *et al*., 2017).

Measurement of water holding capacity using paper filter press method based on Hamm in 1986 (Abustam *et al*., 2017).

The pH measurements were performed using pH Lutron pocket type PH-201 Meter with a special spear tip for PE-06 HD meat.

2.6. Statistic Analysis

The data were processed by analysis of variance (ANOVA) followed by BNT test if real effect based on Steel and Torrie (1991) using SPSS program support (SPSS 16.0, SPSS Ltd., West Street Woking, Surrey, UK)

3. Results and Discussion

The training was attended by 30 members of the cattle group Sikapa and Lempang B, beginning by opening by the head of Livestock Sub-District Tanete Riaja. After the opening continued the material presentation, where the participants enthusiastically follow.

3.1. Making Urea Coconut Water Liquid Smoke Multi Nutrient Block (UCSMB)

Practical in making UCSMB is directly after the exposure of the material. There are three different kinds of UCSMB in liquid smoke concentration in block feed formulation,i.e., 0% concentration (control), 10% concentration, and 20% concentration with 2% grading rate in the formulation. The composition of feed supplements in block form can be seen in Table 1.

Table 1. Feed ingredient and Price of UCSMB

No	Feed materials	Feed ingredient (%) and price at liquid smoke concentration different					
		0%	Price (IDR/kg)	10%	Price (IDR/kg)	20%	Price (IDR/kg)
1.	Coconut water	30	150	28	140	28	140
2.	Urea	5	200	5	200	5	200
3.	Rice Bran	30	1,140	30	1,140	30	1,140
4.	Cornmeal	10	600	10	600	10	600
5.	Copra meal	10	550	10	550	10	550
6.	Cement	10	125	10	125	10	125
7.	Cow Mineral	2	120	2	120	2	120
8.	Table Salt	3	114	3	114	3	114
9.	Liquid Smoke	0	0	2	1,000	2	1,000
10.	Total	100	2,999	100	3,989	100	3,989

UCSMB product per block weighing 500 grams at a price of 1,994.50 IDR for liquid smoke concentrations 10 and 20% while 1,499.5 IDR without liquid smoke (Table 1).

Post-training partner IbM has performed UCSMB 4 times with the amount of 50 kg per manufacture which is destined as Bali cattle feed which used as research material to see weight gain and meat quality.

The results of the nutritional analysis of UCSMB are shown in Table 2. High enough protein content (33.46%) will be able to meet the protective requirements for fattening cattle, as well as the high crude fiber content (9.13%) can replace the elephant grass as a common basic feed used by IbM partners in cattle fattening in cages.

Table 2. Nutrition of UCSMB and rice straw fermentation

No	Feed	Water	Protein	Fat	Crude Fibre	NFE	Ash
1	UCSMB 0%	32,74	28,83	7,05	11,21	27,57	25,34
2	UCSMB 10%	31,81	30,59	8,13	9,72	26,37	25,19
3	UCSMB 20%	31,79	28,53	8,12	10,93	26,51	25,91
4	Rice straw	12,13	5,87	2,85	38,19	32,20	20,89
5	Rice straw Fermentation	10,61	7,87	3,08	36,90	27,90	24,25

Notes: 1) The results of laboratory analysis of Livestock Chemicals and Feeding Faculty of Animal Husbandry Hasanuddin University
2) Except for water, the analysis results are calculated based on dry matter
3) NFE = Nitrogen Free Extract

The UCSMB product is a modification of Urea Molasses Multi Nutrient Block (UMMB) where molasses are sometimes difficult to obtain and expensive prices are replaced with fresh coconut water that is easily obtained at very low prices as waste from coconut dissolution and added liquid smoke as an antioxidant (Abustam *et al* ., 2017). High levels of protein, fat, and coarse fiber in UCSMB can be considered as dietary supplements that can meet the nutrient requirements of Balinese cattle. Table 2

shows high levels of protein and fat in UCSMB of 10% liquid smoke concentration, while the content of crude fiber and ash is lower than UCSMB 0% and UCSMB of theliquid smoke concentration of 20%.

3.2. Making of Probiotic Fermented Rice Straw

Fermented products are produced from arice straw fermentation process using Probiotic Organic Liquid Supplement (SOC) for 10-12 days. 150 kg of rice straw stacked several piles after sprinkling with diluted SOC probiotic solution with 30 cc SOC ratio dissolved into 45 liters of clean water. Then among the piles sprinkled with smooth rice bran. After 10 - 12 days rice straw is fermented and ready to be used as cow feed. Results of laboratory analysis showed better nutritional value than rice straw without fermentation (Table 2).The protein content of fermented straws was 2% higher than the straw without fermented to 7.87%.

Price of fermented straw per kg 1,000 IDR. Giving to cattle as much as 5 kg per day with price 5,000 IDR

After the training has been made probiotic fermentation rice straw two times with the amount of 150 kg per manufacture, where the product is produced for the needs of cattle feed in the cage.

3.3. Economic of Daily Gain

The economic overview of Balinese cattle weight gain during 26 days of UCSMB feeding and fermented straw was shown in Table 3. Feeding per cow per day was 500 g of UCSMB at a price of 1,994.50 IDR and 5 kg fermented straw at 5,000 IDR. Thus the cost of feed expenditure is 6,994.50. Labor and pharmaceutical costs are not taken into account on the grounds of self-management by the farmers while medicines are government aid. Based on the economic analysis per cow per day with the average weight gain of 0.55 kg/day with the price of 42,000 IDR per kg of live weight the breeder get profit 16,105.50 IDR. The B / C Ratio analysis shows that the 10% smoke concentration gives the highest BC / Ratio 3.83 compared with 0.85 without smoke and the smoke concentration of 20% 2.30 with the average value of BC / Ratio 2.33 (Table 3).

Table 3. Average Daily Gain of Bali Cattle During Feeding for 26 Days

No.	LS. Conc (%)	ADG (kg/day) for 26 days			Revenue and benefit			BC/ Ratio
		BW1 (Kg)	BW2 (Kg)	ADG (kg)	Feed cost (IRP)	Price/kg ADG (IDR)	Benefit (IDR)	
1.	0	151.5	158.5	0.27	6,994.50	11,340.00	4,345.50	0.62
2.	0	145.5	150.5	0.19	6,994.50	7,980.00	985.50	0.14
3.	0	117.0	122.5	0.21	6,994.50	8,820.00	1,825.50	0.26
4.	0	135.0	149.5	0.56	6,994.50	23,520.00	16,525.50	2.36
Mean		137.25	145.25	0.31	6,994.50	1,2915.00	5,920.50	**0.85**
5.	10	165.0	180.0	0.58	6,994.50	24,360.00	17,365.50	2.48
6.	10	211.0	225.5	0.56	6,994.50	23,520.00	16,525.50	2.36
7.	10	210.0	242.5	1.25	6,994.50	52,500.00	45,505.50	6.51
8.	10	106.5	128.0	0.83	6,994.50	34,860.00	27,865.50	3.98
Mean		173,13	194.00	0.80	6,994.50	3,3810.00	2,6815.50	**3.83**
9.	20	202.0	235.0	1.27	6,994.50	53,340.00	46,345.50	6.63
10.	20	177.5	186.5	0.35	6,994.50	14,700.00	7,705.50	1.10
11.	20	158.0	168.0	0.39	6,994.50	16,380.00	9,385.50	1.34
12.	20	131.0	136.0	0.19	6,994.50	7,980.00	985.50	0.14
Mean		167.13	181.38	0.55	6,994.50	2,3100.00	1,6105.50	**2.30**
Total		1910	2082.5	6.65	83,934.00	279,300.00	195,366.00	2.33
Mean		159.17	173.54	0.55	6,994.50	23,100.00	16,105.50	**2.33**

A daily weight gain of 0.55 kg/day indicates that UCSMB administration and probiotic fermented rice straw respond to good daily weight gain. The weight gain achieved is better than the weight gain of Balinese cattle, in general, ranging from 0.2 to 0.3 kg/day (Sastradipradja, 1990). The nutritional qualities of high probiotic fermented rice straws and UCSMB can explain this. A short enough time of administration has not been able to produce a higher ADG.

3.4. Meat Quality

The quality of meat from fattening of Bali cattle through the provision of probiotic rice straw fermentation feed and UCSMB can be explained through the measurement of several parameters of meat quality, including shear force value of cooked and raw meat, cooking loss, water holding capacity, and pH. Table 4 shows the quality of Balinese beef based on the concentration of liquid smoke and maturation time.

Table 4. Meat Quality Ob Bali Beef Cattle Based on Liquid Smoke Concentration and Time of Maturation

Treatments	CMSF (kg/cm^2)	CL (%)	RMSF	WHC	pH
LS Conc:	Sig:0.001	Sig:0.001	Sig:0.001	Sig:NS	Sig:0.001
0%	8.24^{a}±1.96	23.41^{a}±6.75	4.03^{a}±0.15	18.38±2.42	6.52^{a}±1.99
10%	4.13^{b}±0.54	15.38^{b}±2.22	2.47^{b}±0.18	18.58±3.26	6.02^{b}±0.36
20%	3.68^{bc}±0.41	13.42^{b}±2.39	3.23^{c}±0.71	20.23±3.97	5.98^{bc}±0.40
Aging:	Sig:0.001	Sig:0.001	Sig:0.001	Sig:0.001	Sig:0.001
0 days	6.11^{a}±2.87	20.41^{a}±6.50	3.59^{a}±0.73	15.79^{a}±2.06	5.87^{a}±0.55
7 days	4.60^{b}±1.35	18.54^{a}±6.63	3.25^{b}±0.67	20.47^{b}±2.54	6.40^{b}±0.23
14 days	5.34^{c}±2.67	13.25^{b}±1.44	2.91^{c}±0.82	20.93^{bc}±2.39	6.24^{c}±0.12

Remarks: CMSF=Cooked meat shear force value, CL=cooking loss, WHC=water holding capacity, pH=potentialhydrogen, LS.Conc=liquid smoke concentration

3.4.1. Cooked Meat Shear Force (80^0C - 15 ')

The higher the concentration of liquid smoke in UCSMB decreases the meat cooked shear force to 55.34% at concentrations 20% lower than without liquid smoke. This matter indicates the excellent ability of liquid smoke supplied directly to livestock through UCSMB feed to lower the meat shear force value. Previous studies where direct liquid smoke was given to fresh meat showed that the concentration of liquid smoke did not significantly affect the shear force value of the meat (80^0C - 15 ').

The longer maturation time decreases shear force value, and at maturation time of 14 days,shear force valuereaches 27.82% lower than maturation time 0 days. This result is in line with the decline in raw meat shear force value during the maturation due to the action of proteolysis enzymes. However, the decline of cooked meat shear force value was greater than that of the raw meat of 18.94% at the maturation time of day 14 (see Table 4). Heating the meat at a temperature of 80^0C causes the dissolution of collagen which results in the tenderness of raw meat can explain this (Abustam *et al*., 2016).

3.4.2. Cooking Loss

The increasing concentration of liquid smoke in UCSMB decreased cooking loss and decreased 34.30% at 20% concentration, although there was no significant difference between 10% and 20% concentrations. The decrease in a cooking loss at higher concentrations of liquid smoke in UCSMB feeds gives a positive result that the concentration level decreases the cooking loss which will have implications for the increase in the yield of meat and processed meat products.

Increased maturation time decreases cooking loss reaches 35.08% at maturation day 14, although there is no real difference between maturation day 0 and 7. Thisresult indicates that the liquid smoke in UCSMB feed is capable of inhibiting the loss of free and semi-free water and the possibility of water binding in the protein (WHC) during maturation which would have implications for high yields of processed meat products even using matured meats.

3.4.3. Raw Meat Shear Force (RMSF)

The increasing concentration of liquid smoke in UCSMB, the decreasing the raw meat shear force; at 10% liquid smoke concentration decrease of RMSF reach 38.71%,and at aconcentration, 20% decrease reach 19.85% compared without liquid smoke. This matter suggests that UCSMB liquid smoke given to Balinese cattle for 26 days can improve the quality of meat through increased tenderness, which is at concentrations of 10% better than concentrations of 20%.

The higher the maturation time, the RMSF decreases to 18.94% at 14 days maturation time lower than the initial maturation (0 days). The low RMSF explains that the meat is more tender than the high RMSF. Previous research using smoked flour on buffalo meat showed that RMSF decreased as long as maturation reached the lowest RMSF value at maturation time of 14 days reached 30.32% (Abustam *et al.*, 2015). Proteolytic enzymes, especially cathepsin enzymes cause improved tenderness of fresh meat during maturation (2 - 5^0C). The improvement of tenderness indicates that liquid smoke can trigger cathepsin enzymes to work more effectively to improve the tenderness of raw meat during maturation.

3.4.4. Water Holding Capacity

Different concentrations of liquid smoke in UCSMB produce approximately the same WHC, although there is a tendency for WHC to increase with increasing concentrations of liquid smoke. At 20% concentration of liquid smoke, WHC reached 20.23% slightly higher than the 10% concentration and without liquid smoke.

The higher the maturation time, the WHC increased to 32.55% higher than the initial maturation time (0 days), although there was no significant difference between maturation time of 7 and 14 days. Increased WHC meat with increasing maturation time indicates that UCSMB liquid smoke given to Balinese cattle for 26 days can improve meat quality through increased WHC during maturation.

3.4.5. pH

The higher the concentration of liquid smoke in UCSMB, the lower the final pH reaching 8.28% lower at a 20% concentration. However, there was no significant difference between the concentrations of 10% and 20%. Thismatter indicates that the liquid smoke given in the block feed for 26 days can decrease the pH ultimate of Balinese beef.

4. Conclusion

Training in the form of papers and lab exposure has been carried out successfully, followed by 30 members of Sikapa and Lempang B farmer groups as activity partners. The making of UCSMB and fermented rice straw has been followed up by members of farmer groups. Post-training of livestock groups has made UCSMB as much as 200 kg and 300 kg of fermented straw.

The B / C Ratio analysis shows that the 10% liquid smoke concentration gives the highest BC / Ratio 3.83 compared with 0.85 smoke without the mean value of BC / Ratio 2.33. The quality of Balinese beef increases with increasing concentrations of liquid smoke in UCSMB feed and maturation time.

This research concluded that the productivity of Balinese cattle rearing in rural areas increased through the application of UCSMB feed and fermentation of rice straw.

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References

Abustam, E, Said, M. I.,Yusuf, M., Ali, H.M. (2015).The Influence of the Types of Smoke Powder and Storage Duration on Sensory Quality of Balinese Beef and Buffalo Meatballs. International Journal of Biological, Biomolecular, Agricultural, Food and Biotechnological Engineering. Vol:9, No:12, 1154-1157, 2015.

Abustam, E., Yusuf, M., Ali, H.M., Said, M. I., and Yuliati, F.N. (2016). Quality of Bali beef and broiler after Immersion in liquid smoke on different concentrations and storage times. International Journal of Biological, Biomolecular, Agricultural, Food and Biotechnological Engineering Vol: 10, No: 2, 2016. World Academy of Science, Engineering,and Technology

Abustam, E., Said, M.I.,Yusuf, M., Nahariah, Tago, S. (2017).Effect of Liquid Smoke Concentration in Feed Block Supplement and Time of Meat Maturation on Bali Beef Quality. American-Eurasian Journal of Sustainability Agriculture, 11(6): 35-41.

Asnawi, A., Amrawaty, A.A., Nirwana. 2017. Local culture and ability to access funding for beef cattle farmers. American-Eurasian Journal of Sustainable Agriculture. 11(5) September 2017: 18-23.

Bali Post, 2008. Sapi Bali, PlasmaNuftah yang harus Diles tarikan http://www.balipost.com/Bali Postcetak/2008/1/18/b9.htm (Akses, 1/1/2011)

BPS. (2013). Kabupaten Barru Dalam Angka 2013. Badan Pusat Statistik Kabupaten Barru

Kunju, G. (1988). Development of Urea Molasses Block and its field application in India (A Review). AJAS, Vol 1 (No. 4) 233-239.

Sastradipradja, D. (1990). Potensi internal sapi Bali sebagai salah satu sumber plasma nutfah untuk menunjang pembangunan peternakan sapi potong dan ternak kerja secara nasional. Pros. Seminar Nasional Sapi Bali. Denpasar, 20-22 September. Denpasar: Fakultas Peternakan Universitas Udayana. Hlm A-47–A54.

Sirajuddin, S.N., Nurlaelah, S, Amrawaty, A., Amrullah, T.,Rohani, S., Saleh, I.M., (2017). RelationshipBetween Farmers Characteristic and Income from Beef Cattle with The Traditional Profit-Sharing. American-Eurasian Journal of Sustainability Agriculture, 11(5): 29-34.

Sri Lestari, V., Sirajuddin, S.N., Abdullah, A.(2017). Identificationof social capital on beef cattle farmers group. AENSI Journals, Advances in Environmental Biology. 11 (11) November 2017. Pp: 6-10.

Soeparno, (2005). Meat Science and Technology. Gajah Mada University Press, Yogyakarta (Indonesian).

Steel, R.G.D., and Torrie, J.H.(1991). Principles and Procedures of Statistics. McGraw-Hill, Book Co. Inc, New York

THE CAPACITY OF TEMPORARY EXTENSION WORKERS (THL) IN INCREASING INNOVATION IDEAS OF LIVESTOCK OWNERS FOR THE ADOPTION OF THE TECHNOLOGY OF BEEF CATTLE FEED

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Abstract

The study aims to analyze the capacity of temporary extension workers (THL) in increasing innovative ideas of livestock owners for the adoption of technology of beef cattle feed. The study was conducted in Bulukumba regency, South Sulawesi Province. All-capture sampling was conducted in which all temporary extension workers were selected as the study samples. The study data were collected using the survey method of interviews using questionnaire, focus group discussion as well as in-depth studies / studied among several key informants. Results of the study revealed that the capacity of temporary extension workers in increasing innovative ideas of livestock owners for the adoption of technology of beef cattle feeds / fed was in the intermediate level , transfer from / to / onto knowledge and skill in the dissemination of subject of livestock feed technology was in the intermediate level and the capacity of temporary extension workers in conducting visits /face-to-face communication and the demonstration of livestock feed technology to livestock owners was in the less level , respectively . Low performance of temporary extension workers in the demonstration of livestock feeds / fed technology to fulfill the need of livestock owners was due to lack of facilities and infrastructure and low accessibility among temporary extension workers to access livestock feed technology . The study suggests to increasing the performance of temporary extension officers in the adoption of livestock feeds / fed technology by increasing extension activities and quality of temporary extension workers through training to improve the adoption of technology of beef cattle feed.
Keywords: Capacity, temporary extension workers, adoption, livestock feed technology.

1. Introduction

As a non-formal education institution, extension that focuses on the transformation of improved behaviors among livestock owners and their families expresses certain challenges to the context of its role and function in which agricultural extension workers that perform their roles and function are hoped to give significant satisfaction with / from farmers and their families. Concerning to this, policies of extension revitalization are an essential thing considering that extension workers are the key mover of the development of agricultural sector. As indicated in the study of Harianto, et al., (2014), extension workers have significant roles in / of / as the development of the husbandry sector in a certain region regarding to the fact that extension workers are the agent of change as the technical implementer in a certain community. Therefore, extension workers should have standard capacity to empower and increase self-sufficiency of livestock owners. However, the main constraint in implementing extension duties are lack of extension officers to fulfill the need of livestock owners in Indonesia. This fact results in job burden of / on targeted extension areas due to the imbalance between

the amount of groups of livestock owners and extension workers. In the year 2016, the total amount of agricultural extension officers throughout Indonesia are 47,898 workers that consist of civil servant extension workers are 25,932 workers (54.14%), temporary extension workers from the Indonesian Budget are 19,083 workers (39.84%) and temporary extension workers facilitated from the Regional Government Budget are 2,883 workers (6.02%), whereas the total amount of villages/village administrations are 78,063 villages all over Indonesia. Based on these figures, the requirement to fulfill one extension officer for one village has not been fulfilled maximally yet, with 30,165 agricultural extension workers are still needed to give extension services (National Center of Agricultural Extension, 2016).

To overcome the shortcoming of extension workers, the central government recruits temporary extension workers from the year 2007 until the year 2009 to assist civil servant extension workers in performing agricultural extension activities. They have duties to assist civil servant extension workers within their job requirements. However, temporary extension workers should conduct to overload job of conducting their regular duties due to lack of civil servant extension workers (Paay, 2012) . On the other hand , standard job to carry out extension activities performed by temporary extension workers bears / bore several constraints that include low frequency of training , inappropriate honorarium and lack of facilities to conduct agricultural extension activities. Concerning to these limitations, temporary extension workers should bear to overload duties to assist civil servant extension workers due to remote areas to give services livestock extension and the discrepancy between the amount of temporary extension workers and targeted farmer groups (Sapar, 2011; Hernanda, 2015).

Capacity is defined as an observed individual capacity that includes knowledge, skill and behavior to finish specified functions and jobs in accordance with defined requirements (Ministry of Manpower and Transmigration of the Republic of Indonesia, 2010). Stone (Brodeur et al, 2011) defines capacity as the ability to apply knowledge, technical skill , and personnel characteristics to produce specified works as the foundation to improve professional extension jobs .

There are 87 civil servant extension workers in Bulukumba regency . Referring to these figures , the need to fulfill livestock extension workers in Bulukumba regency is not maximally realized to fulfill the requirement of one extension officer for one village as stated in the policies of the Department of Agriculture that results in low work productivity of civil servant extension workers (Abdullah , 2017) . Regarding to such a condition , it is necessary to conduct the study of capacity of temporary extension workers bearing in mind the significant role of temporary extension workers in assisting civil servant workers to empower and enhance self-sufficiency of livestock owners . Good capacity of extension workers increases the self-sufficiency and empowerment of livestock owners to enhance livestock production , income and their prosperity . Based on the study background as stated above , the study aims to analyze the capacity of temporary extension workers for the adoption of technology of beef cattle feeds / fed to livestock owners in Bulukumba regency , South Sulawesi Province.

2. Methods of the Study

This study is a descriptive research to explore basic condition in the context of a socioeconomic phenomenon. The study was performed in Bulukumba regency, South Sulawesi Province. The study sampling was performed using the census method as a sampling technique that collects total samples in a certain population (Sugiyono, 2011) . The census method was used on the basis of the reasons that the amount of population of temporary extension workers is not quite large and to reduce errors of measurement. The process of data collection using the survey method by distributing questionnaire and focus group discussion. The measurement of capacity of temporary extension workers was conducted using the scoring method. The indicators of capacity of temporary extension workers include: a) . Level of knowledge and skill in disseminating the subjects of livestock feed technology , b) skill in identifying the need of livestock owners , c) the ability to implement the extension methods or visit/face-to-face communication , d) the ability to apply the methods of livestock extension demonstration , e) the skill in enhancing the capacity of livestock owners in accessing husbandry information , f) the ability to empower livestock owner groups, g) the skill in evaluating the

extension activities , and j) the skill to draft extension reports . Analysis of the data used descriptive method. Measurement of each item was conducted using the scoring method of the lowest score (1) to the highest score (3). Analysis of the data was done using descriptive approach that includes the determination of frequency and percentage.

3. Results and Discussion

3.1.The Demographic Characteristics of Temporary Extension Workers in Bulukumba Regency

The demographic characteristics of temporary extension workers in Bulukumba regency indicate that the average age of total temporary extension workers in this regency is 38.7 years old (adult level). Younger temporary livestock workers generally have better physical condition than older temporary extension workers, but temporary extension officers at older age have more experiences and bear higher responsibility in performing their duties. In addition, older temporary extension workers consider their decisions not to change their profession regarding the strict competition to gain work field. Older extension workers are not awake of current technology, but they have small opportunity to change their current professions (Wuriani *etal*., 2014). The Central Government recommended that temporary extension workers with below 35 years old could follow the Selection Test for the Applicants of Civil Servants, whereas, temporary extension workers with above 35 years old could follow the Selection Test for the Applicants of Government Employees with specified Employment Agreement to improve their job status compared to contract extension employees.

Level of education of extension workers affects their ability and skill in understanding and applying subjects of livestock extension, the ability to make creative ideas, the skill in organizing people as well as the capacity to inspiring, motivating and upholding the participation of the local community. Most extension workers in Bulukumba regency are at the higher level of education (52.8%) with Diploma/S1/S2 in agriculture, but 33.3% temporary extension workers were at the category of senior high school, and accordingly, human resources of temporary extension workers should be boosted at future that in line with their current job. According to Ardhian (2008), level of education gives significant impact to absorb innovative ideas, and consequently, it constitutes their thinking pattern.

Motivation is primary aspect to enhance and generate individual's motive to conduct a certain behavior to achieve a defined objective. As indicated from the analysis in this study, temporary extension workers have low motivation (46.0%) for senior high school category, and they have less motivation to advance their level of education that impedes their optimal extension duties. According to Lindner (1998), motivation is defined as psychological process that drive the purpose and direction of behavior, the tendency to conduct to achieve unsatisfied needs, an internal drive to satisfy unfulfilled needs and interests to realize certain needs. Mc Clelland's Achievement Motivation Theory states that employees have internal motivating drivers, and how to realize this potential driving energy is depend on internal motivation and opportunities (Robbins, 1996). There are several factors that motivate someone according to Mc Clelland's Achievement Motivation Theory that include: (1) the need for achievement, (2) the need for affiliation, and (3) the need for power. The need for achievement is a motivating drive that motivates individuals to do better jobs through creativity and mobilize their potential internal energy to achieve maximum achievement. Employees will build their enthusiasm to achieve maximum performance by giving them opportunities. Individuals who have higher achievements will have higher rewards to fulfill their needs. The need for affiliation is a motivating drive that motivates individuals to enhance their improved jobs considering every individual has several needs that include: the need for acceptance by their social environment where they live and work (*sense of belonging*), the need for individuals to gain respects because every individual considers that he or she has important roles (*sense of importance*), the need for achieve better performance and avoid abortive attempts (*sense of achievement*), and the need to do social participation (*sense ofparticipation*). Someone who has the need for affiliation will motivate him/her to drive him or her to release potential energy to finish his or her work maximally.

3.2. Capacity of Temporary Extension Workers for the Adoption of Technology of Beef Cattle Feed

Results of the study showed that capacity of temporary extension workers in Bulukumba in increasing innovative ideas of livestock owners for the adoption of technology of beef cattle feed were assessed in the following indicators:

Level of knowledge and skill of temporary extension workers in disseminating the subjects of livestock feed technology was 50% (less level), but their skill in identifying the need of livestock owners was 67% (intermediate level). These scores are related to the establishment of organizing team that consists of head and members in which each livestock breeder involve in doing participation in analyzing potential areas for each village and agroecosystem to formulate and implement programs of extensions to gain opportunities livestock feed raw materials. Temporary extension had formulated efforts to involve whole participation among livestock breeders, and hence, representatives of livestock owners gain opportunity to boost their potential areas in community discussion. Such efforts are in line with the study of Van de Ban and Hawkins (1996) in which extension involves the conscious use of communication of information to help people form sound opinions and make good decisions. The ability of temporary extension workers to implement the extension methods or visit/face-to-face communication was 55% (less level). This score indicated that the ability of temporary extension workers to do visit/face-to-face communication was in the less level. In addition, the ability of temporary extension workers to apply the methods of livestock extension demonstration was 45% (less level). This is because one temporary extension worker should service two villages due to limitation of amount of extension workers. This condition gives overload work of extension to temporary extension owing to remote areas of villages that need more operational cost and time-consuming to do extension programs. Referring to this condition, extension demonstration programs are sometimes should be combined together with other extension programs to support cost of extension demonstration program. In addition, they face some limitations to increase their opportunity to develop their knowledge and skill as they should deliver more time to service more villages. Ideally, one extension worker should service one village to prepare temporary extension workers to develop their knowledge and skill. The logical consequence for this condition was reported in the study of Mardikanto (1993) that programs of extension should be serviced by qualified extension workers. The imbalance between their overload duties and given rewards makes less frequency of visits. Results of the field survey indicated that the Central Government derived from the National Budget provides honorarium for 10 months, and the rest (honorarium for 2 months) is under the responsibility of each regional government (regency), and sometimes honorarium for two months are not given due to limitation of budget. This situation is compatible with the study conducted by Firmansyah *et al.*, (2015), in which salary and operational allowance of temporary extension workers are not compatible with their overload work in supporting their main duties maximally, such as presenting information to targeted remote villages. Therefore, it is imperative for the Central Government to formulate and implement efforts to increase the performance of temporary extension workers by adding their honorarium in accordance with the Decree of Minister of Finance.

Capacity level of temporary extension workers in accessing information was high (65%). They are quiteknowing that subjects of extension could be downloaded from internet networks, but they have less knowledge on cyber extension provided by the government as the source of extension information. This is because they seldom utilize technology of information about / on extension activities. Only some temporary extension officers utilize cellular telephone to access information to provide subject to extension, and the rest temporary extension officers sometimes perform discussions each other. But actually the case is the extension officers should learn and utilize technology of information as indicated in the study of Nuryanto (2008) in which they should have accessibility to access information and innovative ideas and information technology considering to the fact that livestock owners need information technology for decision making .

Capacity of temporary extension officers in evaluating extension activities and drafting reports was 50% (less level). This is due to the fact that they do not understand that activities of livestock extension should report independently . In addition to that , they do not comprehend that the report on

extension activities is the evidence of their responsibility for conducting extension activities. Arrangement of extension reports / reported is only considered as the formal requirement to gain honorarium and operational cost that they do not focus maximally on the arrangement of extension reports. Reporting activities on extension services is conducted occasionally only . Regarding to this , they should increase their knowledge on how to make good reports / reported on / to extension activities through non-technical training activities . It is hoped that through the training , the capacity of temporary extension workers in the form of knowledge , skill and behavior to do their roles and function could be increased in accordance with job specifications . This is in line with the study of Stone (Brodeur et al , 2011) that capacity of extension of applying knowledge , technical competence, and personal characteristics could make good performance to be used as the basis in improving professional performance among temporary extension workers . Better capacity of temporary extension officer could enhance the productivity of livestock owners in managing their entrepreneurship optimally in the form the rise of income and prosperous life among livestock owners. According to Van den Ban and Hawkins (1999) , behaviors of human being are related to their past experience, and it is also compelling to livestock owners. Reponses of livestock owners to the performance of temporary extension workers are related with their past experience. Livestock owners are still holding their trust to temporary extension workers as they could assist livestock owners, increase their insights, and facilitate given resources. Based on this fact, capacity level of temporary extension workers in Bulukumba regency was classified in the less level. Therefore, capacity of temporary extension workers should be boosted in improving productivity and income of livestock owners or farmer groups at villages.

4. Conclusion and Suggestions

From the discussion as stated above, it was concluded that level of knowledge and skill of temporary extension workers in disseminating the subjects of livestock feed technology was 50% (less level), their skill in identifying the need of livestock owners was 67% (intermediate level) , the ability to implement the extension methods or visit/face-to-face communication was less than 50% and the skill to draft extension reports was also less . Therefore, it was concluded that capacity of temporary extension workers in Bulukumba regency was classified at less level. It means that they have inappropriate capacity to fulfill their roles and duties maximally. Low level of capacity of temporary extension workers due to their overloads / overloaded work to service targeted areas and lack of facilities and financial support provided by the government as indicated in inappropriate honorarium. Consequently, capacity of temporary extension workers should be improved by increasing training for temporary extension workers to enhance productivity income and prosperous life among livestock owners at villages.

The study suggests to increasing the performance of temporary extension officers in the adoption of livestock feeds / fed technology by increasing extension activities and quality of temporary extension workers through training to improve the competence to understand methodology and learning and teaching process, developing leaning experience to improve knowledge , skills and behavior of livestock owners and increase entrepreneurship and providing facilities used for activities of livestock extension activities.

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References

Abdullah, (2017). Analysis of the Determining Factors on the Performance of Extension Officers for the Transfer of Livestock Feed Technology. American-Eurasian Journal of Sustainable Agriculture. 11,Number 5 Sept-Oct 2017

Brodeur CW, Higgins C, Gonzalez S. G, Craig D. D & Haile T. (2011). Designing a competency-based

Firmansyah, Amanah S, Sadono D. 2015. Motivation, Job Satisfaction, and Performance of Forestry Extension Officers in Cianjur Regency, West Java. Extension Journal, 11(1): 11-22 (in Indonesian language).

Harianto, E., Surahmanto & Putu A. (2014). The performance of Agricultural Extension Workers as the Informants, Facilitators and Assisting Workers in Increasing Bali Cattle *(bos sondaicus)* in Muna Regency, Southeast Sulawesi Province. AGRIPLUS, Vol. 24 : 232-239 (in Indonesian language).

Hernanda TAP. (2015). The Performance of Agricultural Extension Workers in Komering Ulu (OKU) Regency, South Sumatera Province [Master Thesis]. Bogor (ID): Postgraduate Program, Bogor Institute of Agriculture (in Indonesian language).

Mardikanto T. (1993). Extension to Agricultural Development. Sebelas Maret University. Press.Surakarta (in Indonesian language)

Nuryanto BG. (2008). Competence of Extension Workers for the Development of Agriculture in West Java Province. [Dissertation]. Bogor (ID): Postgraduate Program Program. Bogor Institute of Agriculture (in Indonesian language)

Paay P. (2012). Strategies in Improving the Performance of Temporary Extension Workers in Merauke Regency [Master Thesis]. Makassar (ID): Postgraduate Program, Hasanuddin University, Makassar (in Indonesian language)

National Center of Agricultural Extension, 2016. Agriculture Information Management System. Agency of Agricutural Extension and Human Resources, Ministry of Agriculture. [accessed in 2016, 18th January]. https://app2.pertanian. go.id/simluh. (in Indonesia language).

Robbins SP. (1996). Organization Behaviors.1st edition. Jakarta: Prenhallindo (in Indonesian edition).

Sapar. 2011.Factors Affecting the Performance of Agricultural Extension Workers and Their Impacts to the Competence of Cacao Farmers in Four Regional Areas of South Province [Dissertation]. Bogor (ID): Postgraduate Program, Bogor Institute of Agriculture (in Indonesian language).

Van den Ban AW, Hawkins HS. (1999). Agricultural Extension. Yogyakarta: Kanisius (translated in Indonesian Language)

Wuriani, Zakso A. & Suib M. (2014).Contribution of Individual Characteristics and Professional Commitment on the Satisfaction of Lecturers at Midwifery Study Program. Learningand Teaching Journal. 3(8): 1-15.

AN AGGREGATED APPROACH TO MEASURING AGRICULTURAL GROWTH: EVIDENCE FROM LIVESTOCK SECTOR IN TURKEY.

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Abstract

Productivity measures are used to assess agricultural growth performance with the aim of understanding how productivity growth can be improved. Partial and total productivity are the two types of measures used to evaluate the sources of growth but both measures have their own weaknesses and strengths. Traditional measures of factor productivity growth do not give us considerable information about the causes of that growth. Therefore, the aim of this study is to develop an aggregated approach to measuring agricultural growth that is inspired from the growth accounting framework. The source of production growth is decomposed by an identity in order to analyze the production, productivity, and structural changes and to accurately evaluate agricultural policies over time. The livestock sector in Turkey is selected as an attempt to break down and analyze the determinants of cattle meat production for the period 1961-2013. This decomposition reveals that the cattle stock, carcass yield, and share of slaughtered cattle are the important determinants of per capita meat production and all these decomposed variables are explained in detail. The annual growth rates of these individual components are calculated to analyze the effects of policies over these variables. Also by using a semi-log model, the data is separated into periods determined by the structural changes, for further policy analysis and comparison. It is concluded that concentrating only cattle meat production per capita as an indicator of the progress/success in designing policies for improvements on the livestock sector, does not mean a lot if importance do not attached to the short- and long-term effects on these decomposed variables.

Keywords: Growth, Decomposition, Livestock Policies, Turkey.

DETECTION OF ADULTERATION AND IDENTIFICATION OF MEAT AND MILK SPECIES USING MOLECULAR GENETIC TECHNIQUES

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Abstract

Animal meat and milk products are very important in human diet and the quality measurement depends on the ability to satisfy human requirements of proteins, fat, vitamins and minerals, which, of course, vary from animal to another.For the fast, specific and sensitive identification or determination of goat, dog, cat, buffalo, cattle, sheep, camel, donkey, horse and pigmeat and milk, species-specific PCR and PCR–RFLP techniques were developed.Where, DNA from small amount of muscles (0.05 gm) and very little of fresh milk (100 µl) was extracted to amplify the gene encoding species-specific repeat (SSR) region and the mitochondrial DNA segment (*cytochrome-b* gene). The results of PCR amplification were 855 bp in length in goat, 808 bp in dog, 672 bp in cat, 603 bp in both buffalo and cattle, 374 bp in sheep, 300 bp in camel, 221 bp in both donkey and horse, and ≤100 bp in pig.To differentiate between buffalo and cattle meat and milk, as well donkey and horse meat and milk, cytochrome-*b* gene in the four species was amplified (359 bp)and digested with restriction enzymes. By *Taq*I restriction enzyme, two different fragments (191 bp and 168 bp) were generated in buffalo, whereas no fragments were obtained in cattle. With *Alu* I restriction enzyme, three different patterns were generated in horse (189 bp, 96 bp and 74 bp), while in donkey no digestion was obtained. The proposed PCR and PCR–RFLP assays represent a rapid and sensitive method applicable to the detection and authenticationof meat and milk species-specific.

Keywords: Identification, species-specific meat and milk, *cytochrome-b* gene, PCR, PCR-RFLP.

ASSESSING FARM RISK MANAGEMENT DECISION: DETERMINANTS AND METHODOLOGICAL APPROACHES

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Abstract

Agriculture operates in an ever changing environment which makes this sector vulnerable to a number of risks and uncertainties. Among the various risks farmers face, production risks (particularly catastrophic risks) presents the most dominant sources of risks and uncertainties in agriculture. Farmers use available risk management tools to mitigate/minimize the potential adverse impacts of such risks and uncertainties at farm level. This study highlight important factors (internal, external and behavioral factors) affecting risk management decisions at farm level and provide some methodological approaches for quantification of these variables and analyzing their effect on farmers' decisions of adopting risk management tools. The risk management decisions depend on various factors which can be broadly categorized into internal and external factors. Internal factors include farm (farm size, ownership of land etc.) and farm household characteristics (gender, age, education, income, family size etc.). External factors consist of availability and access to information and credit sources and input/output markets. Besides the internal and external factors, there are some behavioral attributes that also effect farmers' risk management decisions. Farmers' risk perceptions and their attitude towards risks are significant factors affecting farmers' decisions of adopting various risk management tools. Another important aspect of the decision process is the simultaneous adoption of multiple tools at the same time i.e. adoption of one risk management tool may make it more likely to adopt other available risk management tool(s). Various methodological approaches are used to quantify these variables and fetch some meaningful results from the field data. The internal and external factors are relatively easy to measure however eliciting farmers' perceptions and their risk attitude is tricky and require sound methodological approaches. Perceptions can be recorded using a likert scale and can be processed using a risk matrix while Equally Likely Certainty Equivalent (ELCE) or Toss Method can be used to elicit risk attitude from an economic agent. Similarly the simultaneous adoption effect can be best captured using a multivariate probit/logit model.
Keywords: Agriculture, risk management, risk perceptions, risk attitude, information, credit.

1. Introduction

People at all timesmake their effort with great attention of all likely occasions. Still, every decision-maker has to face risks regularly in their decisions (Nguyen, 2002). The outcome of any given action may be different from what was expected when action was taken. Renowned economist and noble prize winner Stiglitz said "*Risk is like love we all know what it is, but we don't know how to define it*".

Defining risk is no exception, yetHardaker (2000) narrated risk as the chance of abad outcome and the variability of outcome.

Agriculture industry is highly risky compared to other businesses. There are many causes such as climate, prices, government policies, international markets, and other factors like geographical location, demographic variables, institutional structures etc. that can be sources of variation in the farm income and significantly influence goals, motivations and finally the farmer economic decision Meuwissen, Hurine, and Hardaker (2001). There may be three reasons for the uncertainty of farm income which are environmental changing causing production and yield variation, price unstability which can produce market fluctuation and lack of information. All these are important in Pakistani agriculture where unpredictable rains, floods, pests and disease outbreaks affect the resource availability for agriculture and crop and livestock income.

Risk in agriculture is defined in numerous ways; various scholars have identified risk in different sectors of agriculture. Boehlje and Eidman (1994) indicated that agriculture is a relatively high risky and unreliable sector of economy, which could be further sub-divided into three main types, i.e. production, marketing and financial risks. (Miller et al., 2004) classified agriculture risks into five categories as production, marketing, financial, legal and human risks. However, (Hardaker et al. 2004) determined risks into two main types which were business risk including production, market, institutional and personal risks.

Risk has very imperative part in decision making for farmers and so it effects the productivity, growth and development of agriculture.

Risk management is an imperative part of small holder production decisions. These risks and uncertainties easily generate food shortages, deterioration in nutritional status and poverty. There are many risk and uncertainty causing factor in agriculture. They are classified as production, marketing and financial risk (Boehlje and Eidman, 1994). Some of production and marketing risk and uncertainty component include severe weather such as drought/frost attack, hail storm and wind storm, input quality, pest/disease attack, input output price fluctuation (Yesuf and Randy, 2008). Labour shortage at required time, failure of new technologies, machinery break down in unexpected situation and changes in government policy. All these features are the main reasons for farm production and income variations. Similarly, financial risk is the risk due to which farmers are unable to meet the overall farm expenditure with the income generated by produce (Medai, 2008). This condition becomes more verse when farmers run their farms by obtaining inputs on credit from different sources

Generally risk is measured in three steps; risk perception, risk management and risk strategies to overcome the risk. In agriculture, risk perception is commonly used term for strategic decision making. It is not easy to build a common definition of risk perception. Sjoberg (1998) elaborated risk perception is an individual observation for the possibility of definite type of risk incident, i.e. excessive rainfall, flood and many other factors, include the farmers' consciousness for its concerns. So a person's risk perception in a certain situation shall be a function of chance to lose as well as the possible effect, that such a loss might occur (MacCrimmon and Wehrung, 1986). Although perception of riskcan change an individual's risk taking decision, to make such an investment decision in agricultural farm and on the other hand regarding any business project initiation and continuation (Keil et al 2000; Nosic and Weber 2009). Hence, both business specialists and investment experts specify that business depends on one's perception of risk. For better understanding farmers risk behavior, it is indeed necessary to know their perceptions and responses to these risks.

Subsequently risk managementis known as a compound process that consists of several steps (Hardaker et al 2004). Primarily the nature of risk has to be identified. Next is consideration about the occurrence of risk and to judge the consequences of risk, aiming that how much loss it will cause. Managing the risks in agriculture, these methods are helpful to achieve the farmer's ultimate goal, while considering the farmers attitude towards risk.

In agriculture, risk perception is commonly used term for decision and policy making strategies. It is not easy to build a common definition of Risk Perception. According to Sjoberg (1998) risk perception is an individual observation for the possibility of definite type of risk incident for example excessive rainfall, flood and many others, it also includes the participant consciousness for its concerns. So a person's risk perception in a certain situation shall be a function of the chance of loss happening as well as the possible effect of such a loss may occur MacCrimmon, Wehrung (1986). Risk perception can change the individual risk taking decision matter such as investment decision on

agricultural farm and also the matter on other side regarding business including any project initiation and continuation (Keil et al., 2000; Nosic and Martin 2009).

For tackling risks, (Kay and Edwards 1994) united risk strategies into production, marketing and financial responses. Production responses diminish the risk by controlling the production variability. Marketing responses may try to shift the price risks to other individuals and organizations/institutions. While the financial responses for example insurance transfer risks to other party and focus on the availability of those sources with which firm can bear the adversative condition (Hardaker et al. 1997), and main focus to enhance the farm capacity to endure risk and do not affect the probability of unfavorable condition.

2. Methodological Approaches

Farmers adopt the available risk management tools in response to the growing instability in agricultural production/income mainly arising from adverse weather conditions (Ullah et al., 2015).The decision to adopt various risk coping tools depends on various factors which can be broadly categorized into internal and external factors. Internal factors include farm (farm size, ownership of land etc.) and farm household characteristics (gender, age, education, income, family size etc.). External factors consist of availability and access to information and credit sources and input/output markets. Besides the internal and external factors, there are some behavioral attributes that also effect farmers' risk management decisions. Perception of risk by farmers and their attitude towards risks are significant factors affecting farmers' decisions of adopting various risk management tools. Another important aspect of the decision process is the simultaneous acceptance of multiple tools at the same time i.e. adoption of one risk management schememighthelp to make it more likely to adopt other available risk management tool(s).

The internal and external factors are relatively easy to measure however eliciting farmers' perceptions and their risk attitudes are tricky and require sound methodological approaches. Various methodological approaches are used to quantify perceptions and attitude of an economic agent. Some of the methodologies are discussed under the following sub-heads.

2.1. Quantifying Risk Perceptions

The assessment of farmers' perceptions and their response to risk are crucial because this can describe the decision making behavior of farmers when facing uncertain situations (Flaten et al. 2005). Assessing risk provides an insight concerning how likely something is to go wrong (likelihood) and what the related impact (consequences) will be (Wang and Roush, 2000). It is important to measure both occurrence (likelihood) and severity (consequences) of a risky event for better understanding of the how farmers perceive the risk. A common method while assessing risk perception is the use of likert scale of various points (3 points, 5 points, 7 points etc.).

Farmers can be asked for ranking the likelihood and severity of each risk source by using the likert scale from 1 (lowest) to 5 (highest) for a 5 point likert scale.

These values are then pooledby using risk matrix. Ranking the risks based on product of likelihood (P) and consequence (c) gives a risk factor (RF) (Cooper et al., 2005). The risk factor can be further categorized as low (from 1-4), medium (5-7) and high (8-10). A typical risk matrix is presented in Figure 1.

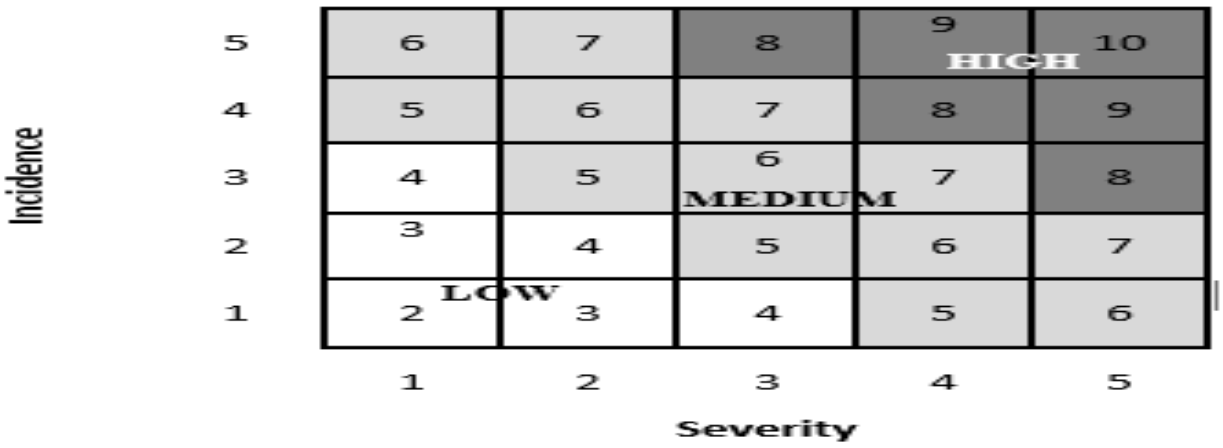

Figure 1. Risk Matrix

2.2. Eliciting Risk Attitude

Farmers' risk attitude and risk perceptions are crucial factors that affect their farm production, investment and management decisions. Risk averse farmers are less willing to take on activities and investments that have higher expected outcomes, but carry with them risks of failure (Ullah et al., 2015). Various methodologies are found in literature to elicit farmers' risk attitude. These include Equally Likely Certainty Equivalent approach (Hardaker et al., 1997) where a certainty equivalent (CE) are derived for a sequence of risky outcomes and matches them with utility values (Binici et al., 2003). A cubic utility function is then used to estimate utility of the individuals. The shape of utility function from an ordinal scale to a more quantitative measure of risk aversion (absolute risk aversion) using a ratio of the first and second derivative of the utility function with respect to wealth. Individual is said to be risk averse if the coefficient of absolute risk aversion is positive, risk seeker if the coefficient is negative and risk neutral if the coefficient of absolute risk aversion is zero.

Another commonly used method of quantification of risk attitude is using an experimental method (with or without real payoffs). In this method respondents are provided number of options with equal probabilities of success and failure but with varying degree of payoffs. The respondents are asked to choose only one option. After choosing an option the researcher toss a coin, in case of success the respondent receive the amount associated with success outcome while in case of failure the amount prescribed in failure category is received by the respondent. Figure 2 presents a hypothetical structure of the experimental method (total payoffs are 100$).

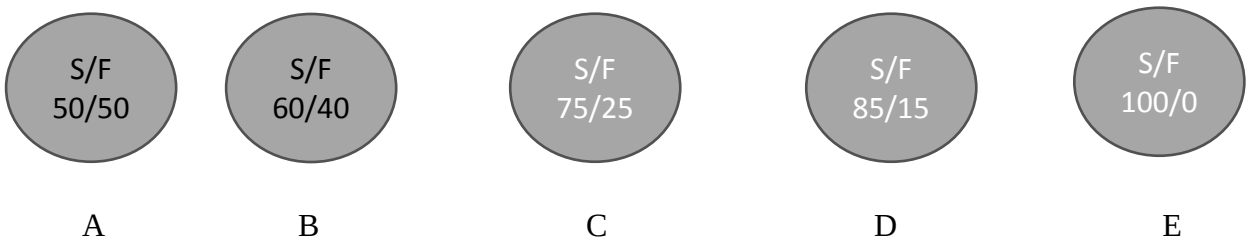

Figure 2. Experimental Method of Risk Attitude Elicitation

Respondents choosing A and B are said to be risk averse in nature, preferring lower sure outcome than higher outcomes with higher degree of risk. Respondent choosing option C is categorized as risk neutral as the individual is minimizing risk by giving up some amount while accepting some proportion of risk to gain higher benefits. Respondents choosing option D and E are referred to as risk seekers as they are taking risks to maximize the outcomes.

2.3. Assessing the Impacts of various factors on Adoption Decision and Simultaneous Adoption

Multiple risk management tools are used as a commonly by the farm households (Velandia et al., 2009). However, there is a dearth of literature on the concurrent adoption of multiple risk management tools adoption at farm level. This effect can be best captured using a multivariate probit/logit model. The multivariate probit/logit model is used to assess the impact of various factors (internal, external and behavioural) on farmers' risk management adoption decisions while keeping in view the possibility of simultaneous adoption and potential correlation among these decisions. A general form of the multivariate probit model is presented in equation 1.

$$Y_{ij} = x_{ij}^{'} \beta_j + \varepsilon_{ij} \quad (1)$$

Where Yij (j =1,...,m) represent the risk management alternatives faced by the ith producer (i =1,..., n) , $x_{ij}^{'}$ is a 1 × k vector of observed variables that affect the risk management adoption decision, β_j is a k × 1 vector of unknown parameters (to be estimated), and ε_{ij} is the unobserved error term. In this specification, each Yj is a binary variable and, thus, equation (1) is actually a system of m equations to be estimated:

$$\begin{aligned} Y_1^* &= \alpha_1 + X\beta_1 + \varepsilon_1 \\ Y_2^* &= \alpha_2 + X\beta_2 + \varepsilon_2 \\ &\vdots \\ Y_m^* &= \alpha_{\mathrm{m}} + X\beta_m + \varepsilon_m \end{aligned} \quad (2)$$

Where $Y_1^*, Y_2^*, \ldots, Y_m^*$ are the latent variables underlying each of the risk strategy adoption decision such that yj = 1 if $y_j^* > 0$; 0 otherwise.

3. Conclusion

Agriculture is highlyriskyand vulnerable sector of economy. It always passes through uncertain environment and weather condition. The study in hand highlighted many factors to manage risk including some methodological approaches affecting decisions about risk management at farm level. The factors can be categorized into external and internal factors. In addition to this there were some behavioral features and farmer's perception about risk that affect farmer'sdecision related to risk management.

Reference

Binici, T., Koc, A. A., Zulauf, C. R., and Bayaner, A. (2003). Risk Attitude of Farmers in Terms of Risk Aversion: A Case Study of Lower Seyhan Plain Farmers in Adana Province, Turkey. Turkish Journal of Agriculture and Forestry, 27(2003): 305-312.

Boehlje M.D., Eidman V.R. (1994). Farm Management. New York, USA: John Wiley andSons, 806 pp

Cooper, D. F., Grey, S., Raymond, G., and Walker, P. (2005). Project Risk Management Guidelines; John Wiley & Sons; Ltd.

Nguyen, N. (2002). Farming risk in the Upper Eyre Peninsula, Master Thesis, The University of Adelaide Roseworthy Campus, SA, Australia

Flaten, O., Lien, G., Koesling, M., Valle, P. S. and Ebbesvik, M. (2005). Comparing risk perceptions and risk management in organic and conventional dairy farming: empirical results from Norway, Livest Prod. Sci. 95(1–2): 11–25.

Hardaker, J. B., Huirne, R. B. M., and Anderson, J. R. (1997). Coping With Risk in Agriculture, New York: CAB International Publishing, Wallingford, Oxon, UK.

Hardaker, J. B. (2000). *Some issues in dealing with risk in agriculture*. University of New England, Graduate School of Agricultural and Resource Economics.

Hardaker, J.B., Richardson J.W., Lien G., Schumann K.D. (2004). Stochastic efficiency analysis with risk aversion bounds: a simplified approach. Australian Journal of Agricultural and Resource Economics, 48(2), 253-70

Keil, M., Wallace L., Turk D., Dixon-Randall G., Nulden, U. An investigation of risk perception and risk propensity on the decision to continue a software development project. Journal of Systems and Software. 2000 Aug 31;53(2):145-57.

Kay RD, Edwards WM. (1994). Farm Management. McGraw-Hill International Editions, Agricultural Series, New York.

Meuwissen, M., Huirne R., Hardaker J. (2001). Risk and risk management: an empirical analysis of Dutch livestock farmers. Livestock Production Science, 69(1): 43-53.

Madai H. Risk Sources and Risk Management Strategies Applied by the Hungarian Sheep Producers. University of Debrecen, Centre for Agricultural Sciences and Engineering. Faculty of Agricultural Economics and Rural Development, Department of Farm Business Management and Marketing. Fascicula: Ecotoxicologie, Zootehnie Si Tehnologii De Industrie Alimentara, 2008, 7.

Maccrimmon K, Wehrung DA. (1986). The management of uncertainty: Taking risks. *New York*.

Miller, A., Dobbins, C. Pritchett, J., Boehlje, M., Ehmke, C. (2004). Risk management for farmers. Staff paper, 04-11.

Nosic, A., Weber M. Changes of expectations and risk attitudes and their impact on risk taking behavior. 2009. Available at https://ub-madoc.bib.uni-mannheim.de/2492/1/SSRN_id1441273_wp167.pdf.

Nosic, A., and W. Martin (2009). Changes of expectations and risk attitudes and their impact on risk taking behavior. http://madoc.bib.uni-mannheim.de/madoc /volltexte/2009/2492/pdf/SSRN_id1441273_wp167.pdf.

Sjoberg L. World views, political attitudes and risk perception. Risk. 1998;9:137.

Ullah, R., Shivakoti, G. P., and Ali, G. 2015. Factors Effecting Farmers' Risk Attitude and Risk Perceptions: The Case of Khyber Pakhtunkhwa, Pakistan. International Journal of Disaster Risk Reduction. 13(2015): 151-157. Doi: 10.1016/j.ijdrr.2015.05.005.

Velandia, M., Rejesus, R. M., Knight, T. O., and Sherrick, J. (2009). Factors Affecting Farmers' Utilization of Agricultural Risk Management Tools: The Case of Crop Insurance, Forward Contracting and Spreading Sales. Journal of Agricultural and Applied Economics, 41(1): 107-123.

Wang, J. X. and Roush, M. L. (2000). What Every Engineer Should Know About Risk Engineering and Management; Marcel Dekker Inc.

Yesuf, M. and Bluffstone, R. (2008). Risk aversion in low-income countries: Experimental evidence from Ethiopia [in Amharic]. International Food Policy Research Institute (IFPRI).

POTENTIAL OF ORGANIC FARMING IN RWANDA

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Abstract

The purpose of this paper is to examine the present situation and potential developments of organic agriculture in Rwanda. The side effects of conventional farming encouraged the producers to adopt organic agriculture as a solution. This paper first reviews the trends in organic farming in the world,and then gives detailed information about organic farming in Rwanda where a high potential of organic production exists due to the abundance of highly fertile and uncontaminated land reserves.

Rwanda's present agricultural policies mostly focus on an increase of agricultural production per hectare and per animal. This goal requires increasing use of subsidized chemical fertilizers and pesticides. Thegovernment's extension system promotes conventional farming and country policy of growing priority crops in specific areas are among the major issues hindering the country's transition to an organic state.

In this paper, the details of the Rwanda's organic farming potential have been highlightedby using a SWOT analysis. Appropriate government supports like facilitating the organic farmers' participation at international trade fairs will strengthen Rwanda's fame as an organic country, linking farmers to export markets, joint negotiations with certification bodies, and rising awareness through media will be a triumphant strategy for the Rwanda's organic farming to develop further. The results of this paper will provide useful information for policymakers, extension specialists, NGOs dealing with organic farming, and researchers.

Keywords: Organic farming, organic agriculture, conventional agriculture, SWOT, Rwanda.

1. Introduction

Organic farming has been suggested as a solution to producing healthy foods at the same time with a reduced negative externality to the environment. But in reality, what organic farming's meaning is shaped by debates from numerous actors that are shown in the figure below. The IFOAM (the first institution to define organic farming principles), came up with a commonly accepted definition though it has some ambiguities (Seufertet al., 2016). It defines organic farming as a production system sustaining a healthy ecosystem, soil, and people. But all the definitions obey common principles like ecology, health, care, and fairness as reflected in organic standards basics.

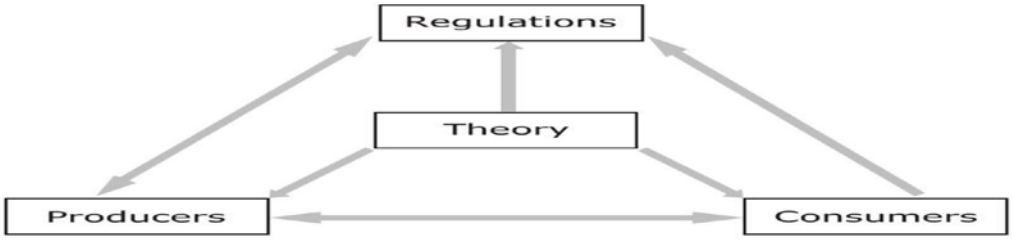

Fig1. Actors in Organic Farming

Source: Seufert et al., 2016.

Producers/farmers define how the organic farming evidence itself in the practices, consumers consciousness about the technologies used during food production, processing, handling and marketing, they become the major drivers of the organic farming sector, and theoreticians also impact the organic farming ideas whereas the regulations define the organic farming practices.

1.1. Brief History of Organic Farming

Just like the proverb says that "Who controls the past controls the future!",Stakeholders need a good sense of organic farming history because understanding its past challenges and crises provides them a sense of connectedness and help them in shaping insightful and effective policies in the future.

When does the history of this thing we now call 'organic farming' begin? Some say that it actually began thousands of years ago. Farmers of the remote past certainly did not have to deal with synthetic chemicals! However, true organic farming is practiced by intent, not by default; you do not automatically become organic only because you never used prohibited chemicals anyway. This makes it clear that organic farming started much more recently. Although it is hard to specify exactly when it began, early landmarks include the evolution of organic farming movements from input substitution techniques to holistic approaches.

It should be remembered that since the 1950s to current, conventional production techniques became widespread and the use of chemical fertilizers, additives, and agricultural mechanization increased. Therefore, remarkable increases in production and efficiency were provided. Since it has always been aimed at delivering economic outcome and efficiency as much as possible in a unit of area, nevertheless, environmental balance and health aspects are ignored. The Global Research Newspaper in April 2016 reported that the health concerns of millions of EU's member states forced its parliament to restrict Monsanto's weed killer/glyphosate (ROUNDUP) for 15 years through effective banning on pre-harvest desiccation of harvested crops like wheat' field beans and peas among others (Tickell, 2016).

In the name of seeking possible resolutions to these increasingly continued conventional production technologies that threaten human health, in 1980's, environmental and food safety issues were driving the development of organic farming sector (Vogt, 2007).

Table1. Showing the Organic World in 2016 at a Glance

INDICATOR	GLOBAL TOTALS		
	2015 survey report	**2016 survey report**	**Change**
Countries with data on certified organic agriculture	2014: 172 Countries	2015: 179 Countries	+7 countries
Organic agricultural land	2014: 43.7 mn ha	2015: 50.9 mn ha	+7.2 mn ha
The organic share of total agricultural land	2014: 0.99%	2015: 1.1%	+0.11%
Wild collection and further, non-agricultural areas	2014: 36.7 mn ha	2015: 39.7 mn ha	+3 mn ha
Producers	2014: 2.3 mn	2015: 2.4 mn	+0.1 mn
Organic market size	2014: 80 bn USD	2015: 81.6 bn USD	+1.6 bn USD
Per capita consumption	2014: 11 USD	2015: 11.1 USD	+0.1 USD
Number of countries with organic regulations	2014:87 countries	2015: 87 countries	+0 countries
Affiliates of IFOAM-Organics International	784 from 117 countries	833 of 121 nations	+ 49 from 4 countries

Source: Helga and Lernoud, 2017.

2. Methodology

The Searching for the bibliography of the relevant documentation took place in June 2017 and January 2018, through the Internet, and through crucial experts in organic Farming and personnel in the AgroPy Ltd (formerly Agropharm Africa Limited) the only manufacturer of liquid and powder organic and eco-friendly pesticides in Rwanda. Keywords used in when we were searching for the relevant document: included "Organic Farming", "organic agriculture," "East Africa", "Rwanda".

The search related to the title of this paper, and sometimes to the abstract text depending on the source. Literature about "the organic matter", "comparing organic fertilizers and non-organic ones", "organic growth" among others were neglected unless there was obviously related to "organic farming" or "organic agriculture".

The bibliographical search was carried out through the libraries of the Atakum youth center library, Ilkadim Atatürk public library and the Ondokuz Mayis University of Samsun-Turkey.

2.1. Organic farming in the East Africa

The development of the Organic farming sector in East African has been very much driven private sector activity, by commercial exporters (particularly in Uganda) and NGOs (especially in Kenya).

Table 2. Developments Organic farming in East African Member States

East Africa Member State	Change in Organic Farming Land 2015-16	Number of Producers 2016	Number of Processors 2016	Name of Organic movement
Rwanda	115	4013	5	ROAM
Uganda	21132	210352		NOAMU
Kenya	4009	37295	22	KOAM
Tanzania	0	148610	-	TOAM
Burundi	-80	35	-	BOAM

Source: Helga and Lernoud, 2018.

2.2. Organic Farming in Rwanda

Rwanda is a small landlocked country located in Sub-Saharan Africa within the center of Albertine Rift, at the heart of the great lakes region. It is neighbored by the Democratic Republic of Congo in the east, Uganda in the north, Tanzania in the west and Burundi in her south; and is a member of both EAC and COMESA economic blocks. It has the total surface area of 26,388 square kilometers out of which 1.38 million ha is arable.

2.3. History of Organic Farming in Rwanda

Just like in a lot of other countries, (Källander 2007), organic farming has been promoted and developed by both commercial and NGO tracks. Unlike many other countries, the government of Rwanda got involved in organic farming at earlier stages. From the NGO's perspective, In 1999 SEND A COW UK introduced the idea of organic farming after observing and appreciating how it had changed the lives of peasant Ugandans SEND A COW UK financed Mr.Munyerango to Rwanda's neightbors-Uganda to get practicle trainings on organic farming. Due to Munyerango's full organic farming inspirations, he founded Gako Organic farming and demonstration center in 2001, where he is up still mobilizing the Rwandan community about organic farming (Munyerango, 2007).

Commercially, organic fruits like passion fruits and sometimes mangoes and avocados were produced in the late 1990's by the Emballage Rwanda limited for export markets. By 2001, ADAR, a USAID funded Project started financing the unfolding organic exports that were originating from Rwanda (Turner, 2001). In 2007, the Rwanda organic agriculture movement s was established for promoting the organic farming sector in the country. Some companies which were financed are currently still running their businesses.

2.4. Rwanda's Suitability for Organic farming

Although the data set of Rwanda National Agricultural survey2017 Season C that runs from July and ends in September of the same year was not yet ready, the 2017 Season B data show that In all Rwanda, small-scale farmers or Segment plots farmers, 95.4% used traditional seeds while 4.6% of them used improved seeds. For Large Scale Farmers, 59.7% used traditional seeds whereas 40.3% used improved seeds.

Table 3. Showing Some of Rwanda's Agricultural Inputs

Inputs	Segment plots farmers	Large-scale farmers
Organic fertilizers	34.7%	32.7%
Synthetic fertilizers	15.1%	32.5%
Hybridized seeds	4.6%	40.3%
Traditional seeds	95.4%	59.7%
Pesticides (common Cypermethrinboth)	36.1%	26%
Anti-erosion activities	64.4 %	56.6 %

Source: Rwanda National Agricultural survey2017 Season B (starts in March and ends with June of the same year)

Fertilizers, smallholder farmers or Segment plots farmers, 34.7% used organic fertilizers while Synthetic fertilizers were used by 15.1%. For Large Scale Farmers,

the use of organic fertilizers was 32.7% and inorganic fertilizers were 32.5%.

The percentage of the different type of pesticides used is led by Cypermethrinboth for segment plots was 36.1% and Large Scale Famers was 26%.

In 2017 between March and June of the same year, 64.4 % of the Segment plots farmers practiced anti-erosion activities and 56.6 % of the large-scale farmers practiced anti-erosion activities. This low use of conventional farming's input technologies by the smallholder farmers who make up almost 80% of the rural population is still subsistence farmers, with Policies and supports targeting these smallholder farmers make up a majority of the population could make it easy and shortenthe period of time needed for conversion to organic farmerstatus. The low altitude areas of the eastern province such as Bugesera, Mayaga, and Mutara that experiences irregular and low rainfalls, organic farms' soils can produce good or better yields due to their higher water-holding capacity than farms that uses convention farming technologies.

Table 4. Corruption Perception Index Scores for East African Countries 2016

EAC Member states	2016 score	2015 score
Rwanda	54	54
Uganda	25	25
Tanzania	32	30
Kenya	26	25
Burundi	20	21

Source: Transparency international's 2016 Corruption perception index scores

Higher-ranked countries tend to have stronger standards of integrity for public officials, and independent judicial systems, higher degrees of access to information about public expenditure, Rwanda's policy of zero tolerance to corruption has scored her a higher rank than her East African member states. This further implies how reliable Rwanda's organically certified products can be compared to other member states in the East African block.

2.5. Agriculture Policies of Rwanda

In Rwanda Environmental degradation has been recognized as some of the main obstacle to realizing the country's medium and long-term development plans represented in the EDPRS[1].The government of Rwanda admits that organic farming alongside conventional farming has important roles to play, Rundgren (2007), in achieving its goals like increasing agricultural export revenues and sustainable development. Several policies have been adopted that encourage organic production practices, such as tree planting, banning the use of polluting plastic bags, and (compulsory) community soil conservation activities, the April, 2007 Fertilizer Policy dominantly encourages chemical fertilizer usage but has its side B that incites a simultaneous livestock and crop production, 2006-GIRINKA home grown initiative, terracing and soil conservation commonly done during the UMUGANDA day (also amongthe many Rwanda's home grown initiate), Rwanda is committed environmental protection and reducing biodiversity loss as stated in both EDPRS1 and EDPRS2.

Over the last years, Rwanda has set a target of increasing the national forest cover to 30 percent by 2020. In order to achieve that target, the government has encouraged rural communities to practice reforestation. With the methane gas exploitation from Lake Kivu, and improved cookstoves usage being among the many carbon friendly policies run by Rwanda's government focused at decreasing reliance on wood used for fuel to further create her already abundant biologically diverse landscape. The Policy includes the introduction of the improved cookstove, the use of solar energy, and the exploitation of methane gas in Lake Kivu among many other pro-organic policies. These environmentally benign policies show how Rwanda indirectly recognizes the importance of organic farming.

2.6. Certified Organic Farming in Rwanda

Willer et al, (2013, p. 54) stated that, in 2011, Rwanda's certified organic production involved 3,705 hectares of land.In 2010, three companies were involved in organic production in Rwanda, exporting hot chilies, geranium oil, and fresh fruits. The export destination to Europeans market have tight regulations to organic farming requirement indicates the development of the organic farming sector in Rwanda

Table5. Showing Some of Rwanda's Organic Products and Export Markets

Company	Organic product	Market volume	Export Market
Urwibutso	Passionfruit Juices	-10 tons/week to national market - 10-15/week export destinations	Uganda, Kenya, and Belgium
Shekina Enterprise	Vegetables Like Cassava Leaves	2 tons …export 3 tons domestic consumption	Belgium and Oman
Ikirezi Natural Products	Geranium Oil	It had just started	United Kingdom (UK)
R-Chilex	Chilies	6 tons export before disagreements	Belgium but halted due to prices disagreements among others
Floris	Organic Apple Banana	1-2 tons/week	Belgium

The government of Rwanda has financed certification processing through subsidizing the would-be-costs incurred during the processing of certificates for organic status. It was noticed that, the major problems that certified organic companies have in Rwanda is not at all related to not following the standards, rather, it is more to do with lack of enough experience for managing and misunderstanding the certification processes.

Table 6. Showing Stakeholders in Rwanda's Organic Farming

Type of institution	Institution	Role
GOVERNMENT	Extension institutions like RBS, RHODA, RADA, and RARDA.	Decentralized structures such as districts & sectors Whose roles involve Facilitating farmers to get organic inputs like seedlings and fertilizers, Influencing organic farming policies and providing guidelines for complying with organic farming standards and certification.
	Research Institutions & Universities like NUR and ISAE	Provide expertise needed by extension agents in order to facilitate the dissemination of improved organic farming technologies.
PRIVATE	**Farmers, Farmers Organization & Cooperatives** like Abakundakawa, Gako organic farm and Tuzamurane etc	Technically assisting, mobilizing fellow organic farmers and advocating for organic farming.
	Civil Society and NGOs Send a Cow, World Vision, Vi Life	Financing farmers' innovations in organic farming and advocating for organic farming.
	Certification & compliance institution RBS, Soil Association, EcoCert, and Ceres	Deliver certificates to farmers who comply with organic farming standards.
	Business Development Services Centers & facilitators	Help farmers in developing business plans, advising on rightful source of funding their organic farming projects and Funding farmers with best innovations.
	Agri-business entrepreneurs & exporters Urwibutso RChillex, Rwandaflora, and Floris	make market available for organic farmers' produces through export, agro-processing, and little local market sales and mobilizing farmers for organic farming.

Some state that almost all farmers in Rwanda are "organic-by-default" except those that are dealing in tea or coffee, while others claim that considerable number of Rwandan farmers use lesser amount of industrial inputs like NPK's. There are also other farmers that neither have organic certificates nor always connected to any NGO's but they are mindfully of organic farming.

2.7. Rwanda's Organic Farming SWOT

The SWOT analysis was used to determine Rwanda's potential and can help to create a vision for achieving a strategy for the development of organic farming.Considering the earlier work of Munyerango (2007) and information gained from different events and reports regarding the research area, an extensive SWOT analysis was developed. Other than academic publications, the information was gained from the following sources: Experiences gained fromphone conversation with crucial informants and specialists in the field, visits to Gako Organic Training Center in Kicukiro district of Rwanda, surveys conducted during field visits to rural areas of Musanze and Kirehe districts, reports on the results of discussions of the stakeholders' meetingthat took placeon 16-17 October 2007 in Kigali; and consulting Rwanda's official documents, namely, Rwanda Fertilizer Policy for 2007, and Plan Strategique pour la Transformation Agricole PSTA 3[2].

Table 7. Showing Rwanda's SWOT

STRENGTHS	**WEAKNESS**
Shows internal aspects were OF has a greater comparative advantage than Conventional farming 1) Existing (export) market for organic production 2) Government support 3) National organic movement (established in 2007) 4) Engaged farmers 5) East African Organic Mark 6) East African Organic Products Standards 7) Regional certification	Here see onwhat is the performance of O.F compared to conventional farming or what are the resources that O.F needs that it lacks 1) The process of certification are difficult, lengthy and costly 2) There are no national certification bodies. 3) There is less demand from local consumers for organic products. 4) low level of awareness about organic products 5) The market information about market trends and prices is currently low 6) The reliability of supply is not yet dependable. 7) Inputs for organic farming is currently still low 8) Farmers have not yet been organized for organic farming 9) Farmers don't have enough techniques required to be fully organic farmers. 10) Rwanda's extension system is highly favors CF than the organic one 11) Limited capacity at a technical level (extension staff)
OPPORTUNITIES	**THREATS**
Here we present the OF's favorable external factors to reconsider the existing strategies in order to exploit profitabilities existing. 1) Rwanda has natural resources favoring farming; good soil conditions and a plentiful sunshine, not much use of pesticides, fertilizers. 2) Rwanda's government and its donors wish to finance vulnerable group of people like windows etc. who are highly involved in Agriculture than their male counterparts. 3) Government's is involvement in cooperative development.(Rwanda cooperative agency-RCA) 4) The price for organic products are higher than for CF products (premium) 5) Quality products are already produced so there is good quality awareness among some crops that can be built on. 6) State's is fully involved in promoting environmental protection programs like soil conservation practices means that introducing O.F is in line with the states policies. 7) International development partners' and National organizations' need to finance Organic farming. 8) The off-farm input usage and imports decreases	Here we showcase the variables that negatively hinder Organic farming from achieving its maximum target 1) Import of inorganic fertilizer often subsidized especially under the CIP program, fertilizer is distributed to farmers using vouchers that offer a transport subsidy, a price subsidy or both transport and price subsidies. 2) State's advisory extension services promote chemical fertilizer access and use as well as productivity increase for priority crops like maize, wheat, Irish potatoes and rice.

3. Conclusion

The paper is showing that, there are varying ideas about the definition of organic farming, particularly among the actors or stakeholders in organic farming, the IFOAM's definition not excluded from various literatures considering it to be ambiguous, but all the definitions obey the common principles of ecology, care, healthy, and fairness as reflected in organic standards basics.

In 2008, Rwanda's remarkable increases in production were attributed to its agricultural transformation programmes like 2007-Crop Intensification Program (CIP) which increased the use of inputs for priority crops i.e. chemical fertilizers and improved seeds and promotion of land consolidation as part of the Green revolution to provide efficiency as much as possible in a unit of area with an economic outcome, ecological balance and health criteria related to product quality were being ignored. However, a lot of researches have proved that Organic farming is a solution to producing healthy foods at the same time with a reduced negative externality to the environment.

In Rwanda, there is an absence of local certification bodies, lack of cooperative spirit, Farmers want to work as individuals, The process of certification are difficult, lengthy and costly, lack of awareness about organics amongst consumers somehow challenges Rwanda's conversion to the organic status. The lack of empirical studies in a Rwandan context that compares the returns on both economic and ecological for organic farms with respect to conventional farms leads to the concerns about the organic farming's Amount of yield and economic feasibility.

Rwanda's Fertilizer Policy (April 2007) is largely about the increased use of subsidized chemical fertilizers and the Government's Extension system promotes conventional farming implies how organic farming has been ignored in the agricultural policy.

Appropriate government supports like facilitating the organic farmers' participation at international trade fairs will strengthen Rwanda's fame as an organic country, linking farmers to export markets, joint negotiations with certification bodies, and rising awareness through media will be a triumphant strategy for the Rwanda's organic farming to develop further.

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Reference

Willer, H., J. Lernoud & l. Kilcher (Eds) (2013), *The World of organic agriculture. Statistics and emerging trends* 2013, Research Institute of Organic Agriculture (FiBL), Frick and IFOAM – Organics International, Bonn. Available athttp://orgprints.org/26322/1/1606-organic-world-2013.pdf

Willer, H., Lernoud, J., & Home, R. (2011). The world of organic agriculture 2011: Summary. *The World of Organic Agriculture. Statistics and Emerging Trends 2011*, 26-32.

Paull, J. (2010). From France to the World: The International Federation of Organic Agriculture Movements (IFOAM). *Journal of Social Research & Policy*, *1*(2), 93.

Källander, I., & Rundgren, G. (2008). *Building sustainable organic sectors*. Bonn: IFOAM.

Munyerango, R. 2007, Gako Organic Training Center, Kigali Oct 2007.

Seufert, V., Ramankutty, N.& Mayerhofer, T., 2017. "*What is this thing called organic? – How organic farming is codified in regulations*," Food Policy, Elsevier, vol. 68(C), pages 10-20.

Helga Willer and Julia Lernoud (Eds.) (2018): *The World of Organic Agriculture. Statistics and Emerging Trends 2018*. Research Institute of Organic Agriculture (FiBL), Frick and IFOAM – Organics International, Bonn. Available at www.organic-world.net/yearbook/yearbook-2018.html

Tickell, O. (2016, April 14). Slap in the Face for Monsanto: European. Parliament Votes to Ban Most Uses of Glyphosate. *Global research*, Retrieved from https://www.globalresearch.ca/.

Turner, A. (2001) *Assisting Rwandans with entry into the international marketplace for tropical fruit*, November 2001.

Willoughby, R., & Forsythe, L. (2012). Farming for impact-A case study of smallholder agriculture in Rwanda. *Farming for Impact*.

[1] Economic Development and Poverty Reduction Strategy (EDPRS) (2013-2018), stems from Rwanda's Vision 2020 and guides medium-term actions that will lead to the achievement of the Vision 2020's goals to speeding up progress towards becoming a middle-income economy. Vision 202 is Rwanda's long-term development framework.

[2] PSTA 3, a 5-year program running from 2013-14 to 2017-18 having strategic objectives like transforming Rwanda's agriculture sector to enhance food security and accelerating sustainable increase production, commercialization of staple crops, export products among others.

AGED GARLIC EXTRACT IN BROILER DIET CAN IMPROVE SHELF LIFE OF THE MEAT BY LOWERING THIOBARBITURIC ACID AS WELL AS REDUCE CHOLESTEROL[1]

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Abstract

The environment-friendly growth promoters as aroma plants and their active compounds including garlic for the sustainability of broiler production have become more and more important.This study was carried out to determine the effects of supplementation of garlic extract and different levels of aged garlic extract (AGE) into broiler diets on sensory quality, shelf life and Thiobarbituric acid (TBA) value of the meat. A totally of 540 one-day old broiler (Ross 308) were randomly assigned to six treatment groups with six replicates containing 15 birds. The dietary treatments consisted of the negative control (AGE0) and two positive control (E200=Vitamin E; 200 mg/kg and 10 ml/kg fresh garlic extracts "FGE10" respectively) and diets supplemented with 5, 10 and 15 ml kg-1 AGE (AGE5, AGE10 and AGE15) respectively. Feed and water are offered to animals ad libitum.On day 42, blood sample was collected from the birds for the evaluation of hematological and serum biochemical parameters.

There were no significant differences in terms of edible inner organs (hearth, liver and gizzard), pH values, color, organoleptic sensory tests and chemical composition of meats among the treatments. The birds given fresh garlic extract and AGE had lower blood cholesterol and TBA compared to the birds found in control group. It could be concluded that fresh garlic extract (10 mg/kg) and aged garlic extract supplementation (5, 10 and 15 ml/kg) decreased blood cholesterol and improved the shelf life of meat by lowering TBA of the meat without effecting performance in broilers.
Keywords: Broiler, aged garlic extract, blood parameters, meat quality, TBA.

YILLANMIŞ SARIMSAK EKSTRAKTI KAN KOLESTEROLÜNÜ VE THİOBARBİTURİC ASİTİ DÜŞÜREREK PİLİÇ ETİNİN RAF ÖMRÜNÜ ARTIRABİLİR

Özet

Sarımsak *(Allium sativum L.)* da dahil tıbbi ve aromatik bitkiler ve bunların aktif bileşikleri, çevre dostu büyüme destekleyicileri olarak piliç üretiminin sürdürülebilirliği için gittikçe daha yaşamsal öneme sahip hale gelmiştir. Sarımsak, antioksidatif, antimikrobiyal, immüno-modülatör ve sindirim sistemi geliştirici özellikleri nedeniyle bir tıbbi ajan olarak ilgi konusu olmaya devam etmektedir. Ete ve yumurtaya kokusu geçtiği için kümes hayvanları rasyonlarında oldukça sınırlı düzeyde kullanılmaktadır. Ezilerek veya doğranarak yaklaşık bir yıl süreyle bekletilen yıllanmış sarımsak veya ekstraktında (YSE) koku sorunu asgariye indirgenmektedir. Bu çalışmada etlik piliç rasyonlarına farklı düzeylerde ilave edilen yıllanmış sarımsak ekstraktının çiğ ve pişmiş et kalitesi üzerine etkilerinin belirlenmesi amaçlanmıştır. Kırk iki gün olarak sürdürülen araştırmada 540 adet günlük etlik civciv

[1]This Project was supported by Ondokuz Mayis University (Project number: PYO.ZRT.1904.11.005) and summarized from MSc thesis of Emine SACILDI.

kullanılmıştır. Muamele grupları; negatif kontrol, 10 ml/kg taze sarımsak ekstraktı, 200 mg/kg vitamin E (pozitif kontrol grupları), 5, 10 ve 15 ml/kg YSE'nın standart etlik piliç yemlerine ilavesiyle beslenmişlerdir. Rasyonlar ve su hayvanlara serbest olarak sunulmuştur. Çalışmada, karkas ağırlığı, yenilebilir iç organ ağırlıkları, etin besin maddeleri kompozisyonu, but eti rengi ve pH değerleri ile duyusal lezzet test sonuçları taze sarımsak ekstraktı veya yıllanmış sarımsak ekstraktı ilavesinden etkilenmemiştir. Buna karşın, kan kolesterolü ile Thiobarbituric acid (TBA) düzeyi yıllanmış sarımsak ekstraktı kullanımına bağlı olarak düşmüştür. Mevcut araştırma, etlik piliç rasyonlarına taze sarımsak ekstraktı veya yıllanmış sarımsak ekstraktı ilavesinin etlik piliçlerin performansında herhangi bir olumsuzluk oluşturmaksızın, kan kolesterolü ve TBA'yı düşürerek etlerin raf ömrünü uzatabileceğini göstermiştir.

Anahtar Kelimeler: Etlik piliç, yıllanmış sarımsak ekstraktı, kan parametreleri, et kalitesi, TBA.

LOCAL KNOWLEDGE AND IT'S RELATION WITH AGRICULTURAL EXTENSION

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Abstract

Farmers have to decide on various issues while carrying out their agricultural activities. There is a significant impact on the knowledge that the farmers have in making the decision. While scientific knowledge is the produced by research institutions and transmitted to farmers through extension organizations, local knowledge is reflect cultural and society features and it transferred next generations. So previous generations are local sources of information.Local knowledge is helping to make decisions about agriculture, health, education, natural resource management. Local knowledge is data for agricultural extension studies. Thanks to this knowledge extension institutions are learning about the farmers' current conditions and practices and building their extension programs on this knowledge. On the other hand, local knowledge protects biodiversity and preserves local genetic resources, while agricultural heritage protects natural resources through low-input agricultural production. It is also important to ensure food safety, as local knowledge is an alternative production technique when modern farming technologies do not comply locally with farmers' requirements. When an assessment is made in terms of agricultural extension, local knowledge appears to be an important source of knowledge. Because farmers provide important information from family members, friends and neighbors. The farmers' own experiences are also an important source of information. In this study will be examine the differences between local knowledge and scientific knowledge, the characteristics of local knowledge, local knowledge types, extension approaches that respect local knowledge, and the importance of local knowledge in terms of agricultural extension.
Keywords: Local knowledge, agricultural extension, scientific knowledge, farmer, rural area.

YEREL BİLGİ VE TARIMSAL YAYIM İLİŞKİSİ

Özet

Çiftçiler tarımsal faaliyetlerini yürütürken çeşitli konularda karar almak durumunda kalmaktadır. Karar almada çiftçilerin sahip olduğu bilgilerin önemli bir etkisi bulunmaktadır. Bilimsel bilgi araştırma kuruluşları tarafından üretilen ve yayım kuruluşları aracılığıyla çiftçilere aktarılan bilgi ikenyerel bilgi bir kültür ve topluma özgü bilgi olup, kuşaktan kuşağa aktarılmaktadır. Yani önceki kuşaklar yerel bilgi kaynağı konumundadır. Yerel bilgi tarım, sağlık, eğitim, doğal kaynak yönetimi ile ilgili konularda karar almada yardımcı olmaktadır.Yerel bilgi tarımsal yayım çalışmaları için veridir. Bu bilgiler sayesinde yayım kuruluşları çiftçilerin mevcut koşul ve uygulamalarını öğrenerek yayım programlarını bu bilgiler üzerine inşa etmektedir. Diğer taraftan yerel bilgilerbiyolojik çeşitliliği ve yerel gen kaynaklarını koruyarak tarımsal mirası, düşük girdili tarımsal üretim sayesinde doğal kaynaklarıkorumaktadır. Ayrıca modern tarım teknolojilerinin yerelde çiftçi şartlarına uymadığı durumlardayerel bilgiler bir alternatif bir üretim tekniği olması nedeniyle gıda güvencesini sağlama açısından daönemli görülmektedir. Tarımsal yayım açısından bir değerlendirme yapıldığında, yerel bilginin önemli bir bilgi kaynağı olduğu görülmektedir. Zira çiftçiler aile üyeleri, arkadaşlar

vekomşularından önemli ölçüde bilgi sağlamaktadır.Çiftçilerin kendi deneyimleri deönemli bir bilgi kaynağı konumundadır.Bu çalışmada yerel bilgi ve bilimsel bilginin farkları, yerel bilginin karakteristikleri, yerel bilgi tipleri, yerel bilgiyi önemseyen yayım yaklaşımları ve yerel bilginin tarımsal yayım açısından önemi üzerinde durulmuştur.
Anahtar kelimeler: Yerel bilgi, tarımsal yayım, bilimsel bilgi, çiftçi, kırsal alan.

1. Giriş

Bilgiye dayalı ekonomi 21. yüzyılda önem kazanmış, bilgi ekonomik kalkınmanın motoru halini almıştır. Tarım sektörü için bu bilgi motoru ürünlerin miktarını ve kalitesini artıracak yeni teknolojilerin geliştirilmesinde kullanılmaktadır (Semeon vd., 2013). 1998/1999 Dünya Kalkınma Raporuna göre bilgi, sürdürülebilir sosyal ve ekonomik kalkınmanın anahtarıdır(World Bank, 1998). Bilgi yönetimi tarımsal verimliliğin artırılmasında ve gıda güvencesini sağlamada çok önemli bir rol oynamaktadır. Bilgi doğru yönetilirse çiftçilerin ihtiyaç duyduğu zamanda ulaşabilmektedir. Bu bilgi transferi çiftçilerin üretim ve pazarlama aşamasında karşılaşacakları risk ve belirsizlikleri minimize edecektir. Tarımsal bilgi yönetim sisteminin doğru çalışması için bilginin oluşturulması ve yayılması aşamalarında doğru prosedürlerin uygulanması gerekir. Tarımsal bilginin kaynağıbilimsel bilgiler ve yerel bilgilerdir (UNDP, 2012). Bilimsel bilgi araştırma kuruluşları, üniversitelerve diğer kuruluşlar tarafından üretilen ve yayım kuruluşları aracılığıyla çiftçilere aktarılan bilgi iken yerel bilgi bir kültür ve topluma özgü bilgi olup, kuşaktan kuşağa aktarılmaktadır.

Yerel bilgi oldukça geniş kapsamlı bir kavramdır. Literatür incelendiğinde yerel bilgi ile ilgili değişik kavramların aynı anlamda ve/veya birbirlerinin yerine kullanıldıkları göze çarpmaktadır (traditional knowledge, traditional ecological knowledge, folk knowledge, local knowledge, indigenous knowledge, tacit knowledge, native knowledge). Yerel bilgi ile ilgili birbirinden farklı tanımların olduğu görülmektedir. Bamigboye vd.(2017) ye göre yerel bilgi, yerel toplumların sahip olduğu kültür, yaşam şekli ve uygulamalar ile ilgili nesilden nesile geçen bilgilerdir.Yerel bilgi genel olarak, yerel halkın belirli bir çevrede yaşamak için kullandığı bilgidir (Langill, 1999). Grenier (1998)'e göre yerel bilgi belirli bir coğrafi alanda yaşayanların geliştirdikleri geleneksel ve eşsiz bilgilerdir. Banda vd. (2015)'e göre yerel bilgi kültür ve toplum için eşsizdir ve hayatı sürdürmeyle ilgili geniş bilgiler içermektedir. Nakashima vd. (2012)'e göre, yerel bilgi nesilden nesile geçen bilgi birikimidir ve belirli çevrede yaşayan toplumlara rehberlik eder.Tran vd. (2009)'a göre yerel bilgi, bir yöreye özgü kurumsallaşmış bilgi olup bir nesilden diğer nesile ağızdan ağıza geçmektedir.Makinde, Shorunke (2013)'e göre, yerel bilgi yerel topluluklara özgü bilgiler olup, yerel halkın deneyimleri ve yerel kültüre adaptasyonu ile ilgilidir. Genel olarak, bu bilgiler yerel çevrede gelişir ve yerel halkın gereksinimlerine ve koşullarına adapte edilir (Langill, 1999).Yerel bilgi sözel geleneklerdir ve kırsal toplumların kente göç etmesi nedeniyle yok olma tehlikesiyle karşı karşıyadır (Morrison vd., 1996). Bir Afrika atasözü şöyle söylemektedir: "Bir yaşlı öldüğünde bir kütüphane yanmış demektir".

Yerel uygulamalarda eğer yerel bilgiler dikkate alınmıyorsa kullanılan teknolojilerin çoğu başarısızlıkla sonuçlanacaktır. Bu nedenle binlerce yıllık deneyim sonucu oluşan bu bilgiler önemsenmelidir (Abedi, Khodamoradi, 2011). Yerel halk yerel bilgiyi değişik alanlarda kullanmaktadır. Yerel bilgi tarım, sağlık, depolama, işleme ve koruma sistemleri, erozyonla mücadele, biyolojik çeşitliliğin korunması vb. alanlarda kullanabilmektedir (Anaeto vd., 2013).

Yerel bilgi yerel toplulukların gıda güvenliği, eğitim, doğal kaynak yönetimi ve diğer önemli kararların alınmasında önemli etkiye sahiptir. Yerel bilgi kırsal alanda yaşayanların sosyal sermayesidir ve hayatlarını idame ettirmelerinde kilit rol oynamaktadır (Gorjestani, 2000). Çiftçilerin yerel tarımsal uygulamaları arasında;

- Yerel toprak hazırlama ve üretim materyalleri
- Yerel hastalık ve zararlılarla mücadele yöntemleri
- Toprak verimliliğini koruyan yerel uygulamalar
- Yabancı otların kontrolünü sağlayan yerel uygulamalar
- Yerel hasat ve depolama yöntemleri sayılabilir (Abioye vd., 2011).

Yerel bilginin araştırmacılar açısından önemli olmasının iki temel nedeni vardır. Bunlardan en önemlisi yerel bilgiler araştırmaya dahil edildiğinde, yerel güçlenme ve kalkınmaya katkıda bulunabilmektedir. Yerel bilgi sayesindekendine yeterlilik artmakta ve çiftçiler kendi kararlarını kendileri verebilir duruma gelmektedir. Diğer taraftan yerel bilgilerin araştırmalarda kullanılması yerel

halkın bu çalışmalara güvenmesini kolaylaştırmaktadır. Bu motivasyon yerel sorunların çözülmesine katkıda bulunmaktadır. Yerel bilginin kullanılmasının ikinci önemli nedeni, yerel halk ve çevre hakkında değerli bilgilere sahip olmasıdır. Bu bilgiler sayesinde doğal kaynaklar etkin kullanılabilir. Son zamanlarda yaşanan ekolojik krizler yerel bilgilerin önemini artırmıştır. Yerel bilgi sayesinde araştırmacılar, yerel halkın yüzyıllar boyunca doğaya zarar vermeden nasıl üretim yaptıkları konusunda bilgi sahibi olabilir (Langill, 1999). Diğer taraftan yerel bilgilerin incelenmesiyle, araştırmacılar karmaşık tarım sistemlerinin sosyo-ekolojisi hakkında bilgi sahibi olabilmektedir (Rusten, Gold, 1991). Yerel bilgi yerel toplumların problem çözme stratejileri için temel oluşturmaktadır. Kalkınma konularında formal bilginin temel bileşenidir. Ancak kalkınma aşamasında yeterince kullanılmamaktadır. Yerel bilgilerden faydalanabilmek için öncelikle yerel halkların ne bildikleri, içinde bulundukları koşulları ve bu koşulların iyileştirilme yollarını araştırmak gerekir(World Bank, 1998).

2. Çiftçi Kararlarında Etkili Olan Enformasyon Kaynakları

Bilgi ve çiftçilerin tarımsal uygulamaları arasındaki ilişki açık değildir. Araştırmacılar bilginin tek başına tarımsal uygulamalarda bir değişikliğe yol açmayacağını düşünmektedir. Uygulama değişikliklerinde ilgili bilginin sosyal ve ekonomik yönü ve çiftçilerin değişime karşı tutumlarının da etkisi bulunmaktadır (Warburton, Martin, 1999). Yeni teknolojiler yararlı, uygun, basit, denenebilir ve gözlenebilir ise çiftçiler tarafından benimsenip uygulanmaktadır.

Tarımsal üretim süreci uzun ve karmaşık bir süreçtir. Bu nedenle çiftçiler tarımsal faaliyetlerini yürütürlerken değişik alanlarda ve değişik zamanlarda tarımsal enformasyona ihtiyaç duymaktadır. Bilindiği gibi çiftçilere enformasyon sağlayan kurumların başında tarımsal yayım kuruluşları gelmektedir. Ancak çiftçiler zaman zaman ihtiyaç duydukları enformasyonu tarımsal yayım kuruluşları yerine yerel bilgi kaynaklarından temin edebilmektedir. Bunun birçok sebebi olabilmektedir. Çiftçilerin enformasyona ihtiyaç duyduğu konularla ilgili yayım çalışmaları olmayabilir. Çiftçiler kendilerine önerilen enformasyona güvenmeyebilir. Veya önerilen enformasyon çiftçi şartlarına uygun olmayabilir. İşte bu durumlarda tarımsal yayımda yerel bilgi kaynakları olarak adlandırılan arkadaşlar, aile üyeleri ve çiftçilerin kendi deneyim ve tecrübeleri önemli bir enformasyon kaynağı konumuna gelmektedir. Konuyla ilgili yapılan literatür taramasında tarımsal yayım da yerel bilgi kaynaklarının önemli bir enformasyon kaynağı olduğu saptanmıştır.

Akın vd., (2017) Diyarbakır ilinde sebze üreticilerin bilgi kaynaklarının incelendiği araştırmada üreticilerin bilgi kaynağı olarak %3.2'sinin ziraat fakültesinden, %15'nin tarım müdürlüklerinden, %4.3'nün özel tarım danışmanlarından, %20.6'sının ilaç bayilerinden, %56.8'nin komşu ve arkadaşlarından faydalandıkları saptanmıştır.

Hatay ilinde zeytin üreticileriyle yapılan araştırmada, tarımsal bilgi kaynaklarının daha çok işletme çevresinde bulunan ve bunlara girdi sağlayan işletmeciler ve iletişim içinde olunan komşu ve akrabalardan (%62) oluştuğu saptanmıştır (Demirtaş, 2017).

Özger vd., (2016) Denizli ilinde şeftali üreticilerinin kimyasal ilaç kullanımına yönelik bilgi kaynaklarının belirlenmesi amacıyla yaptıkları araştırmada üreticilerin tarım ilaçlarını seçerken en fazla dikkate aldığı bilgi kaynağının %56.03 ile zirai ilaç bayileri olduğu, GTHB Tarım İl ve İlçe Müdürlüğünde çalışan teknik elemanlarından bilgi alanların oranının ise %30.5 olduğu belirlenmiştir.

Çukur vd., (2011) tarafından yapılan araştırmada üreticilerin değişik konularda enformasyona ihtiyaç duymalarına rağmen enformasyon kaynaklarına pek danışmadıkları, kendi bilgi ve tecrübelerine göre hareket ettikleri saptanmıştır. Üreticilerin %66.67'sinin girdi temini ile ilgili, %86.36'sının üretim tekniği ile ilgili ve %77.27'sinin ise pazarlama ile ilgili herhangi bir kaynağa danışmadığı belirlenmiştir.

Kalıpçı vd., (2011) tarafından yapılan araştırmada çiftçilerin ürünlerinde kullandıkları pestisitleri seçerken; % 35.8'nin ilaç bayilerinden, %15.0'nin diğer çiftçilerden, %11.6'nın Tarım İl ve İlçe Müdürlüklerinden, %6.6'nin Ziraat Mühendislerinden, %4.1'nin Ziraat Odalarından fikir aldıkları, %2.5'nin internet radyo ve televizyon programlarından yararlandıkları, %24.1'nin deneme-yanılma yoluyla kendi tecrübelerine göre kullanacakları pestisitleri seçtikleri belirlenmiştir.

Yılmaz vd. (2009), Isparta ilinde üreticilerin kimyasal gübre kullanımında bilgi kaynaklarının belirlenmesi amacıyla yaptıkları araştırma üreticilerin %33.67'sinin gübre miktarını, %37.76'sının gübre çeşidini ve %36.73'ünün gübreleme zamanını belirlerken kendi bilgi ve tecrübesine göre karar

verdikleri tespit edilmiş olup, araştırma bölgesinde gübre ve gübreleme konusunda ciddi bir eğitim ve yayım eksikliği tespit edilmiştir.

Yalçın ve Boz (2007) tarafından Antalya ili Kumluca ilçesinde serada sebze üretimi yapan üreticilerin kullandıkları bilgi kaynaklarını belirlenmesi amacıyla yapılanaraştırmada bölgesindeki çiftçilerin %22'sinin kendi deneyiminden faydalandığı, %16.7'sinin komşu ve diğer çiftçilerden faydalandığı ve %7.2'sinin ise aileden gelen geleneksel bilgilerle tohum seçimi yaptığı görülmektedir. Çiftçi eğitim ve yayım şubesi elemanlarından bilgi alanların oranı ise %0.7 olduğu tespit edilmiştir.

Taluğ ve Torun (2005) tarafından yapılan araştırmada çay tarımı yapan çiftçilerin gençleştirme budaması konusunda başvurduğu bilgi kaynakları arasında ilk sırayı %73.85 ile Çaykur elemanları aldığı ve bunu % 18.46 ile çiftçilerin kendi deneyimlerinin takip ettiği belirlenmiş olup, bölgedeki Tarım il ve ilçe müdürlükleri elemanlarının budama konusunda hiçbir yayım çalışmasına rastlanılmadığı belirlenmiştir.

Boz vd. (2004) çiftçilerin toprak hazırlığı konusunda %72, ekim teknikleri ve tohumluk seçimi konusunda %70, gübreler ve gübreleme konusunda %73, sulama konusunda %71, tarımsal mücadele konusunda %48, hasat-harman ve kurutma depolama konularında %79 ve pazarlama ve satış konularında da %66 oranında kendi aile bireylerinden bilgi aldıkları tespit edilmiştir. Araştırmada bütün tarımsal uygulamalarda, Tarım İl Müdürlüğü, Ziraat Fakültesi veya Tarımsal Araştırma Enstitüsü gibi kuruluşlardan bilgi edinme oranının çok düşük olduğu vurgulanmaktadır.

Kızılaslan, Kızılaslan (1998) Tokat ili Merkez İlçesinde yüksek sistem bağcılıkla uğraşan çiftçilerin %80.77'sinin toprak hazırlığı, %24.36'sının omca seçimi, %38.46'sının dikim tekniği, %55.13'ünün gübreleme, %65.38'inin zirai mücadele ve %75.64'ünün ise budama tekniği konunda kendi bilgilerine güvendiklerini belirlemiştir.

3. Yerel Bilgi ile Bilimsel Bilginin Karşılaştırılması

Yerel bilgi ve bilimsel bilgi birbirine benzer özellikler gösterdikleri gibi birbirinden farklı özelikleri de bulunmaktadır. Gerek yerel bilgi gerekse bilimsel bilginin odağında yerel olguları gözlemleme ve eğilimleri tahmin etme vardır. Tüm bilgi sistemleri uygulamalarında ve tekniklerinde dünyayı sınıflandırmak ve bunun için tipolojiler, kurallar ve yöntemler oluşturma söz konusudur. Bunların temelinde deneme ve yenilik vardır (Davis, 2006). Sürdürülebilir doğal kaynak yönetimi, biyolojik çeşitliliğin korunması ve sürdürülebilir kullanımının sağlanması için bilimsel bilgi ve yerel bilginin beraber kullanılmasına ihtiyaç bulunmaktadır(ICSU, 2002). Yani bilimsel bilgiyle yerel bilgi birbirine rakip değildir. Aralarında tamamlayıcılık ilişkisi vardır. Bilimsel bilgi yanında yerel bilgiyi de dikkate alan bir üretim sistemi, hem çevresel değerler açısından, hem insanların bilgi ve işbirliğini sağlama açısından ideal bir sistem olarak düşünülebilir (Yılmaz vd., 2009).

Bilgi sistemleri dinamiktir ve kişiler bu bilgileri çevrelerini değiştirmek için kendi şartlarına adapte ederek kullanır (Islam, 2012). Kırsal alanda bilimsel bilgi ile yerel bilgi belli ölçülerde kesişmektedir. Eğer kesişim alanı küçük olursa tarım uzmanlarıyla yerel çiftçiler arasında yanlış anlamalar olabilmektedir. Eğer bilgi paylaşım alanı büyük olursa çiftçiler ve tarım uzmanları daha fazla birlikte zaman geçirip fikirlerini birbirlerini yargılamadan karşılıklı saygı çerçevesinde paylaşabilmektedir (Hess, 2006).

Yerel bilgi, bilimsel bilgiye oranla bazı sınırlılıklara da sahip olabilmektedir. Bazı toplumların aşırı avlanma, aşırı otlatma gibi hatalı yerel pratikleri yürüttüğü ortadadır, ancak tüm bu hatalara rağmen yerel bilginin önemi yok sayılmamalıdır. Yerel bilginin önemi, kırsal toplumların sürdürülebilir geçim kaynaklarını garanti altına almış olması, bilginin doğa ile uyumlu ve yaşayan topluluğun ihtiyaçlarına çok yönlü çözümler getirmesi nedeniyle günümüzde giderek daha çok fark edilmektedir. Her şeyden öte, yerel bilgi kırsal toplumların sahip olduğu koşullarda mevcut potansiyelini yansıttığından toplumlarda yürütülecek kalkınma çabalarının başlangıç noktasını oluşturmalıdır. Yerel bilgi yoksul üreticilerin sahip olduğu en önemli sosyal kapitaldir. Bu bilgi sistemleri dinamik sistemlerdir ve yeni bilgi ile tecrübeler sürekli olarak sisteme eklenmektedir (Özer, 2007).

Yerel bilgi ile bilimsel bilginin karşılaştırılması Tablo 1'de gösterilmiştir. Yerel bilgi ile bilimsel bilgi arasındaki farklılık, bunların her birinin soyut düşünce (ayırma), özümleme (benzeşme), entegrasyon (bütünleştirme), sentez (bireşim), genelleme ve kullanma derecelerine bağlıdır. Ancak, bu iki tür bilgi bir araya geldiğinde, bilimsel bilgi daha iyidir gibi bir yanlı algılama nedeniyle, sentez

sürecinin her zaman gerçekleşmesi beklenemez. Çiftçinin yerel bilgisi, yeniden formüle edilerek ve daha kesin olarak, deneme yaparak ve deneyimleri yoluyla sürekli değişmektedir (Demiryürek, 2001).

Tablo 1. Yerel Bilgi ile Bilimsel Bilginin Karşılaştırılması

Karşılaştırma alanı	**Yerel bilgi**	**Bilimsel bilgi**
İlişki	İkinci derecede önemli	Baskın
Baskın düşünce tarzı	Sezgisel Bütüncül Zihin ve madde birlikte değerlendiriliyor	Analitik İndirgemeci Zihin maddeye indirgenmiş
İletişim	Sözlü Yaparak öğrenme	Yazılı Öğretici
Öğretim	Gözlem veya yaparak öğreniliyor	Öğrenme uygulama yapmadan gerçekleşiyor
Etki	Yavaş Kesin değil	Hızlı Kesin
Veri yaratma	Kişisel gözlem, deneme yanılma ve olguların sentezi üzerine kurulmuştur. Veri kaynak kullanıcıları tarafından yaratılır	Deneylere ve sistematik, bilinçli gerçeklerin birikimine dayanır. Veri araştırmacı uzman kadro tarafından üretilir
Veri tipi	Nitel Tarihi (Bir bölgede uzun zaman serileri)	Nicel İstatistiksel (Geniş bir alanda kısa zaman serileri)
Açıklama	Manevi Ahlak	Hipotez, kanunlar Mekanik Değerler dikkate alınmıyor
Sınıflandırma	Ekolojik	Genel ve hiyerarşik
Karakteristikler	Bütüncül Öznel Tecrübeye dayalı	İndirgemeci Nesnel Olgucu, pozitivist

Kaynak: Islam, 2012; Sillitoe, 2002.

4. Yerel Bilginin Karakteristikleri

Yerel halk, yerel çevre ve doğal kaynakların nasıl etkin kullanılacağı konusunda değerli bilgilere sahiptir. Dünyada çevreyle ilgili problemler ve doğal kaynakların aşırı kullanımından sonra yerel bilgiyle daha çok ilgilenilmeye başlanmıştır.Yerel bilgi kültürel bilgi olarak düşünülmesine rağmen, geniş olarak ele alındığında yerel halkın sosyal, politik ekonomik ve manevi yönleri ile ilgili olduğu görülmektedir (Tanyanyiwa ve Chikwanha, 2011). Yerel bilginin özellikleriaşağıda sıralanmıştır: (Nazarpour ve Sadighi, 2011).

1.Yerel bilgi insanların yüz yıllar boyunca sahip oldukları deneyimlerine dayalıdır.
2. Yerel bilgi yüzyıllar boyu üzerinde çalışılarak test edilmiştir.
3. Yerel çevre ve kültürle uyumludur.
4.Yerel bilgi dinamik ve değişkendir.
5. Yerel bilgi kırsal alanda yaşayanların teknik olmayan bilgilerine dayalıdır.
6.Kırsal halkın bilgisi istatistiksel değildir.
7. Kırsal halkın bilgisi yeterli değildir.
8.Yerel bilginin bölgesel ekonomi politikalarının (arazi dağılımı, pazarlama ilişkileri vb.) oluşturulmasında önemli bir etkisi bulunmaktadır.
9. Yerel halkın birçok konuda bilgisi vardır.
10.Yerel bilgi sistemi bütüncüldür. Yerel halk çevrelerindekilerin problemlerini kendi problemleri gibi algılar ve çözüm üretir.
11.Yerel bilgi sistemleri karı maksimize eden ve riski minimize eden uygulamaları tercih eder.

Yerel halk günlük hayatta çeşitli konularda karar alırken yerel bilgiden yoğun olarak yararlanmaktadır. Bu konulardan bazıları aşağıda sıralanmıştır (ICSU, 2002):

-Avcılık, balıkçılık, toplama
-Ev idaresi
-Gıda hazırlama, koruma ve dağıtma
-Sulama
-Hastalık ve zararlılarla mücadele
-Meteorolojik ve iklimsel değerleri yorumlama
-Alet ve giysi yapımı
-Barınak yapımı
-Ekolojik değişkenlerin toplum ve çevre üzerindeki etkileri
-Çevresel ve sosyal değişkenlere adaptasyon.

5. Yerel Bilgiyi Önemseyen Tarımsal Yayım Yaklaşımları

Tarımsal yayım, tarımla uğraşan kişilerin sosyal, ekonomik ve kültürel yönden kalkınmalarına yardım etmek amacına yönelik, okul-dışı ve gönüllü bir eğitim sistemidir. Tarımsal yayım çalışmaları ile tarımsal konulardaki teknik bilgiler ve araştırma sonuçları çiftçilere ulaştırılır. Böylece çiftçilerin mevcut problemleri çözülür veya yeniliklerin çiftçiler tarafından benimsenmesi sağlanır (Yurttaş, Atsan, 2007). Genel bir yaklaşımla yayım, araştırmacılar ile çiftçiler arasındaki bir bağ olarak düşünülebilir (Özkaya, 1996).Yayım sistemi, içerisinde çok sayıda yayımcının organize olduğu ve değişik yaklaşımları kullanarak kırsal alanda gelişmeye yönelik planlı ve organize değişiklikleri destekleyen, bu amaca yönelik yönetim ve teknik danışmanlık ile yayım mesajlarını içeren bir bütündür. Yayım yaklaşımı ise tarımsal yayım sisteminin bir uygulama stili olup aynı zamanda sistemin mantığını ifade eden ve sistemin yalnızca bir komponenti olmayıp felsefesini ortaya koyan ve bu özelliği ile sistemin diğer unsurlarını yönlendiren bir kavramdır (Kumuk, Oktay, 1994).Yayım yaklaşımları arasında, genel tarımsal yayım yaklaşımı, ürün bazında yayım yaklaşımı, eğitim ve ziyaret yaklaşımı, katılımcı tarımsal yayım yaklaşımı, proje yaklaşımı, çiftçilik sistemleri araştırması yaklaşımı, maliyeti paylaşım yaklaşımı ve kurumlaştırılmış eğitim yaklaşımı sayılabilir (Özçatalbaş, Gürgen, 1998).Bu yaklaşımlar genel olarak incelendiğinde katılımcı tarımsal yayım yaklaşımı ve çiftçilik sistemleri araştırması yaklaşımının yerel bilgilere önem verdiği söylenebilir.

5.1. Katılımcı Tarımsal Yayım Yaklaşımı

1950 ve 1960'lı yıllarda bilimsel bilginin gelişmekte olan ülkelerdeki kırsal yoksulluk problemlerine çözüm olacağı, kırsal refah düzeyini artıracağı görüşü hakimdi. Bu dönemde yeni teknolojiler üretilip yayım kuruluşları aracılığıyla çiftçilere aktarılmıştır. Bu bilgi akışı tek yönlüydü ve araştırma kuruluşları yayım kuruluşları aracılığıyla çiftçilere bilgi transfer etmekteydi. Yerel halktan araştırmacıya geri bildirim ise çok düşük düzeydeydi. Teknoloji Transferi Modeli olarak adlandırılan bu modelde kırsal halkın bilgileri, çevresel koşulları, çiftçilik sistemleri, sosyal ve ekonomik durumları göz ardı edildiğinden çiftçilere sunulan tavsiye ve teknolojiler çiftçi şartlarına uygun olmamıştır (Warburton, Martin, 1999).Genel tarımsal yayım yaklaşımında çiftçilerin yeni üretim teknikleri ve teknolojiler konusunda bilgisiz olduğu varsayılmaktadır. Bu yaklaşımda teknoloji araştırma kuruluşlarında üretilmekte ve yayımcılar aracılığıyla da çiftçilere aktarılmaktadır. Çiftçilerin teknoloji üretimine ve geliştirilmesine herhangi bir etkisi veya katkısı bulunmamaktadır. Teknolojilerin geliştirilmesi sırasında çiftçilerin bilgi ve deneyimlerinden ve yerel bilgilerden faydalanılmamaktadır. Yayımcılar çiftçi ile araştırmacı arasında adeta bir köprü görevi görmektedir.

Dünyada 1990'lı yılların başlarında ise katılımcı yaklaşımlar gündeme gelmiştir. Katılımcı yaklaşımlarda kırsal alanda yaşayanların sahip oldukları yerel bilgiler başlangıç noktası olarak kabul edilmektedir. Yaklaşımın temel prensibi, karşılıklı öğrenmedir (Armağan, 2017). Yaklaşımda, çiftçiler ve konu uzmanlarının bir araya gelerek; mevcut durum analizlerinin yapıldığı, sorunların belirlendiği, çözüm yollarının geliştirildiği ve ortak karar sürecinin işlediği bir yapı sözkonusudur.

Katılımcı tarımsal yayım yaklaşımı, kırsal alanda yaşayan insanların tarımsal üretimi gerçekleştirecek bilgi birikimine sahip olduğunu varsaymaktadır (Kumuk, Oktay, 1994). Bu bilgiler

gerek tarımsal araştırma ve gerekse tarımsal yayım için önemli olup, kırsal alanda yapılan tüm çalışmalarda bu bilgilerdenyararlanılmaktadır. Katılımcı tarımsal yayım yaklaşımında araştırmacılar, yayımcılar ve çiftçiler araştırma konusunun belirlenmesinden araştırmanın sonuçlanmasına kadar geçen süreçte beraber ve işbirliği içinde çalışmaktadır. Böylelikle yerel bilgi ve modern bilgi bir araya gelerek çiftçi şartlarına uygun yararlı teknolojiler geliştirilmektedir.Katılımcı yaklaşımlar, önceden belirlenmiş amaçlardan yola çıkmamakta aksine hedef kitleleri ve diğer tarafları çalışmaların merkezine yerleştirmektedir. Bu modele göre tarımsal yayım çiftçiye düşünsel yardım yoluyla kendi problemlerini çözebilmek için yetenek kazandırdığı ve motive ettiği bir süreçtir. Bu süreç içerisinde çiftçi problem ilişkilerine ilişkin daha iyi bir bakış açısı kazanmakta ve sahip olduğu çözüm alternatiflerini tanımaktadır (Anonim, 2007). Kırsal alandaki insanların düşüncelerinin çok önemli olduğu, çalışmaların başarılı olabilmesi için projelerin hedef kitle tarafından "sahiplenilmesi" gerektiği, bununda ancak katılımcılıkla sağlanabileceği varsayılır (Şentürk, 2013).

5.2. Çiftçilik Sistemleri Araştırması Yaklaşımı

Çiftçilik sistemleri araştırması yaklaşımı işe küçük çiftçilerle başlamakta ve işi küçük çiftçilerle birlikte tamamlamaktadır. Çalışmaların ağırlık noktasını onların koşullarına ve gereksinmelerine yönelik faaliyetler oluşturmaktadır. Bu yaklaşımda çiftçi merkezdedir. Çalışma çiftçiye yöneliktir. Çiftçi çalışmanın başlangıcından son aşamasına kadar faaliyetin içindedir. Etkin rol almaktadır. Çiftçi çiftçilik sistemleri araştırması yaklaşımı ekibinin çalışma arkadaşıdır, ortağıdır. Tüm kararlar birlikte alınır ve uygulanır sonuçları yine birlikte değerlendirilir (Özçatalbaş, Erkan, 1996).

Çiftçilik sistemleri araştırması yaklaşımı araştırma ve teknoloji üretme çalışmalarının, söz konusu teknolojiyi kullanacak olan üreticilerin kendi ortamlarında ve onlarla birlikte yürütülmesine, geliştirilmesine ve denenmesine dayanmaktadır. Çiftçilik sistemleri araştırması yaklaşımı, yeni teknolojilerin üretilip geliştirilmesindeki işlevlerinin yanısıra, üreticilerin sorunlarının, amaçlarının ve önceliklerinin belirlenmesinde de üretici katılımını öngörmektedir (Çelik vd. 1994). Yani burada çiftçilerin bilgi ve deneyimleri önem kazanmaktadır.

Çiftçilik sistemleri araştırması yaklaşımında yerel bilgi yeni teknolojilerin çiftçi koşullarında adaptasyonu aşamasında önemli bir görev üstlenmektedir. Çiftçilik sistemleri araştırması yaklaşımında araştırmacılar çiftçileri problem tanımlama ve teknolojilerin uygunluğunu saptama aşamalarında sürece dahil ederek çiftçiler ve çiftçilerin bilgilerine odaklanmaktadır (den Biggelaar, 1991).

Çiftçilik sistemleri araştırması yaklaşımını özellikleri şunlardır: (Farrington, Martin, 1988)

-İçinde çiftçilerinde bulunduğu disiplinler arası bir ekiple problem çözme yaklaşımıdır.

-Teknoloji değişiminin kapsamını ve potansiyel etkisini, bütüncül bir yaklaşımla değerlendirir.

-Araştırmaları uygulamak için belirli bir bölgede nispeten homojen çiftçi grubu belirler.

-Dinamik, yinelemeli bir yaklaşımdır. Bir yılın deneme sonuçları bir sonraki yılının denemehipotezlerini oluşturur.

-Çiftçi şartlarında deneme sonuçları, araştırma kuruluşlarındaki çalışma konularını etkiler.

6. Sonuç ve Öneriler

Yerel bilgi uzun yıllar boyunca yerel halkın doğal kaynaklarla etkileşimi sonucunda oluşmuş bilgi birikimidir. Bu bilgi birikimi aynı zamanda geçmişten günümüze uygulamalara kaynak oluşturmaktadır.

Konu uzmanlarının ya da yayımcıların saha çalışmalarında yerel bilginin varlığını gözönünde tutmaları hem çalışmalarına yön verecek hem de gelecekteki kararlara zemin oluşturacaktır. Bir bilgi ya da teknolojinin yayılımında yerel halkı tamamen konuyla ilgili bilgisiz kabul etmek ve yerel bilgiyi dikkate almamak yayılması istenen bilgi ve teknolojiye toplumsal direncin oluşmasına neden olabilir. Yerel bilginin varlığını bilip katılımcı bir yaklaşımla saha çalışmalarına devam etmek yerel halkın da kararların içerisine çekilmesine neden olacak ve yeni bilgiler daha hızlı yayılma imkanına kavuşabilecektir. Ayrıca yerel bilgi dikkate alındığında, motivasyon oluşarak yerel halkın çözümleri sahiplendiği, yayımcıların yanında yer aldığı, çözümlerin sorun odaklı olduğu bir yapıya dönüşecektir.

Yerel bilginin önemli olması bilimsel bilgiye ihtiyaç olmayacağı anlamına gelmemektedir. Çiftçiler için yerel bilgiyle bilimsel bilginin entegre edilerek kullanılması en ideal yöntemdir.

Literatür incelendiğinde yerel bilgi sistemleri kullanılarak yürütülen tarımsal faaliyetlerde doğal kaynakların korunduğu ve bu faaliyetlerde daha ziyade sürdürülebilir tarım tekniklerinin uygulandığı gözlemlenmektedir. Bu nedenle yazılı olmayan yerel bilgiler kayıt altına alınarak kaybolma ve unutulma tehlikeleri ortadan kaldırılmalıdır.

Yerel bilgileri tehdit eden en büyük tehlike kırsal alanlardan kente göç ve çiftçilerin tarımsal faaliyetleri bırakma eğilimleridir. Bu nedenle kırsal nüfusun azalmasına karşı gerekli tedbirler alınmalı, yerel bilgilerin sürdürülebilirliği sağlanmalıdır.

Çiftçiler kırsal alanda önemli enformasyon kaynağı durumundadır. Bu nedenle yayım çalışmalarında önder çiftçi niteliğindeki üreticilerden daha fazla yararlanılmalıdır.Yayım çalışmalarında çiftçilerle daha fazla birlikte çalışmak amacıyla bireysel yöntemlere ağırlık verilmelidir.

Referanslar

Akın, S., Pirinç, V., Gökova, S.,& Kara, A.(2017). Sebze üreticilerinin tarımsal yayım çalışmalarından faydalanma düzeyleri ve karşılaştıkları sorunlar: Diyarbakır Örneği, Iğdır Üni. Fen Bilimleri Enst. Der. 7(1): 329-336.

Abedi, M., &Khodamoradi, S.(2011). The role of agricultural extension in integrating indigenous knowledge and modern knowledge in rural, Life Science Journal 8(2):254-258.

Abioye, A., Zaid, Y., &Egberongbe, H.S. (2011). Documenting and disseminating agricultural indigenous knowledge for sustainable food security: the efforts of agricultural research libraries in Nigeria, World Library and Information Congress: 77th IFLA General Conference and Assembly, 13- 18 August, San Juan, Puerto Rico.

Anaeto, F.C., Asiabaka, C.C., Nnadi, F.N., Aja, O.O., Ajaero, J.O., Ukpongson, M.A., &Ugwoke, F.O.(2013). Integrating indigenous knowledge system in extension education: The potential for sustainable agricultural development in Nigeria, Research Journal of Agriculture and Environmental Management 2(11): 332-340.

Anonim.(2007). Tarımsal Yayım/Danışmanlık Kavramı ve Felsefesi, https://personel.omu.edu.tr/docs/ders_dokumanlari/865_19650_345.doc.

Armağan, G.(2017). Tarımsal Yayım ve İletişim, Ders Notları, Adnan Menderes Üniversitesi Ziraat Fakültesi Tarım Ekonomisi Bölümü, Aydın.

Bamigboye, S.O., Tshisikhawe, P.M.,& Taylor, P.J. (2017). Detecting threats to Encephalartos transvenosus(Limpopo cycad) in Limpopo province, South Africa through indigenous knowledge, Indian Journal of Traditional Knowledge 16(2): 251-255.

Banda, S., Namafe, C.M., &Chakanika, W.W. (2015). Traditional Environmental Knowledge among Lozi Adults in Mitigating Climate Change in the Barotse Plains of Western Zambia, International Journal of Humanities Social Sciences and Education 2(9): 222-239.

Boz, İ., Akbay, C., Orhan, E., & Candemir, S. (2004). Çiftçilerin tarımsal faaliyetlerde kullandıkları bilgi kaynaklarının belirlenmesi ve tarımsal yayım açısından değerlendirilmesi, Türkiye VI. Tarım Ekonomisi Kongresi, 16-18 Eylül, Tokat.

Çukur, T., Saner, G. Çukur, F., Dayan, V., &Bayraktar, Ö.V.(2011). Zeytincilik işletmelerinin enformasyon kaynakları: Milas ilçesi örnek olayı, GAP VI. Tarım Kongresi 09-12 Mayıs, Şanlıurfa.

Çelik, H., Ceylan, İ.C., &Olhan, E. (1994). Çiftçilik sistemleri araştırması ve Türkiye'deki uygulamaları, Türkiye l. Tarım Ekonomisi Kongresi, 8-10 Eylül, İzmir.

Davis, M. (2006). Bridging the Gap or Crossing a Bridge? Indigenous Knowledge and the Language of Law and Policy. In Berkes, F., Capistrano, D., Reid, W. V., Wilbanks, T. (eds). Bridging Scales and Knowledge Systems: Concepts and Applications in Ecosystem Assessments. Washington DC, Island Press: 145-182.

Demirtaş, B.(2017). Zeytin üreticilerinin tarımsal yayım programlarına katılımının değerlendirilmesi, Harran Tarım ve Gıda Bilimleri Dergisi 21(3): 309-322.

Demiryürek, K.(2001). Tarımsal Enformasyon ve Bilgi Sistemleri Üzerine Bir Araştırma: Kavram, Teori ve Metot Rehberi, Türkiye Ziraat odaları Birliği, Ankara.

Den Biggelaar, C.(1991). Farming systems development: synthesizing indigenous and scientific knowledge systems, Agriculture and Human Values Winter-Spring: 25-36.

Farrington, J., & Martin, A. (1988). Farmer Participation in Agricultural Research: A Review of Concepts and Practices, Overseas Development Institute, Agricultural Administration Unit Occasional Paper 9, 79pp., London.

Grenier, L.(1998). Working with Indigenous Knowledge a Guide for Researchers,International Development Research Centre.

Gorjestani, N.(2000). Indigenous knowledge for development opportunities and challenges, Conference on Traditional Knowledge in Geneva, November 1, Italy.

Hess, C.G.(2006). Knowledge Management and Knowledge Systems for Rural Development, In: READER: GTZ Knowledge Management. GTZ Sector Project Knowledge Systems in Rural Development,
http://www.fao.org/nr/com/gtzworkshop/Knowledge_Management_and_Systems.pdf.

International Council for Science. (2002). ICSU Series on Science for Sustainable Development No. 4: Science. Traditional Knowledge and Sustainable Development. 24 pp.

Islam, M.R. (2012). Indigenous or Global Knowledge forDevelopment: Experiences from two NGOS in Bangladesh, International NGO Journal 7(1): 9-18.

Kalıpçı, E., Özdemir, C., & Öztaş, H.(2011). Çiftçilerin pestisit kullanımı ile ilgili eğitim ve bilgi düzeyi ile çevresel duyarlılıklarının araştırılması, Tübav Bilim Dergisi 4(3): 179-187.

Kızılaslan, N., &Kızılaslan, H. (1998). Tokat ili Merkez ilçesinde yüksek sistem bağcılıkla uğraşan işletmelerde bilgi edinme kaynakları, Gaziosmanpaşa Üniversitesi Ziraat Fakültesi Dergisi 1:127-142.

Kumuk, T., & Oktay, E. (1994). Türkiye'nin Kırsal Kalkınma Deneyimlerinin Işığı Altında Tarımsal Yayım Yaklaşımları, Örgütlenme-Organizasyon ve Yayım Öğretimi Üzerine Kimi Görüşler, Ege Üniversitesi Tarımsal Uygulama ve Araştırma Merkezi Yayım Serisi No:1, Bornova-İzmir.

Langill, S. (1999). Indigenous Knowledge a Resource Kit for Sustainable Development Researchers in Dryland Africa, People, Land and Water Program Initiative, IDRC.

Makinde, O. O., & Shorunke, O. A. (2013). Exploiting the values of indigenous knowledge in attaining sustainable development in Nigeria: The place of the Library, Library Philosophy and Practice (e-journal). 908.http://digitalcommons.unl.edu/libphilprac/908.

Morrison, B.J., Gold, M.A., & Lantagne, D.O.(1996). Incorporating indigenous knowledge of fodder trees into small-scale silvopastoral systems in Jamaica, Agroforestry Systems34:101-117.

Nakashima, D., McLean, K.G., Thulstrup, H., Castillo, A.R., &Rubis, J.(2012). Weathering Uncertainty: Traditional Knowledge for Climate Change Assessment and Adaptation, UNESCO, and Darwin, UNU, 120 pp, Paris.

Nazarpour, M., & Sadighi, M. (2011). Relationship between rural sustainable development and indigenous knowledge, Journal of Applied Environmental and Biological Sciences 1(8)172-176.

Özçatalbaş, O., & Erkan, O. (1996). Çiftçilik sistemleri araştırması yaklaşımının tarımsal yayım açısından değerlendirilmesi ve Türkiye'de uygulanabilme olanakları, Türkiye 2. Tarım Ekonomisi Kongresi, 4-6 Eylül, Adana.

Özçatalbaş, O., & Gürgen, Y. (1998). Tarımsal Yayım ve Haberleşme, Baki Kitapevi, Adana.

Özkaya, T. (1996). Tarımsal Yayım ve Haberleşme, Ege Üniversitesi Ziraat Fakültesi Yayınları No:520, E.Ü. Ziraat Fakültesi Ofset Atelyesi, İzmir.

Özer, D.(2007). Yeniden Yerleşimin Hayvancılık Yerel Bilgi Sistemine Etkisi Üzerine Bir Araştırma, Doktora Tezi, Ankara Üniversitesi Fen Bilimleri Enstitüsü, Tarım Ekonomisi Anabilim Dalı, Ankara.

Özger, Ş., Bayındır, A., Bal, T., & Birgücü, A.K.(2016). Denizli ili Çivril ilçesi şeftali üreticilerinin kimyasal ilaç kullanımına yönelik bilgi kaynaklarının ve davranışlarının belirlenmesi, 12. Ulusal Tarım Ekonomisi Kongresi, 25-27 Mayıs, Isparta.

Semeon, G., Garfield, M. J., Meshesha, M., & David, D. (2013). Agricultural knowledge management systems in practice: the ability to support wereda knowledge centers in Ethiopia, Proceedings of the Nineteenth Americas Conference on Information Systems, August 15-17, Chicago, Illinois.

Rusten, E.P., & Gold, M.A.(1991). Understanding an indigenous knowledge system for tree fodder via a multi-method on-farm research approach, Agroforestry Systems15:139-165.

Sillitoe, P. (2002). Participant observation to participatory development: making anthropology work. In Participating in Development: approaches to indigenous knowledge, (eds) Bicker, A., Pottier, J. and Sillitoe, P., London and New York: Routledge.

Şentürk, C. O. (2013). Çeltik Üretimi Yapan Tarım İşletmelerinde Tarımsal İlaç Kullanımında Yayım Yaklaşımları: Edirne İli Örneği, Yüksek Lisans Tezi, Namık Kemal Üniversitesi Fen Bilimleri Enstitüsü Tarım Ekonomisi Anabilim Dalı, Tekirdağ.

Tanyanyiwa, V.I., & Chikwanha, M. (2011). The role of indegenous knowledge systems in the management of forest resources in Mugabe area, Masvıngo, Zimbabwe, Journal of Sustainable Development in Africa 13(3): 132-149.

Tran, P., Takeuchi, Y., & Shaw, R.(2009). Indigenous Knowledge in River Basin Management,In: Indigenous Knowledge and Disaster Risk Reduction R. Shaw, A. Sharma vd.. (eds) Nova Science Publishers, Inc., pp 1-13.

Torun, E., & Taluğ, C.(2005). Çay budama projesi kapsamında üreticilerin kullandıkları bilgi kaynakları, Tarım Ekonomisi Dergisi 11(1): 41-49.

UNDP, (2012). Promoting ICT based agricultural knowledge management to increase production and productivity of smallholder farmers in Ethiopia.

Warburton, H., &Martin, A. (1999). Local People's Knowledge in Natural Resources Research, Socio-economic Methodologies for Natural Resources Research.Chatham, UK: Natural Resources Institute.

World Bank. (1998). Indigenous Knowledge for Development a Framework for Action, Knowledge and Learning Center Africa Region.

Yalçın, M., & Boz, İ. (2007). Kumluca ilçesinde seralarda üreticilerin kullandıkları bilgi kaynakları, Bahçe 36 (1-2): 1-10.

Yılmaz, E., Duran, C., Tüfekçi, S., & Ünal, E. (2009). Adana İli Feke İlçesi Sedir Mantarı Toplayıcılarına Yönelik Sosyo-Ekonomik Çözümlemeler ve Yerel Bilginin Değerlendirilmesi, Çevre ve Orman Bakanlığı Yayın No: 389, 110s. Tarsus.

Yılmaz, H., Demircan, V., & Gül, M.(2009). Üreticilerin kimyasal gübre kullanımında bilgi kaynaklarının belirlenmesi ve tarımsal yayım açısından değerlendirilmesi, Süleyman Demirel Üniversitesi Ziraat Fakültesi Dergisi 4 (1): 31-44.

Yurttaş, Z., & Atsan, T. (2007). Tarımsal Yayım ve İletişim Teknikleri, Atatürk Üniversitesi Ziraat Fakültesi Yayınları No: 67, Erzurum.

ECONOMIC ANALYSIS OF PESTICIDE USE IN THE HARRAN PLAIN

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Abstract

Agricultural fighting medicines (pesticides) are chemicals with a wide range of uses in agricultural struggle in order to increase agricultural production and improve quality. Harran Plain in terms of climate and soil properties is one of the most important plain in Turkey. Therefore, an unconscious agriculture pesticide application to pollute these lands should not be done and the work to be done in this regard is very important.

Pesticide use by farmers in the Harran plain which is one of the most important plain of Sanliurfa examined in detail with data obtained from surveys conducted by 130 agricultural enterprises

It was determined that the share of the pesticide cost per decare of the farmers in total changed cost was 14.83% for cotton, 12.78% for wheat and 7.58% for corn.

While many of the farmers were buying pesticides, they found that they acted according to the recommendation of the franchisees and used excess pesticides and reached the result that the cost of spraying could be reduced by the training activities to be done in this area.
Keywords: Harran Plain, pesticide costs, economic analysis.

HARRAN OVASINDA TARIMSAL İLAÇ KULLANIMININ EKONOMİK ANALİZİ

Özet

Tarımsal mücadele ilaçları (pestisitler), tarımsal üretimi artırmak ve kaliteyi iyileştirmek amacıyla zirai mücadelede oldukça geniş kullanım alanına sahip kimyasallardır. Harran Ovası iklim ve toprak özellikleri yönünden Türkiye'deki en önemli ovalardan biridir. Bu yüzden bu toprakları kirletecek bilinçsiz bir ilaç uygulamasının yapılmaması gerekmektedir ve bu konuda yapılacak çalışmalar çok önemlidir.

130 işletme ile yüz yüze yapılan anket sonuçlarından elde edilen verilerle , Şanlıurfanın en önemli ovalarından biri olan Harran ovasındaki çiftçilerin tarımsal ilaç kullanımları detaylı olarak incelendi.

Yapılan değerlendirmede çiftçilerin dekar başına yaptıkları ilaçlama masraflarının toplam değişen masraflar içerisindeki payının pamuk için %14,83, buğday için %12,78 ve mısır için %7,58 olduğu belirlenmiştir.

Çifçilerinçoğunun tarımsal ilaç satın alırken bayilerin tavsiyesine göre hareket ettikleri ve gereğinden fazla ilaç kullandıkları tespit edilmiş, bu konuda yapılacak olan eğitim faaliyetleriyle ilaçlama masrafının azalabileceği sonucuna ulaşılmıştır.
Anahtar kelimeler: Harran ovası, ilaçlama masrafları, ekonomik analiz.

DETERMINATION OF PRODUCTION AND MARKETING POTENTIAL OF MEDICINAL AND AROMATIC PLANTS IN MUGLA

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Abstract

Production of medicinal and aromatic plants improved in recent years together with the increase of the amount of consumer demands. Medicinal and aromatic plants which have wide area of use also have important contribution on rural economy. In this way, medicinal and aromatic plants which are local resources in rural area provide an alternative income channel for the producers. On the other hand, although Turkey is one of the most important countries in the sense of medicinal and aromatic plants, exportation of medicinal and aromatic plants is not still at expected level. At this point, there is a need for various strategies for more effective marketing of the product. Mugla has an important place in medicinal and aromatic plants production of Turkey with its geographical and natural structure and ecological and biological diversity. In this sense, increase of production and marketing potential of available medicinal and aromatic plant of Mugla and enabling its sustainability is of great importance for country economics in macro basis and for Mugla in micro basis. In this study, first of all available medicinal and aromatic plants production and marketing structure of Mugla will be presented through years. Moreover, projects carried out from past until present for enabling sustainability of medicinal and aromatic plants production will be evaluated. In the study, in further stages, problems in production and marketing will be discussed and solutions will be suggested for these problems.
Keywords: Medicinal and aromatic plants, production, marketing, rural development, Mugla.

MUĞLA İLİ TIBBİ VE AROMATİK BİTKİLER ÜRETİM VE PAZARLAMA POTANSİYELİNİN BELİRLENMESİ

Özet

Son yıllarda dünyada tüketicilerin talep miktarında da yaşanan gözle görünür artışı ile tıbbi ve aromatik bitkiler üretimi hız kazanmıştır. Birçok kullanım alanı olan tıbbi ve aromatik bitkiler, aynı zamanda kırsal ekonomiye de önemli katkılar sağlamaktadır. Böylelikle kırsal alanda bir yerel kaynak olan tıbbi ve aromatik bitkiler üreticiye alternatif bir gelir kapısı olanağı sunmaktadır. Diğer taraftan, Türkiye tıbbi ve aromatik bitkiler yönünden dünyanın en önemli ülkelerinden birisi olmasına rağmen, tıbbi ve aromatik bitki ihracatı henüz istenilen düzeylerde bulunmamaktadır. Bu noktada üretilen ürünün daha etkin bir şekilde pazarlanmasına yönelik çeşitli stratejilere ihtiyaç bulunmaktadır. Muğla ili, coğrafi ve doğal yapısı ile ekolojik ve biyolojik çeşitliliği itibariyle Türkiye'nin tıbbi ve aromatik bitkiler üretiminde önemli bir konumdadır. Bu bağlamda, Muğla ilinin mevcut tıbbi ve aromatik bitki üretim ve pazarlama potansiyelinin artırılması ve sürdürülebilirliğinin sağlanması makro bazda ülke ekonomisi ve mikro bazda da Muğla ili açısından önem taşımaktadır. Bu çalışmada, öncelikle Muğla ilinde yıllar itibariyle mevcut tıbbi ve aromatik bitkiler üretim ve

pazarlama yapısı ortaya konacaktır. Ayrıca dünden bugüne tıbbi ve aromatik bitkiler üretiminin sürdürülebilirliğinin sağlanmasına yönelik yapılan projeler değerlendirilecektir. Çalışmada, daha sonraki aşamada, üretim ve pazarlamada yaşanan sorunlar ve bu sorunlara ilişkin çözüm önerileri getirilecektir.
Anahtar kelimeler: Tıbbi ve aromatik bitki, üretim, pazarlama, kırsal kalkınma, Muğla.

THE USAGE OF DIFFERENT ENERGY SOURCES IN THE ECONOMY

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Abstract

In this essay we analysethe global problems which are connected with limited – mainly fossil – resources and population growth, and focusing those possibilities – renewable resources – which can help us to substitute them.

The climate change that threatens the entire human race – and has been proven to accelerate due to human activities – requires quick action. Greenhouse gases must be reduced and we have to prepare for weather anomalies associated with climate change. Increasing energy efficiency and the use of environmentally sound technologies are important issues of cost-effectiveness in the economy. Our goal is to develop and generalize technologies with low carbon intensity throughout the total life cycle in order to reduce the effects of pollution and climate change. A shift towards "green economy" also raises doubts and carries risks. It is advisable to analyse the effects of climate change so that humanity may be able to prepare for the changes. The future is not written yet and all options are open, but there is not much time left. If we do not change our behaviour, the idea of a sustainable future will simply be mirage and nothing more.

We analyse population growth and the exponentially increasing energy consumption we have crossed the limits of the Earth's biological carrying-capacity.

One of the key factors, of showing the way to draft, the future prospects and strategies, which are based on the results of sciences. However, we can attain results only if – with the presence of renewable resources – we use innovations that provide living in the long run.

Keywords: Energy sources, sustainability, renewable, climate change, green economy.

1. Introduction

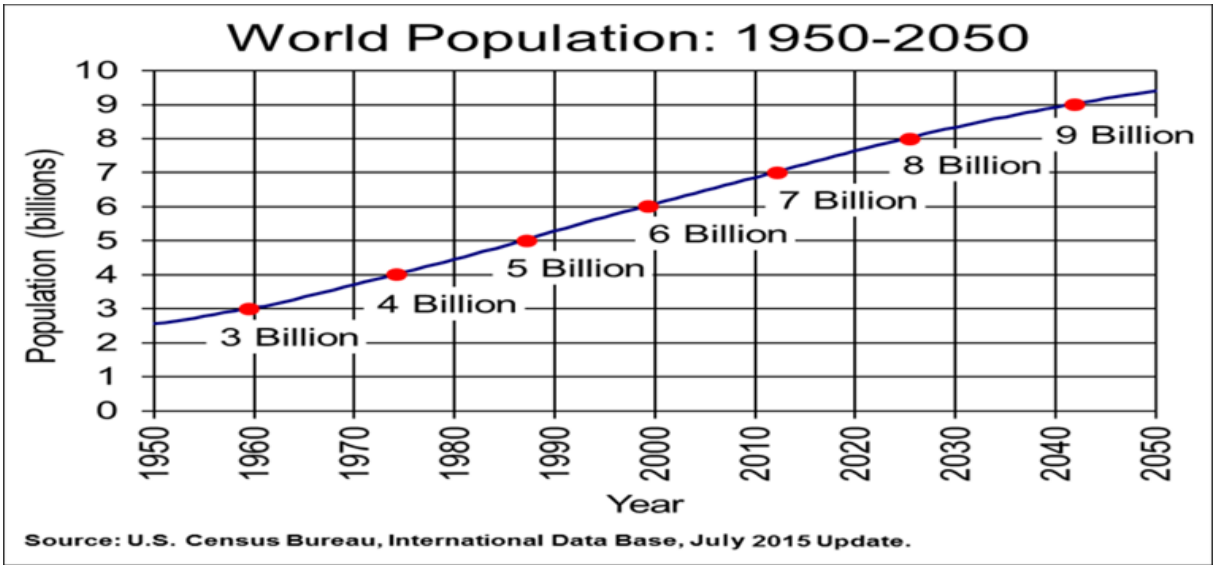
Owing to the unstoppable population growth and the exponentially increasing energy consumption we have crossed the limits of the biological carrying-capacity of the Earth. It must be realized that we have come to the end of an economy based on the use of cheap fossil fuels. In this century humanity must return to the basics of life on earth and consider global challenges. Topic of the essay is current nowadays, because the population growth is increasing the use of resources. One part of these resources is limited, so we will have to find those possibilities which can substitute them. In our research we are searching for answer to which may be the resources that could be used for it. This problem is present not only in Europe, but all over the world. The aim is to highlight the problems and the limitations on opportunities that will help reduce them. In the first part of the essay we introduce the world's population and energy use increases, after the use of renewable resources which could be a solution for the future.

The theoretical concept is developed in this essay, and the conclusions drawn from empirical research provide extended understanding of the crucial question: how can we solve the resource scarcity problem in the future?

2. Population Growth and Energy Consumption

2.1 Population Growth

Nowadays population growth seems to be unstoppable as the number of the world population exceeded 7.6 billion in 2018 (see Figure 1).Since 1960 the population of Africa almost quadrupled, that of Latin America tripled, while the number of people in Asia has grown by two and half times.According to the estimates by U.S Census Bureau (2015) by 2035 the population of the world will have exceeded 8.5 billion. Around 2025 the population of India will be larger (1.5 billion) than that of China.



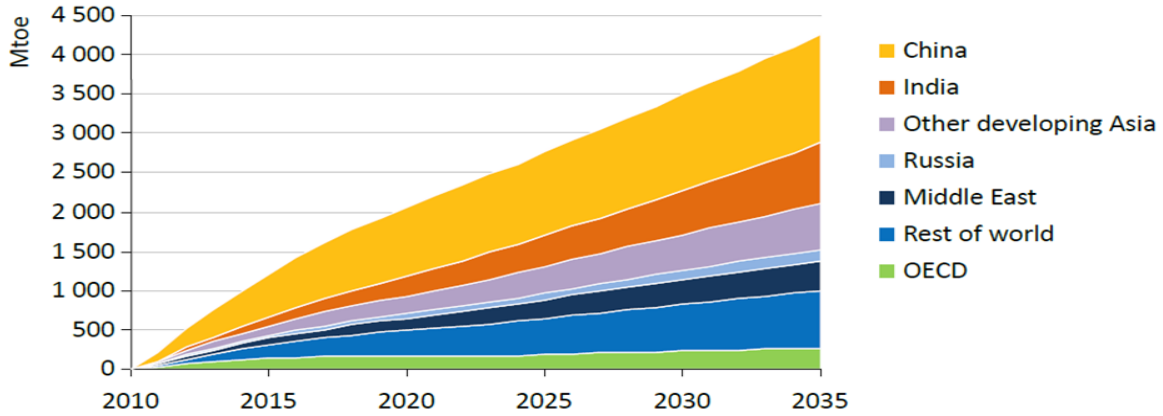
Source: U.S. Census Bureau, International Data Base (2015)

Figure 1.World Population: 1950-2050

Over the past two centuries in Western countries the so-called modern demographic cycle went through all the phases. Europe's population increased fourfold, the number of births per woman fell from 5 to under2, the birth and death rate dropped from 35-40% to 10%. Life expectancy increased from 30 years to 75-80 years. This change is called the "demographic transition".(Liui-Bacci, 1999) Countries with high birth-rates will have to go through similar phases so as to stabilise their population but this will only happen in the distant future. Africa and India should implement the transition through a much shorter time, because the longer transition more unfavourable, the consequences of the rapid population growth will be considering the conditions for development.

2.2 Energy Consumption

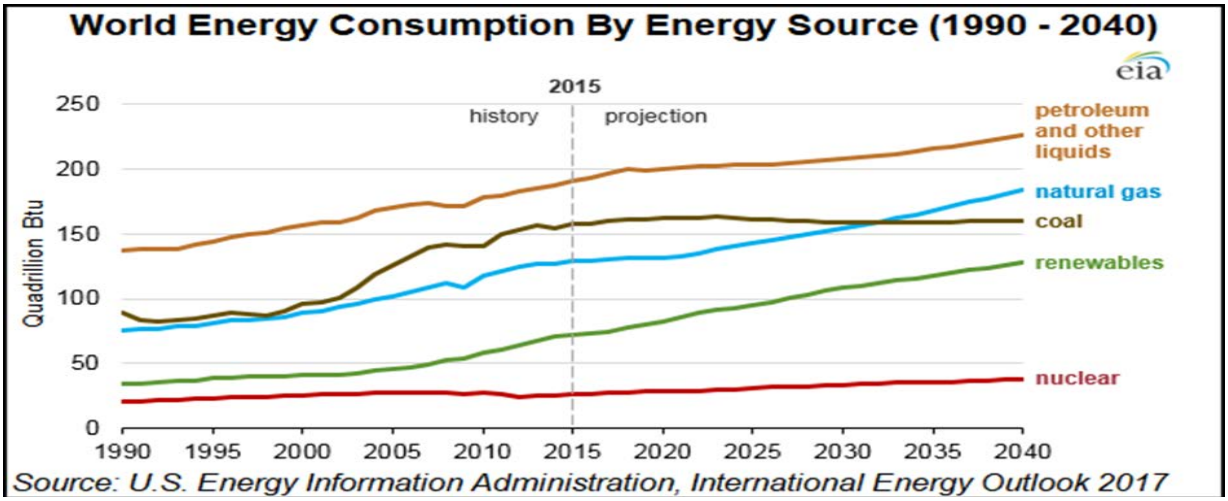
Population growth is associated with an increase in energy demand. Changes in energy policy are inevitable, but even so the demand for energy is expected to increase by 1.2% a year and between 2010 and 2035 it is likely to reach a 30% growth. 90% of energy-demand-growth is generated outside OECD countries, China & India accounting for 50% of the growth (see in Figure 2).



Source: International Energy Agency (2017).

Figure 2 : Global Energy Demand Increases in Mtoe (Million Tons of Oil Equivalent)

Energy production is increasing in the world today, for all energy sources. Fossil energy sources will be determining in the near future.Reduction in the use of fossil fuels is not expected till 2040 while the proportion of renewables may rise to 18% by 2035 (see in Figure 3).Different regions of the world show different production and consumption patterns. Asia and North America are in a leading position in the use of coal. Asia, North America and Europe are the largest consumers of oil. Europe and North America leads in natural gas consumption. World energy demand in 1980 was 7.229 million tonnes of oil equivalent (Mtoe) in 2008 it increased to 12.271 Mtoe. More than 80% of the global primary energy demand is satisfied by fossil energy resources.



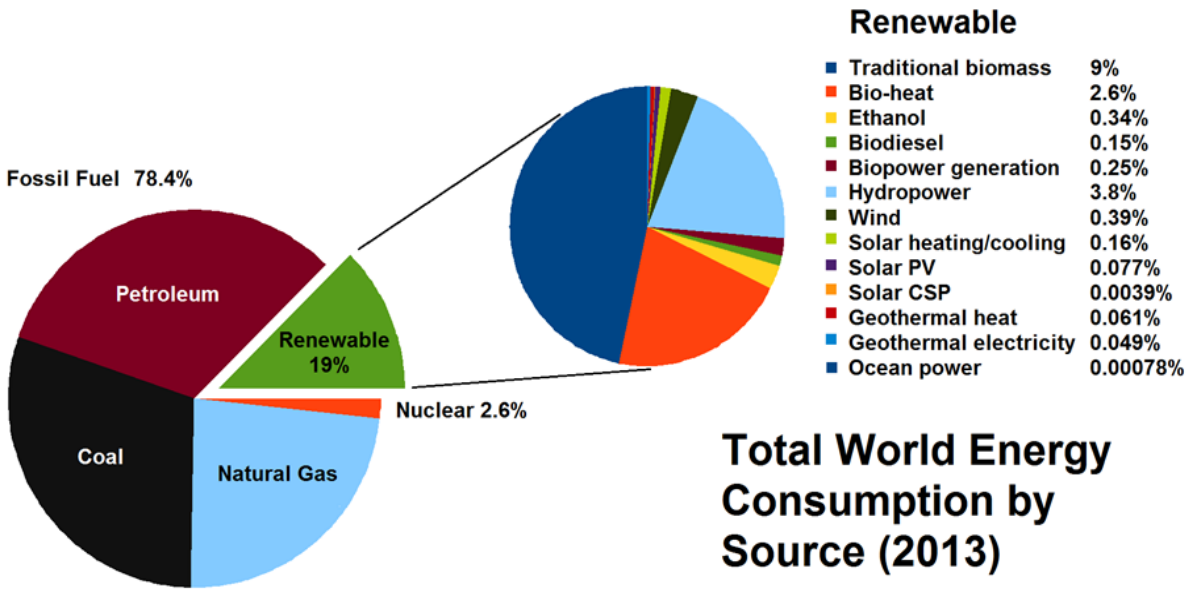
Source: U.S. Energy Information Administration, International Energy Outlook (2017)

Figure 3. World Energy Consumption by Energy Source (1990-2040)

Of all the energy resources crude oil is still the most important one. The exploitation of energy resources has accelerated dramatically compared to their formation and regeneration. Gyulai (2009) writes that "at present the exploitation of crude oil is 300 000 times faster than the formation and maximal accumulation of crude oil in the geological storage systems. Natural gas is extracted 1.4 million times faster than its peak accumulation during the third age. Coal mining these days is 60 000 times faster than the formation of the coal in the late carbon era."

3. The Role of Different Renewable Energy Sources

There are plenty of renewable energy resources available and it would be possible to satisfy our total energy needs from these sources providing that they were used in a sensible way. However, we are a long way away from this as only 19% of the energy we consume originates from renewable sources (see in Figure 4).The global energy need is growing continuously due mainly to China, India, and the developing countries.



Source: REN21 Renewables. 2014 Global Status Report (2014)

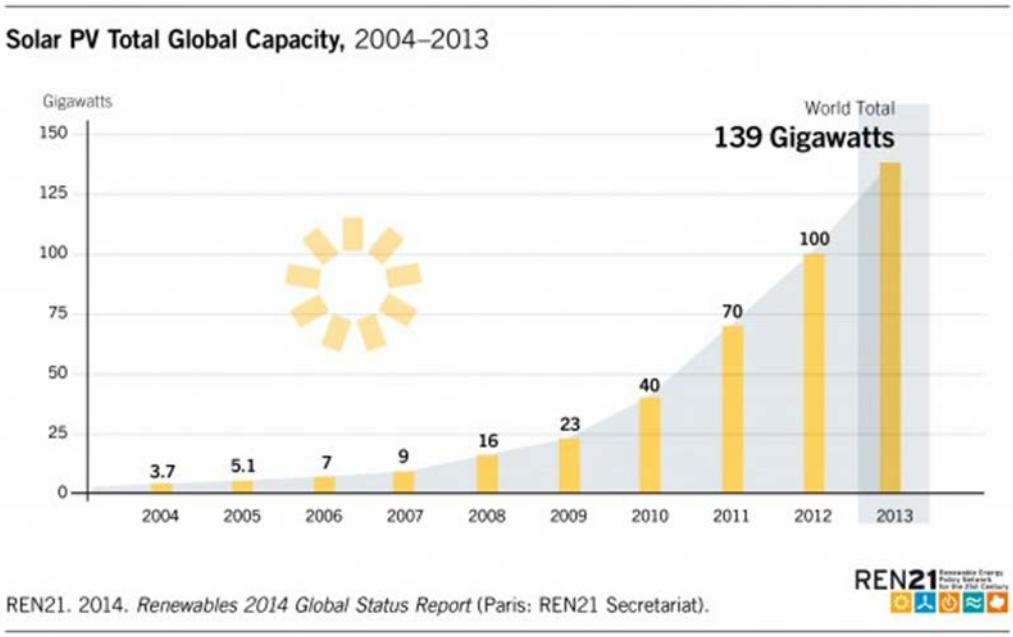
Figure 4. The World Energy Consumption by Source (2013)

The different energy potentials must be distinguished since theoretical potentials have five different forms which can be interpreted as follows: theoretical potential (according to our present knowledge "*physically available amount of energy*" in a given area) includes convertible or conversion potential ("exploitable at the current technology level") which covers the technical, economic and sustainable potential volumes. Technical potential refers to (*"from the technical point of view realistically exploitable within structural constraints")* the volume that can be achieved with current technology, which is still greater than the economic potential (which refers to the *„economically exploitable potential"*). Compared to the economic potential they actually (realistically) exploitable so called sustainable potential (i.e. the *"potential that can be utilised in harmony with social ecological factors")* is even smaller, more restricted. The amount of the potentially usable renewables could satisfy the current total energy demand of mankind no less than twenty times.

Renewable energy production receives increasing support, but the 88 billion US dollar grant green technology received in 2011 is only one-sixth of the support for fossil fuels (European Commission, 2013). Investments in renewable energy production are the largest in Europe and Asia. North America in this field is more restrained, due to the shale gas and shale oil production which resulted in a decline in the price of energy thus consequently investments in renewable sources of energy have been postponed. Renewable energy sources actually utilise solar energy either directly or indirectly, while the other option is geothermal energy, which comes from energy-producing processes in the depths of the earth.

3.1 Solar Energy

The utilisation of renewable energy sources, such as solar energy, is a specific research and development project. The use of solar energy is currently next to minimal, but it is evolving rapidly (see in Figure 5). Its utilization can be passive when it comes to the design and construction of buildings in order to make use of solar energy, and it can also be active when heat or electricity production is conducted. The cost of equipment decreases rapidly, and international results can be adapted in a number of different questions. However, due to the local nature of renewable energy sources in many cases the local conditions require appropriate individual judgment and technical solutions. This must be considered during the application of such systems (Kerek, 2003).



Source: REN21 Renewables. 2014 Global Status Report (2014)

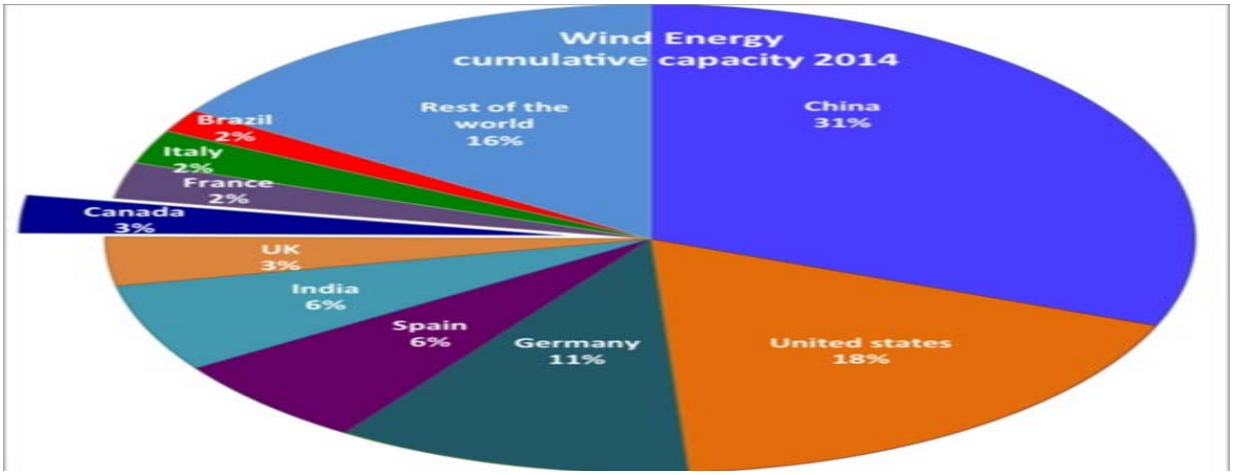
Figure 5. Solar PV Total Global Capacity, 2004-2013

3.2 Wind Energy

The use of wind energy is becoming widespread since the 1970s, especially in the coastal areas with high wind conditions. With the rapid development of technology the price of electricity produced by wind turbines has fallen rapidly. Wind generators can be installed anywhere depending on the wind, they require minimal maintenance and they do not emit harmful substances during their operation. The importance of wind power has grown significantly as the Fukushima nuclear disaster has brought about substantial structural changes.

While the three major wind energy farm installation regions (Asia, Europe and North America) run at their own individual tempos the overall growth of wind power across the world remained steady.

Based on the survey of EurObserv'ER in 2015 the North American market came to the fore with a market share put at 31.8% that translated into 14059MW installed capacity over the previous 12 months thus it could jostle the Asian markets this year although the latter should remain the main focus of wind energy installations. European market is still sizeable and last year it accounted nearly 30% of the global market (see in Figure 6).



Source: EurObserv'ER (2015)

Figure 6.Wind Energy Cumulative Capacity 2014

The rapid growth of wind power production is hampered by various factors in different continents. The lack of properly developed grids in China, the tax policy in India, the federal grant system in the USA and the political instability in the Middle-East are the main problems (Hartmann B, 2012). Wind energy – combined with solar energy utilization – can be a significant factor in the autonomous energy supply by forming a hybrid system (Marselek, 2012).

3.3 Hydro Energy

Hydroelectricity is the production of power through use of the gravitational force of falling or flowing water. It is the most widely used form of renewable energy. There is no direct waste once a hydroelectric complex has been constructed. Small scale hydro power systems can be installed in small rivers or streams with little or no environmental effect or disruption to fish migration. This has become a popular alternative energy source, especially in remote areas where other power sources are not viable. The majority of small-scale hydro power systems make use of water wheels to generate energy, skipping the need for a dam or major water diversion. Many hydroelectric projects are plugged into the national grid, however, some are created to serve specific industrial enterprises. Dedicated hydroelectric projects are often built to provide the substantial amounts of electricity needed for aluminium, electrolytic plants.

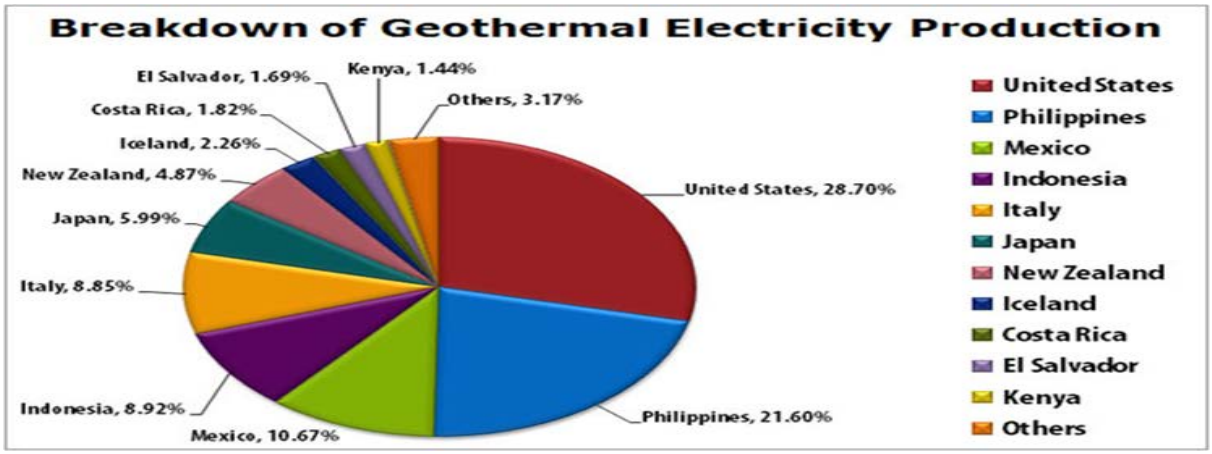
Table 1. The World's Hydropower Potentials by Continents

Continent	**Theoretical Hydropower-potential TWh**	**Technically utilisable-TWh**	**Total electricity generation TWh**	**Hydro-energy generation TWh**	**% of hydro-energy**	**Utilised technical hydropower potential %**
Europe	4 360	1 430	2 599	453	18	32
North America	6 150	3 120	3 202	642	20	21
Latin-America	5 670	3 780	370	281	76	7
Africa	10 120	3 140	234	49	21	2
Asia	20 430	7 530	3 475	564	16	7
Oceania	1 500	390	161	39	24	10
Total	**18 230**	**19 390**	**9 962**	**2 028**	**20**	**11**

The world's technically recoverable hydropower capacity (according to estimates) is about 20000 TWh, while the total global hydropower production is about 2000 TWh, which is only 10% of the technically recoverable energy (see in Table 1).
Today more than 160 countries around the world generate electricity using hydropower and the total capacity of the approximately 11000 hydropower plants worldwide is 874 GW. Half of the technically recoverable hydro energy can be found in 5 countries, namely: China, USA, Russia, Brazil, and Canada.

3.4 Geothermal Energy

The energy is accessible at any time of the year, unlike wind and solar energy. The constantly flowing heat from inside the Earth represents 42 million MW of power, so its utilisation is justified (Stacey and Loper, 1998). The capacity of geothermal power plants in 2012 exceeded 11 GW. The rate of capacity expansion is dynamic. Geothermal energy can be used directly for heat utilisation or indirectly for electricity generation. Direct heat utilisation is more common as only 0.3% of the globally generated electricity comes from geothermal sources (Goldstein, 2011). The main types of utilization and their distribution is as follows: heating of buildings (63%), baths, balneology (25%), horticultural greenhouses and soil heating (5%), industrial heat consumption and agricultural drying (3%), aquaculture and fish farming (3%), snow-melting (1%) (Lund et.al, 2010). The breakdown of geothermal electricity producer countries can be seen in Figure 7.



Source: Geothermal Renewable energy essential: Geothermal available at wwwiedorgOECD/IEA (2010)

Figure 7. Breakdown of Geothermal Electricity Production

3.5 Biomass

The Directive 2009/28/EC of the European Parliament and of the Council defines biomass as "the biodegradable fraction of products, waste and residues from biological origin from agriculture (including vegetal and animal substances), forestry and related industries including fisheries and aquaculture, as well as the biodegradable fraction of industrial and municipal waste". Biomass is potentially the largest source of renewable energy; the annual primary production reaches 4500 EJ, of which 2900 EJ can potentially be used as bioenergy. The extraction of about 10%of the total amount is sustainable in the long-term (Hall and Rosillo-Calle, 1999).

The energy use of biomass can be achieved through thermochemical and biochemical conversion with four types of possible end products:

- heat energy (heating-cooling, domestic hot water supply),
- electricity (electric lighting, thermal, motor power supply),
- combined electricity and heat energy (power plant level electrical and thermal energy supply),
- fuel, vehicle fuels (biogas, bio methane, oil, biodiesel, bioethanol).

Second generation biofuels are made from new ingredients. The technology is traditional, but different plants are used, for example spurge-species (Jatropha), cassava, or Japanese grass (Miscant Hus). It is possible to produce new varieties of biofuel (ethanol, butanol, syndiesel) from ligno-cellulosic materials (fibrous biomass, grasses, wood etc.) but it is not economical yet. The production of third generation biofuels is still in an experimental phase for example biofuels produced from algae or biomass derived from hydrogen (Rutz and Jansen, 2008).

The 2009/28/EC Directive obliges Member States to increase the share of renewable energy in transport to 10%by 2020.

It is expected that there will be a technology shift within 5 to 10 years in biofuel production and that the current firstgeneration technologies will be replaced by secondgeneration procedures. The difference between the two lies in the fact that in case of former technology only a portion of the plants (seeds, stems) can be used for fuel production, the latter will enable the utilisation of the cellulose content of the plants, which means that the whole plant can be used. What is more, the arboreal plants, which at the moment cannot be used owing to their composition, will also be suitable for fuel production. It is obvious that with this possibility the potentials of biomass will be greatly increased and thus certain countries will be able to produce enough bio fuel to meet their own demand. Naturally, in order to achieve this aim both the technology must be developed and the levels of consumption will have to be reduced. In the field of bio-ethanol production the USA and Brazil have a leading role, but the availability of cheap shale gas has reduced growth. The first generation of production, the main crops are maize and sugar cane, which are suitable for bioethanol production. The EU and the USA produces the majority of biodiesel while the role of other countries in this respect is negligible. Today over 50 countries have introduced legislation on mandatory biofuel blending ratios. In those countries if fuel consumption grows, more biofuel is required, so the use of biofuels is affected by the price of crude oil.

The assessment of potential sources of raw materials can be beneficial, but it does not usually correspond to the scope of the sustainable supply of available resources. The crux of bio-energy projects are the accessibility and sustainability issues, which is closely related to biomass energy production technologies.

4. Conclusion

The energy challenge is one of the greatest tests which the World has to face. It will take at least 20 years to steer our energy systems onto a more secure and sustainable path. Yet the decisions to set us on the right path are needed urgently as failing to achieve a well-functioning World energy market will only increase the costs for consumers and put World's competitiveness at risk.

To achieve a resource-efficient World, we need to make technological improvements, a significant transition in energy, industrial, agricultural and transport systems, and changes in behaviour as producers and consumers. To give businesses the certainty which they need to invest now, and to ensure that future generations benefit from smart investment, we have to start taking action immediately, on the basis of a regulatory framework that provides long-term stability. Improving resource efficiency also provides an opportunity to keep costs under control by reducing material and energy consumption and thus to boost future competitiveness.

Policy thus needs to be long-term and consistent and, while national policies can still be effective, given the global nature of resource consumption, internationally harmonised policy will make the task of reaching a resource efficient future in a smoother operation. Research that elucidates the complexity of resource use, such as that highlighted in this issue, will help to shape long-term, future policies.

References

Blaskovics, Gy (2008). Vízenergia. In: Megújuló energiák. Sprinter Kiadó Kft., Budapest

Dominik, R& Rainer, J.R. (2008) Biofuel marketplace – Biofuel Technology Handbook, WIP Renewable Energies, München

European Commission, (2013). Brussel

EurObserv'ER, (2015). Paris

Goldstein, B., Hiriart, G., Bertani, R., Bromley, C., Gutierrez-Negrin, L., Huenges, E., Muraoka, H., Ragnarsson, A., Tester, J., Zui, V. (2011). Geothermal Energy. In: IPCC Special Report on Renewable Energy Sources and Climate Change Mitigation [eds. Edenhofer, O., Pichs-Madruga, R., Sokona, Y., Seyboth, K., Matschoss, P., Kadner, S., Zwickel, T., Eickemeier, P., Hansen, G., Schlomer, S., von Stechow, C.], Cambridge University Press, Chambridge, United Kingdom and New York, NY., USA, 36. p.

Geothermal Renewable energy essential (2010). Geothermal available at wwwiedorgOECD/IEA

Gyulai, I (2009). A biomassza dilemma. Miskolc, Lánchíd Kiadó Kft., Ökológiai Intézet a Fenntartható Fejlődésért Alapítvány

Hall, D., Rosillo-Calle, F. (1999). The Multifunctional Character of Agriculture and Land: the energy funciton (Background Paper 2: Bioenergy), in: Background Pappers: FAO/Netherlands Conference on the Multifunctional Character of Agriculture and Land, (Ed.) Trenchard, R., Rome (FAO).

Hartmann, B (2012). Szélerőművek integrálása a villamosenergia-rendszerbe. PhD. Disszertáció, Budapesti Műszaki és Gazdaságtudományi Egyetem, 1-112. p.

International Energy Agency (2107). Brussel

Kerek, Z (2003). Fenntartható energiagazdálkodás. In Észak-Magyarország agrárfejlesztésének lehetőségei. S.Magda&S. Marselek (Eds.).(pp. 180-191)., Budapest: AGROINFORM Kiadó

Lund, J. W., Freeston, D. H., Boyd, T. L. (2010). Direct utilization of geothermal energy 2010 worldwide review.In Proceedings World Geothermal Congress 2010, Bali, Indonesia, pp. 25-30, p. 23.

Liui-Bacci M. (1999).A világ népességének rövid története. Osiris Kiadó, Budapest, 130-140. p.

Marselek, S (2012). Fenntartható intelligens kistérségi megújuló energetikai rendszer konstrukció IV. TÁMOP – 4.2.1. – 09/1 – 2009 – 0001 Kutatási jelentés. Gyöngyös, Károly Róbert Főiskola.

REN21 (2014). Renewables. 2014 Global Status Report. REN21 Secretariat, Paris.

Stacey, F. D. and Loper, D. E. (1988). Thermal history of the Earth: a corollary concerning non-linear mantle rheology. Phy. Eart. Planet: Inter, 53.

U.S Census Bureau (2015). International Data Base

U.S. Energy Information Administration (2017). International Energy Outlook

SELECTED ASPECTS OF SUSTAINABLE DEVELOPMENT IN AGRICULTURE

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Abstract

Sustainable development is the progress which meets the needs of the present without compromising the ability of future generations to meet their own needs. All definitions of sustainable development require that we see the world as a system—a system that connects space and a system that connects time. When we think of the world as a system over space, we grow to understand that air pollution from power plants of North America affects air quality in Europe and Africa, and that tragedy of nuclear station in Fukushima could harm fish stocks off the coast of Australia. And when we think of the world as a system over time, we start to realize that the decisions of our grandparents made about how to farm the land continue to affect agricultural practice today and the economic policies we endorse today will have an impact on urban poverty when our children are adults. Sustainable development has been defined in many ways, but the definition which is the most frequently quoted comes from the Brundtland Report (3.27). *Sustainable development is development that meets the needs of the present, without compromising the ability of future generations to meet their own needs*. This means meeting the diverse needs of all people in existing and future communities, (1) promoting personal wellbeing, (2) social cohesion and inclusion, and (3) creating equal opportunity.

From the agricultural point of view, the three points mentioned above concerning the sustainable development, can be describe as:

a) Food Security - Sustaining the Potential. Food security requires attention to questions of production and distribution, It can be furthered by land reforms, and by policies to protect vulnerable subsistence farmers, pastora1ists, and the landless.

b) Species and Ecosystems - Resources for Development. Conservation of living natural resources - plants, animals, and micro-organisms, and the non-living elements of the environment on which they depend - is crucial for development.

c) Energy - Choices for Environmentand Development. Energy is necessary for daily survival. Future development crucially depends on its long-termavailability in increasing quantities from sources that are dependable, safe, andenvironmentally sound. At present, no single source or mix of sources is at hand to meet thisfuture need.

Many macro and micro analysis on the influence of the growth-oriented agricultural policies have showed that achievements in increasing food production have been attained at the expense of depleting the environmental and natural resources, that are indispensable for the sustainability of any agricultural systems.Sustainability and sustainable development have become issues of global policies over the past two decades. Continuously and systematically transforming of the agricultural sector for the age of sustainable developmentrequires tracking these interactions, evaluating if objectives are being achieved and allowing for adaptive management within the diverse agricultural systems that make up global agriculture.

Key Words: Sustainable development, agriculture, food security, energy, welfare.

1. Introduction

The research werecarried out in Egypt, Ethiopia and Guinea in order to compare the sustainable development in Africa countries. It was observed that Africa'sinfrastructure deficits undermine industrial development and has influence the stagnation in value addition in manufacturing. And, even though value-addition in agriculture has been rising, it remains substantially low by global standards due, in part to limited investments and inefficiencies at all levels of the agricultural production chain. Increased efficiency of investments in agriculture, both private and public, is vital to addressing food insecurity in Africa.Improving agricultural productivity is vital to addressing food insecurity in Africa. Measured in terms of agricultural value added, Africa's agricultural productivity is on the rise but remains well below the global average. Working young people and women are disproportionately affected by the burden of poverty.

1.1. Food Security - Sustaining the Potential

Food consumption is required to support human life. Food demand in the world will increase as populations increase and their consumption patterns change. Global food security depends on many factors, not only on raising global production, but also on reducing interference and distortions in the structure of the world global food market and on shifting the focus of food production to food-deficit regions, countries, and individual households.

Global food security also depends on ensuring that all population, including even the poorest of the poor, can get food. Food consumption is also different across individuals/countries depending on tastes and preferences, prices and income distribution. The access to food by individuals is complex. In general, food insecurity varies over time and across space. It depends on food availability(Chavas, 2017). While on the world scale this challenge requires a reappraisal of global food distribution, the task weighs more immediately and heavily on national governments. Rapid, sound agricultural development will mean not only more food but also more opportunities for people to earn money to purchase food.

Thus, when countries with untapped agricultural resources provide food by importing more, they are effectively importing unemployment. Interventions that improve food security and provide for basic needs may go some way towards weakening some – but not all – of the welfare.

1.2. Species and Ecosystems - Resources for Development

Conservation and support of the natural resources –fauna and flora e.g. plants, animals, and microorganisms, and the non-living elements of the environment on which they depend - is essential for development. A first element, the priority is to establish the problem of disappearing and disintegration species and threatened ecosystems on political agendas as a main resource issue.

Governments need to follow a new approach and create new models in this field - one of anticipating the impact of their policies in numerous sectors and acting to prevent undesirable consequences. However, contemporary models of scientific and technological development processes for sustainable development suggest that relationships between basic and applied sciences are interactive and complex, and that there continues to be a role for targeted, applied research and development by public institutions, even in developed countries (Fuglie, 2016). In this sense, governments should review programmes in areas such as agriculture, forestry, and settlements that serve to degrade and destroy species' habitats.

Furthermore, governments should describe and recommend how many more protected areas are needed, especially in the spirit of how such areas can contribute to national development objectives, and make further provision for the protection of gene reservoirs (for instance, primitive cultivated varieties) that may not normally be preserved through conventional protected areas.

Every country has only limited resources at its disposal for dealing with conservation priorities. The dilemma is how to use these resources in the most effective way.

1.3. Energy - Choices for Environment and Development

Energy is very important in today's world. For example, we use different energy sources to generate the electricity we need for daily survival. Moreover, the future development of energy is crucially important and depends on its long-term availability in growing quantities from sources that are reliable, safe, and environmentally sound (Chen, Wu, 2017). Nowadays, there is an issue that no single source or mix of sources of energy is not at hand to meet this future need.

Currently, major sources of energy are mainly unrenewable, for example, petroleum, natural gas, coal, peat and conventional nuclear power. In addition, there are renewable sources including - wood, plants, dung, falling water, geothermal sources, solar power, tidal, wind, and wave energy as well human and animal muscle-power. The growth of energy or demand in response to industrialization, urbanization, and societal affluence has led to a highly, uneven global allocation of primary energy expenditure. There are many of literature that provides empirical evidence for the fact that, while efficiency improvements in resource use have been continuous for years, the global consumption of resources such as energy has not stopped growing (Freire-González, Vivanco, Puig-Ventosa, 2017).

One of the most widespread regular problems in developing countries is the eye and lung exasperation due to wood smoke and cars' gas emission. When agricultural wastes burns, pesticide residues inhaled from the dust or smoke of the crop material can be a health problem. The same situation is with cars' gases. When agriculture producers do not follow the emission classes of machinery, which is a requirement, it influences not only on human health but also on the environment.

The problem is also with modern biofuel liquids, they have their own special hazards. For instance, such fuels as particular methanol may produce irritant or toxic combustion products. Separately from competing with food crops of the good agricultural land, their production generates large quantities of organic waste, and if they are not used as a fertilizer, they can bring serious local water pollution.

All these and many other problems and issues, as they are large or small, they will increase as renewable energy systems are developed. Agriculture worldwide is only a modest energy consumer and we should consider all nuances to boost and to enhance sustainable development of energy.

2. Materials and Methods

The major method of the research was the qualitative research. Qualitative market research methods, which are including focusgroup studies, depth interviews and observational techniques were realised (Belk, 2013).

In this study, the market research methods were used as follows: (1) observation, (2) primary research and (3) secondary research (Creswell, Creswell, 2017). The methodswere used to define the problem and identify determining factors. The scientific problem posed in the studies were conducted to determine whether related to climate change and the law of positive impact on the energy sector and the agricultural sector and what factors affect the functioning of these sectors.

The study was also carried out by desk research based on the available source material. Text mining method was also used in order to the process of deriving high-quality information from source materials (Chu, Ke, 2017). Desk research method, called also secondary research, was involved to gather data that already exists either from internal sources of the UE (European Union) publications.The courses of UE included publications of governmental and non-governmental institutions, free access data on the internet, in professional newspapers and magazines, in annual reports of companies and commercial databases, public reference materials (particularly provided by national statistics' offices), industry publications, media reports and scientific journals.

The main source texts isThe UN (United Nations) Documents Gathering a body of global agreements.

3. Results and Discussion

The fast-growing youth population in Africa, the urbanization expected to drive over 50% of Africans to cities by 2050, and Africa's formalizing economy are all well known. The results of research which were realized on site in three countries in Africa shows the most important problems concerning to sustainable development.

3.1. Food Security - Sustaining the Potential

There are many examples of food insecurity in sub-Saharan Africa, some of them having reached catastrophic dimensions. Food insecurity is not just about insufficient food production, availability, and intake, it is also about the poor quality or nutritional value of the food. The African challenge indeed is key to mitigating food insecurity in the world.

Guinea was a food exporter, especially banana. With the ongoing changes in climate, household food insecurity is likely to be more widespread in most small-holder and subsistence farm households in sub-Saharan Africa (Tibesigwa, Visser, 2016). Today Guinea imports an estimated third of the rice it consumes each year. Weak linkages between farmers and markets reduce the overall agricultural productivity. This situation is characterized by limited access to reliable high-quality seeds and fertilizer, lack of information on new agricultural technologies and best practices.The realized interview showed that persistently poor economic performance has negatively impacted on poverty reduction and human development. All respondents indicated that high level of pollution and low human development is a result of the financial situation. Guinea remains one of the poorest countries in the world and is ranked among the lowest performing countries as a low human development country in the UNDP Human Development Index (183 of 188 countries surveyed in 2016) indicated in Human Development Reports.

Ethiopia's economy is dependent on agriculture, which contributes 43 percent of the GDP (Gross Domestic Products) and 90 percent of exports. However, just five percent of the land is irrigated, and crop yields from small farms are below regional averages. Market linkages are weak, and the use of improved seeds, fertilizers and pesticides remains limited. Despite these challenges, agriculture-led economic growth that is linked to improved livelihoods and nutrition can become a long-lasting solution to Ethiopia's chronic poverty and food insecurity. Ethiopia's Human Development Index (HDI) and its relative ranking have not moved appreciably during the past decade. Even though Ethiopia is one of the 10 countries globally that has attained the largest absolute gains in its HDI over the last several years, it still ranks 174 out of 188 countries in the latest UNDP Human Development Report.

Egyptian agriculture over the past 40 years has improved productivity, exports, and earnings for low-income Egyptians. Agriculture is a major component of the Egyptian economy. The agriculture sector in Egypt is dominated by small farms, which use traditional practices, do not comply with internationally recognized standards. For instance, farmers tend to overuse and misuse agricultural chemicals, use outdated technologies and tools for land preparation, irrigation, and harvesting. As a result, farmers experience increased production costs, reduced yields, decreased soil fertility, and limited marketing opportunities. They are further constrained by lack of cold storage infrastructure, transportation systems, and market information. In Egypt,governorates vary in terms of the distribution of labor on the three activities: agriculture, industry, and services. It depends on the nature of each governorate as well as the prevailing activity. Therefore, in the urban governorates, the services activity has the highest share of labor, and then the industrial activity comes inthe second place and finally the agricultural activity with the lowest share of labor, while in Upper Egypt, the agricultural activity is the major recipient of the labor force.

3.2. Species and Ecosystems - Resources for *Development*

Pollution of the soil, groundwater, surface water, and coastal zones from chemicals and human activity is a substantial threat to many countries' natural environment and the health condition of its

citizens. Overcrowded urban environment affects deforestation, desertification and other irrevocable ecological changes. In towns and urban areas, rivers, streams, and watercourses become disposal sites for human and solid wastes, putting the populations at greater risk from water-borne diseases (such as the cholera crisis in Conakry in August 2012) and polluting the environment at large (Borowski, 2017). More people living in urban areas means greater levels of waste generation. With the increase in population, and an increase of people who are moving to urbanized areas, the amount of solid waste produced is increasing. As municipalities cannot cope with this, large quantities of solid wastes are not collected, are not treated, or are not disposed of in designated sanitary land fills. Due to the growing problem of the impact of air pollution on natural ecosystems, it is necessary to continue to monitor developments and long-term trends in air pollution and chemical precipitation in different types of ecosystems.

3.3. Energy - Choices for Environment and Development

The long-term forecasting of energy supply and demand is of prime importance in Africa due to the steady increase in energy requirements, the non-availability of sufficient resources, the high dependence on fossil fuels to meet these requirements, and the global concerns over the energy-induced environmental issues. Due to the expanding economies, populations grow residential, international trade, commercial energy, and transportation-related energy demand will increase, by more than 40 percent from 2010 to 2040 and in Africa by 45%.

3.4 Sustainable Development Factors

We divided Sustainable development into three main groups: the first group is environmental sustainability; the second is economic sustainability; and the third one is social sustainability. Each group plays a key role in the sustainable development of agriculture. Tables 1-3 show the most important factors of Sustainable Development.

Table 1. The First Group of Sustainable Development

HDI rank	**Country**	**Environmental sustainability**		
		Renewable energy consumption (% of total final energy consumption)	**Carbon dioxide emissions** Per capita (tonnes)	**Forest area** (% of total land area)
36	Poland	11,1	7,9	30,8
71	Turkey	12,8	4,2	15,2
111	Egypt	5,5	2,4	0,1
174	Ethiopia	93,5	0,1	12,5
183	Guinea	76,3	0,2	25,9

Table 2. The Second Group of Sustainable Development

HDI rank	**Country**	**Economic sustainability**		
		Natural resource depletion (% of GNI)	**Adjusted net savings** (% of GNI)	**Research and development expenditure** (% of GDP)
36	Poland	0,7	7,9	0,9
71	Turkey	0,3	10,8	1,0
111	Egypt	6,4	2,3	0,7
174	Ethiopia	11,2	14,5	0,6
183	Guinea	19,2	-47,8	---

Table 3. The Third Group of Sustainable Development

HDI rank	Country	Social sustainability		
		Population in multidimensional poverty Average annual change (%)	**Old-age (ages 65 and older) dependency ratio** (per 100 people ages 15-64)	**Income quintile ratio** Average annual change (%)
36	Poland	---	36,3	-0,6
71	Turkey	---	18	-0,3
111	Egypt	-11,9	10,5	---
174	Ethiopia	---	6,6	1,4
183	Guinea	-2,2	6,1	-2,5

3.4.1 Environmental Sustainability Group of Index

Renewable energy consumption: Share of renewable energy in total final energy consumption. Renewable sources include hydroelectric, geothermal, solar, tides, wind, biomass, and biofuels.

Carbon dioxide emissions per capita: Human-originated carbon dioxide emissions stemming from the burning of fossil fuels, gas flaring and the production of cement, divided by midyear population. Includes carbon dioxide emitted by forest biomass through depletion of forest areas.

Forest area: Land spanning more than 0.5 hectares with trees taller than 5 meters and a canopy cover of more than 10 percent or trees able to reach these thresholds in situ. Excludes land predominantly under agricultural or urban land use, tree stands in agricultural production systems (for example, in fruit plantations and agroforestry systems) and trees in urban parks and gardens. Areas under reforestation that have not yet reached but are expected to reach a canopy cover of 10 percent and a tree height of 5 meters are included, as are temporarily unstocked areas resulting from human intervention or natural causes that are expected to regenerate.

3.4.2 Economic Sustainability Group of Index

Natural resource depletion: Monetary expression of energy, mineral and forest depletion, expressed as a percentage of gross national income (GNI).

Adjusted net savings: Net national savings plus education expenditure and minus energy depletion, mineral depletion, net forest depletion, and carbon dioxide and particulate emissions damage. Net national savings are equal to gross national savings less the value of consumption of fixed capital.

Research and development expenditures: Current and capital expenditures (both public and private) on creative work undertaken systematically to increase knowledge, including knowledge of humanity, culture, and society, and the use of knowledge for new applications. Research and development covers basic research, applied research and experimental development.

3.4.3 Social Sustainability Group of Index

Income quintile ratio, average annual change: Change in the ratio of the average income of the richest 20 percent of the population to the average income of the poorest 20 percent of the population over 2000–2014, divided by the respective number of years.

Population in multidimensional poverty, average annual change: Change in the percentage of the population in multidimensional poverty over 2005-2014, divided by respective number of years.

Old-age dependency ratio: Projected ratio of the population ages 65 and older to the population ages 15–64, expressed as the number of dependants per 100 people of working age (ages 15–64).

4. Conclusion

The research carried out by the author allows one to conclude that the sustainable development factors play a particular role in implementing the concept of sustainable development in agriculture. This assessment can provide a foundation to explore changes to cropping and livestock systems at the field scale alongside relevant technical, agronomic, environmental, and economic or policy changes.

While the new technologies have led to increase in input factors such as capital, fertilizers, minerals, pesticides they have also triggered environmental degradation. In Africa, countries sustainable development is a way for achieve better level of life and welfare. Africa has embraced the quest for sustainable development as an urgent imperative that requires serious attention.

An innovative approach to sustainable development in agriculture makes it possible to introduce new production techniques and technologies that comply with environmental requirements, ensure economic viability, take into account animal welfare and make farmers' work easier.

References

Belk, R. (2013). Visual and projective methods in Asian research. *Qualitative Market* Research: An International Journal, 16(1), 94-107.

Borowski, P. F. (2017). Environmental pollution as a threats to the ecology and development in Guinea Conakry. *OchronaSrodowiskaiZasobowNaturalnych*, 28(4), 27-32.

Chavas, J. P. (2017). On food security and the economic valuation of food. *Food Policy*, *69*, 58-67.

Chen, G. Q., & Wu, X. F. (2017). Energy overview for globalized world economy: source, supply chain and sink. Renewable and Sustainable Energy Reviews, 69, 735-749.

Chu, H., & Ke, Q. (2017). Research methods: What's in the name?. *Library & Information Science Research*, *39*(4), 284-294.

Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage publications.

Freire-González, J., Vivanco, D. F., &Puig-Ventosa, I. (2017). Economic structure and energy savings from energy efficiency in households. *Ecological Economics*, *131*, 12-20.

Fuglie, K. (2016). The growing role of the private sector in agricultural research and development world-wide. *Global food security*, *10*, 29-38.

Tibesigwa, B., &Visser, M. (2016). Assessing gender inequality in food security among small-holder farm households in urban and rural South Africa. *World Development*, *88*, 33-49.

UNDP (2016), *Human Development Report 2016. Human development for Everyone*.

PLANNING ACTIVE PACKAGING FOR ORGANIC PRODUCTION

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Abstract

Foods for human nutrition are provided by agricultural production. Since the beginning of agriculture ten thousand years ago, agricultural production has continuously evolved, with many different methods being developed. Organic farming is a highly managed farming system that bases scientifically methods and add value to the farming ecosystem. Demanding organic food consumptionin the world-wide is a result of increased hospitalization of the consumers, owing to nutrition. Therefore, consumers are more interested with organic foods to regulate their daily nutritional habits. Scavenging of free radicals in the human body can be provided by bio-active compounds from daily intake. Studies have shown that some of these compounds (e.g. antioxidants) are rich in organically produced foods rather than their conventionally produced counterparts. These compounds are also a good choice to be used in active packaging. Active food packaging is a new generation of food packaging. It includes packaging materials that have antimicrobial or scavenger properties and controlled released packaging (CRP). Bio-active compounds are encased in the packaging materials to achieve a stable shelf life in CRP. So as, this kind of packaging is missing direct addition of food additive materials in the foods. Specifically, synthetic additive materials are no more welcomed by consumers.Therefore, organic production stands foravailability of bio-active compounds for CRP use. Another concern for synthetic materials is environmental problems. There is a general consensus for a sustainable environment in the world. For instance, biodegradable packaging materials, edible films and coatings are respectfully accepted by the consumers. In sum, whether most of the organic food prices are higher than conventional foods, the organic farming is a promising farming strategy for a sustainable agriculture, globally.

Keywords: Organic farming, active packaging, sustainability, food security, nutrition.

THE EFFICIENT USE OF SOILLESS TECHNIQUES TO MAXIMIZE THE BENEFIT FOR FARMERS

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Abstract

The world is facing many global challenges, such as the sustainable development and adapting to the climate change. The sustainable development is related directly to the sustainable of agriculture sector, in which takes into account the needs of rural communitiesand food safety for consumers as well as the impact of agricultural practices on local ecosystem services.

In Jordan, as a poor water country, a lowquantity of rainfall, especially in southern Jordan, is a major cause of drought. Consequently, producers will face abigger productivity drop. Governmental strategic changes are needed in order to sustain irrigated agriculture to achieve food security and conserve the associated natural environment.

The use of technical alternatives of using scare resources and their impact on environment, social and economicshould be assessed. This research focuses on the efficient use of soilless production systems in Jordan and to find out the best use of the soilless techniques for different crops in limited resources of land and water area and determine the impact on the living standard of the farmers.The study depended on a case study that collected data from the farmers. The linear programming model uses to analyze the data and find out the results.

The basic results show that the soilless system improves water efficiency, strengths the agricultural productivity by increasing the quantity and the returns and achieve high economic profitability.

Keywords: Soilless techniques, hydroponic, linear programing, sustainable development.

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ECONOMETRIC ANALYSIS OF CEREAL DEMAND IN MOROCCO USING THE ALMOST IDEAL DEMAND SYSTEM MODEL

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Abstract

Following the agricultural policies already led in the Moroccan context, the new strategy Green Morocco Plan (GMP) launched in 2008 also stressed on the cereal's supply. Nevertheless, little attention has been given to the demand side. This paper intends to perform a quantitative analysis of the demand of five main cereals: (Common wheat, Durum wheat, Barley, Corn and Rice) through an econometric approach. In this respect, we opt for the linear version of the flexible model Almost Ideal Demand System (LA/AIDS). A Seemingly Unrelated Regression (SUR) procedure is employed to estimate regressions, by using the Eviews software as econometric tool. The data needed to estimate the demand system equations are annual series, covering the period from 1980 to 2015. Econometrically, the results of tests of stationarity, structural stability and low separability of preferences, the Durbin and Watson statistics, the Student's test values, as well as the signs of the calculated elasticities, show the respect of the conditions of the theoretical plausibility of nominal and real estimates. Our results suggest that the relations of complementarity or substitution are not determining in the cereal bundle in Morocco. Also, the Moroccan consumer behavior is characterized by a strong sensibility towards common wheat price's changes and by a difficult access for the durum wheat as it is considered as luxury good.
Keywords: Cereals, GMP, demand, LA/AIDS, SUR.

1. Introduction

The productivity approach of the Green Morocco Plan (GMP) and the economic openness towards the world market aim at ensuring the cereals food security in Morocco. Indeed, such a challenge has become among the most determinantfor the country, since cereals sector stands for the backbone of the Moroccan agro-food system, whether from the point of view of production or consumption. . In addition, the cereals import bill accounted for 36% of total agricultural imports in value terms in 2014[1]. On one hand, this is explained by the volatility of cereals production, conditioned by rainfall. On the other hand, the annual demand reaches 200 kg per capita which overpasses the world average with 152 kg per capita[2]. It should be noted that this spectacular increase in cereal demand is due not only to an expanding population, but also to the Moroccan consumption model, which gives cereals a special position.

The sensitivity of these strategic staples induces a strong presence of the government as a regulator of the grain sector. The National Soft Wheat Floor[3] is especially concerned with a consumption price subsidy that amounted to 2.2 billion dirhams in 2014[4].

Like the agricultural policies already in place, focusing on the intensification of cereals and price policies, the GMP launched in 2008 has also focused on the supply side. This strategy aims to reduce

the area allocated to cereals by 20%, improve productivity by 50% and reduce imports by 15 to 20% by 2020. However, little attention has been given to the demand side patterns.

Within this context, this paper is a contribution to the study of the cereal consumption model to help better orient policies related to the cereals sector in Morocco. In other words, we are interested in understanding how consumers of cereals respond to changes in prices and income and, consequently, adjust their demand. As a result, our work strategy is based on a three-step approach. First, we perform preliminary tests to ensure efficient use of the annual time series covering the period 1980-2014. Then, we use the linear version of the Almost Ideal Demand System (AIDS) model to estimate a system of demand of five cereals (soft wheat, durum wheat, barley, maize and rice). Finally, we deduce the values of the price elasticities, the cross-price elasticities and the expenditure elasticities, which will enable us to decide on the nature of each commodity.

The first part of the article is devoted to the theoretical framework of the study. The second part looks at the presentation of the results of the estimates made and the interpretation of the obtained figures.

2. Methodological Approach

2.1 Model Description

The literature related to demand modeling is very broad. Generally, the two flexible functional forms intensely used in the analysis of demand behavior, especially in the field of agricultural economics are: the Rotterdam model[5] and the AIDS model[6]. Although several characteristics are valid for both functional specifications, the AIDS model seems more suitable for modeling our system of demand equations. Indeed, according to Deaton and Muellbauer (1980), the AIDS model has the advantage of:

- Allowing a first-order approximation of any demand system,
- Respecting the axioms of choice of the consumer perfectly,
- Presenting a functional form consistent with the budget-consumption survey data,
- Satisfying the zero degree homogeneity restrictions of demand functions at the income and price level, and symmetry, by imposing linear restrictions on the fixed parameters of the model,
- Agreeing with welfare analyzes given the model's correspondence to a well-defined preference structure.

As suggested by Deaton and Muellbauer (1980), the linear version of the AIDS model is specified as follows:

$$W_{it} = a_{it} + \sum_j^n g_{ij} \, lnp_{jt} + b_i ln\left({X_t}/{P_t}\right) + u_{it} \qquad \text{i=1, 2….n}$$

W_{it}: Represents the budget (expenditure) parts of good i in the goods bundle, with $W_i = \frac{P_i D_i}{X_t}$, specifying that Di: is the demand quantity of this good and Pi is its nominal price;

P_{jt}: represents the nominal price of good j;

X_t: is the bundle total expenditure with $X_t = \sum_i^n P_i D_i$;

The parameters a_{it} , g_{ij} and b_i represent the parameters of the model that will be estimated

$ln(P_t)$ represents the Stone index whose expression is defined as follows:

$$logP^* = \sum_i^n W_i logP_i$$

Several economists have applied and adapted the AIDS model in different contexts and today it is also the case in our work, using the linear version of this functional form for the estimation of cereal demand in Morocco. Indeed, our system of equations of demand contains five equations corresponding to the estimate of the share of expenditure of each of the five considered cereals. Empirically, only four equations are estimated, while the fifth is deduced via a simple summation.

This will make it possible to impose the restriction of the additivity and to test it for the system in question.

It is important to note that almost the same parameters are involved in the five equations. So, there is dependence between the residues of our model. In order to take into account the possibility of a correlation between the error terms that may bias our estimates, we used the Seemingly Unrelated Regressions (SUR) method, developed by Zellner (1962).

According to Benoit and Hyungsik (2006), this method has the advantage, first, of gaining efficiency in the estimation by combining the information on the different equations and, then, imposing / testing the restrictions implied by the parameters in the different equations.

2.2 Elasticities Estimates

The elasticity of demand for a good is a tool that measures the magnitude of a change in demand as a result of a change in price or income. In our study of grain demand system, total expenditure is used as proxy of income; this implies that income elasticities are approximated by expenditure elasticities.

In this study, price and income elasticities will be calculated from the estimated parameters of the LA / AIDS model using the mathematical formulas of Jung (2000). These are as follows:

- ✓ Uncompensated / Marshallian elasticity: containing both a price effect and an income effect of a price change. It is given by the following formula:

$$e_{i,t} = -d + (g_{i,t}/\bar{w}_{t,i}) - b_i (\bar{w}_j/\bar{w}_i) \quad i, j = 1, 2 \ldots n$$

- ✓ Income elasticity is calculated using the following formula:

$$h_i = 1 + (b_i/\bar{w}_i)$$

Where d is the kroenecker index with d = 1 for i = j; d = 0 for i ≠ j. The average budget share is represented by $\bar{w}_t$. The coefficients $g_{i,t}$ and b_i are the parameters estimated with the SUR method.

3. Data Types and Sources

The data needed to estimate the demand for the five major cereals (soft wheat, durum wheat, corn, barley and rice) are of three types: Current prices and constant consumer prices; quantities consumed per inhabitant; income or expenditure of each household allocated to the group of goods.

These data are annual series, covering the period from 1980 to 2015. They are extracted from the database of the National Office for Cereals and Legumes, the Exchange Office, the Directorate of Strategy and Statistics, the High Commission for Planning and FAO.

4. Results and Interpretations

Econometrically, we are interested in the results of the stationarity, structural stability and low separability preference tests, the coefficients of determination of the demand system equations, the Durbin and Watson statistics, the Student's test values, as well as the signs of the calculated elasticities, show the respect of the conditions of the theoretical plausibility of nominal and real estimates. This reinforces the reliability of our results (See tables 1 and 2).

Table 1. Estimation Results with Current Prices

Parameters	Soft wheat i=1	Durum wheat i=2	Barley i=3	Maize i=4	Rice i=5
a_i	0,402*** (17,37)	0,176*** (6,472)	0,301*** (12,99)	0,05*** (6,07)	0,071+ (1,64)
g_{i1}	**-0,111* (-1,87)**	0,093+ (1,425)	0,036 (1,204)	-0,006 (-0,314)	-0,011 (-0,12)
g_{i2}	0,093+ (1,425)	**-0,002 (-0,024)**	-0,064* (-1,81)	-0,028 (-0,832)	0,002 (0,019)
g_{i3}	0,036 (1,204)	-0,064* (-1,81)	**0,041+ (1,339)**	-0,017+ (-1,544)	0,004 (0,083)
g_{i4}	-0,006 (-0,314)	-0,028 (-0,832)	-0,017+ (-1,544)	**0,053*** (2,472)**	-0,0009 (-0,019)
g_{i5}	0,071+ (1,64)	-0,011 (-0,12)	0,002 (0,019)	0,004 (0,083)	**0,005 (0,03)**
b_i	0,10*** (5,232)	0,066*** (2,746)	-0,147*** (-7,143)	-0,048*** (-6,597)	0,021 (0,5621)
Year_2006				0,026*** (2,633)	
R^2	0,506	0,32	0,612	0,795	
DW	2,038	1,33	1,558	1,98	
W (average)	0,517776	0,2506	0,140747	0,0799	0,010977

Notes: the number of stars reflects the significance of the parameter at a given threshold α:(***); for α = 1%, (**) for α = 5%, (*) for α = 10%, (+) for α = 20%. Values in parentheses are Student's (t-Student) ratios.

Table 2. Estimation Results with Constants Prices

Parameters	Soft wheat i=1	Durum wheat i=2	Barley i=3	Maize i=4	Rice i=5
a_i	0,189 (0,951)	-0,041 (-0,191)	0,268+ (1,303)	0,355*** (5,139)	0,229 (0,042)
g_{i1}	**-0,0498 (-0,821)**	0,116*** (2,198)	-0,022 (0,526)	-0,025 (-1,23)	-0,019 (-0,220)
g_{i2}	0,1169*** (2,198)	**-0,040397 (-0,595)**	-0,094*** (-2,658)	-0,005 (-0,193)	0,023 (0,24)
g_{i3}	-0,022 (0,526)	-0,094*** (-2,658)	**0,097*** (2,46)**	0,010 (0,843)	0,008 (0,132)
g_{i4}	-0,025 (-1,23)	-0,005 (-0,193)	0,010 (0,843)	**0,026+ (1,416)**	-0,006 (-0,17)
g_{i5}	-0,019 (-0,220)	0,023 (0,24)	0,008 (0,132)	-0,006 (-0,17)	**-0,004 (-0,032)**
b_i	0,08*** (4,01)	0,099*** (4,558)	-0,106*** (-4,387)	-0,0587*** (-8,005)	-0,015 (-0,374)
R^2	0,41	0,39	0,432	0,75	
DW	1,304	1,349	1,157	1,755	
W (average)	0,517776	0,2506	0,140747	0,0799	0,010977

Notes: The number of stars reflects the significance of the parameter at a given threshold α:(***); for α = 1%, (**) for α = 5%, (*) for α = 10%, (+) for α = 20%. Values in parentheses are Student's (t-Student) ratios.

From the economic point of view, the results show that it is the expenditure elasticities and the own price elasticities that determine the model of cereal consumption. Clearly, cross-price elasticities are all below unity and, generally, do not differ statistically from zero, indicating that our cereals are neither strong substitutes nor complements. (See tables 3 and 4).

Table 3. Elasticities Calculated in Nominal Terms

	Soft wheat j=1	**Durum wheat j=2**	**Barley j=3**	**Maize j=4**	**Rice j=5**	**Expenditureel asticity**
E_{1j}	**-1,32*** (-11,30)**	0,128 (1,009)	0,04 (0,696)	-0,029 (-0,377)	-0,024 (-0,132)	1,208*** (30,30)
E_{2j}	0,2 34 (0,881)	**-1,076*** (-2,768)**	-0,295** (-2,073)	-0,136 (-0,985)	0,007 (0,013)	1,3*** (13,04)
E_{3j}	0,801*** (3,53)	0,216 (0,85)	**-0,558** (-2,28)**	-0,041 (-0,505)	0,045 (0,111)	-0,05 (-0,345)
E_{4j}	-0,234 (0,889)	-0,270 (-0,478)	-0,135+ (-0,94)	**-0,276 (-1,01)**	-0,005 (-0,008)	0,39*** (4,206)
E_{5j}	-2,08 (0,233)	-0,27 (-0,023)	0,151 (0,029)	-0,244 (-0,056)	**-0,541 (-0,03)**	2,98 (0,845)

Notes: the number of stars reflects the significance of the parameter at a given threshold α:(***); For α = 1%, (**) for α = 5%, (*) for α = 10%, (+) for α = 20%. Values in parentheses are Student's (t-Student) ratios.

Table 4. Elasticities Calculated in Real Terms

	Soft wheat j=1	**Durum wheat j=2**	**Barley j=3**	**Maize j=4**	**Rice j=5**	**Expenditureelasticity**
E_{1j}	**-1,18*** -9,86**	0,187* (1,811)	-0,0644 (-0,955)	-0,0607 (-0,784)	-0,04 (-0,23)	1,1*** (25,67)
E_{2j}	0,2603 (1,199)	**-1,261*** (-4,639)**	-0,433*** (-3,042)	-0,052 (-0,486)	0,088 (0,227)	1,4*** (16,005)
E_{3j}	0,232 (0,886)	0,010 (0,042)	**-0,201 (-0,822)**	0,135+ (1,5016)	0,069 (0,15)	0,25+ (1,435)
E_{4j}	0,066 (0,258)	0,118 (0,347)	0,235+ (1,497)	**-0,607** (-2,576)**	-0,078 (-0,153)	0,27*** (2,887)
E_{5j}	-1,105 (-0,131)	2,459 (0,276)	0,972 (0,164)	-0,521 (-0,139)	**-1,435 (-0,102)**	-0,37 (-0,101)

Notes: the number of stars reflects the significance of the parameter at a given threshold α:(***); for α = 1%, (**) for α = 5%, (*) for α = 10%, (+) for α = 20%. Values in parentheses are Student's (t-Student) ratios.

In the light of the results obtained from the two estimates in nominal terms and in real terms, we remain cautious about the use of elasticities calculated in nominal terms. This caution is justified by the fact that the change in cereal demand measured by current prices is disrupted by price changes themselves. This could explain the surprising value of the elasticity of soft wheat in nominal terms (1.2) (see table 3), when it is known that this cereal is a normal good and not of luxury so its elasticity expenditure must not exceed unit. Therefore, it is better to develop our analysis of the behavior of the Moroccan cereals consumer, based on the results in real values. In fact, the estimates using the prices deflated by the general index of consumer prices led to the following observations.

Firstly, the durum wheat demand shows a high price elasticity Indeed, we notice a very pronounced sensitivity to the price variation with own-price elasticity of the order of (-1.26) (see table 4). By reading the real value of the expenditure elasticity (1.4) (see table 4), it appears that durum wheat could be considered as a luxury good. It appears that the Moroccan consumer is not satisfied with the quantities usually consumed in durum wheat, and therefore any improvement in his income would encourage him to increase his demand for this foodstuff. Moreover, this observation could be explained, initially, by the high prices of durum wheat compared to the rest of cereals, estimated on

average at 314 Dh/ql during the last decade while the soft wheat price was around 250 Dh/ql. Despite its staple food status, nutritional value and role in the cereal season, durum wheat is not supported by the government, compared to the soft wheat which takes advantage from a farmer reference price[7],a storage premium anda consumer subsidy for the national soft wheat flour.

Secondly, the softwheat demand has met the expectations with respect to its expenditure elasticity, which is (1.1) (see table 4), but it has displayed a price elasticity that exceeds the unit in absolute terms. This high sensitivity of common wheat to price changes reflects, on one hand, the reason why this cereal has always been the common denominator of all cereal policies.On the other hand, it shows that the reform of wheat policy, which is likely to have an impact on the price, would have a significant effect on the demand for this product. Consequently, we could argue that with the maintenance of the reference price, in a context of trade liberalization, the consumer subsidy could only be maintained.

Thirdly, it is interesting to develop the analysis for the other cereals namely barley, maize and rice. Based on the results of the estimates, it turns out that barley and maize behave as commodities with actual values of expenditure elasticities of the order of 0.25 and 0.27 respectively (see table 4). This shows that the results of our work are in perfect agreement with what was obtained by the Directorate of Statistics (2001) and Bossoh (2012) with respective expenditureelasticities of 0.63 and 0.6. Still in relation to barley and maize, we add that only the latter displays a price elasticity that is significant at the 5% threshold and in the range of 0.6 in absolute terms. A result that elucidates the economic theory, that food goods generally have inelastic demand.

As for rice, it displays an expenditure elasticity that does not differ statistically from zero, this could be explained by the fact that the demand for rice in Morocco is negligible compared to other cereals. Indeed, it does not exceed 0.4% of total cereal demand on average over the last ten years.

5. Conclusion

This study has shown that the pattern of cereal consumption in Morocco is defined mainly by the price elasticities and the expenditure elasticities. Indeed, the calculated cross prices elasticities are all below unity and generally do not differ statistically from zero. In other words, the relations of complementarity or substitution are not decisive in the cereal basket in Morocco.

This study also showed that the Moroccan consumer displays a strong sensitivity to changes in the price of common wheat. This underlines the need ofmaintaining the regulatory system for common wheat but, at the same time, opens the debate on the ways of reforming compensation. As for durum wheat, the high sensitivity of its demand for price variation and its nature as a luxury good make access to this cereal difficult for an average consumer. In light of the above, several recommendations are suggested:

- Focus on the quality of the domestic wheatsupply, to produce the varieties demanded by the industrial mills and, thus, reduce the volumes imported from abroad;
- Consider a differentiation policy to support production proportional to the quality of locally produced wheat;
- Improve the productivity of durum wheat and reduce the costs of its production to lower prices that can stimulate domestic demand for this high-nutritious cereal;
- Maintain the regulatory mechanisms of the soft wheat sector, and improve the subsidy system for domestic flour, by strengthening the control of national flour prices;
- Continue investigations in this research area by modeling cereals demand along with other food products.

References

Akanni, F. (2011). Les déterminants de la demande de travail et de l'investissement dans les entreprises privées québécoises (Master's thesis). Retrieved from https://papyrus.bib.umontreal.ca/xml/bitstream/handle/1866/5088/rapport%20de%20recherche.pdf

Arrar, A. (1998). Le bien être des ménages et la transition économique en Pologne(PhD thesis). Retrieved from https://www.collectionscanada.gc.ca/obj/s4/f2/dsk2/ftp02/NQ36225.pdf

Barnett, W. A. (1979). Theoretical foundations for the Rotterdam model. The Review of Economic Studies, 46(1), 109-130. DOI: 10.2307/2297176

Benoit, P. & Hyungsik, R. (2006). Seemingly Unrelated Regressions. Retrieved from http://www.mapageweb.umontreal.ca/perrob/palgrave.pdf

Bossoh, W. (2012). TVA et structure de la consommation des ménages au Maroc: Simulations à partir du modèle *QUAIDS*. Retrieved from http://www.lasaare.com/Fiscalite%20et%20Developpement/TVA%20et%20Consommation%20Modeles%20Quaids.pdf

Deaton, A. and Muellbauer, J. (1980). An Almost Ideal Demand System. The American Economic Review, 70(3), 312-326. Retrieved from http://www.jstor.org/stable/1805222

Hendrik, P. V.(2003). Demand Relations of Oilseed Products in South Africa. Retrieved from https://ageconsearch.umn.edu/bitstream/28062/1/mp03va01.pdf

Jung, J. & Koo, W. (2000). An econometric analysis of demand for meat and fish products in Korea. Retrieved from https://ageconsearch.umn.edu/bitstream/23122/1/aer439.pdf

Laamarti, F. (2013). Estimation économétrique de la fonction d'offre des céréales au Maroc (Unpublished master's thesis).NationalSchool of Agriculture, Meknes.

Savard, L., (2004). Un système de demandes AIDS dans un contexte EGC micro-simulation pour l'analyse de pauvreté et des inégalités. Retrieved from http://gredi.recherche.usherbrooke.ca/wpapers/ 04_10_ls.pdf

Sayouti, S. (2014). Estimation économétrique de la demande alimentaire en produits de base au Maroc (Unpublished master's thesis).National School of Agriculture, Meknes.

Yankam, N.R. (2004).Analyse économique de la réponse du marché du blé différencié aux instruments de l'organisation commune des marchés du secteur des céréales : le cas de la France(PhDthesis).Retrieved fromhttps://dial.uclouvain.be/pr/boreal/en/object/boreal%3A4574/datastream/PDF_01/view

Zellner, A. (1962). An efficient method of estimating Seemingly Unrelated Regressions and tests for aggregation Bias. Journal of the American Statistical Association, 57(298), 348-368. DOI: 10.2307/2281644.

[1] Ministry of Agriculture and Fisheries(2014)

[2]National Federation of Flour Mills (2014)

[3]This is a product that theoretically is supplied for the poor population with a price subsidy.

[4]Ministry of Finance (2016)

[5]Barnett (1979)

[6]Deaton and Muellbauer (1980)

[7]The referential price of common wheat announced by the Government for domestic production allows the farmer, in the absence of a reference market, to better assess the level of prices prevailing on the national market. It is neither mandatory nor guaranteed but helps to strengthen the bargaining position of the farmer.

APPLICATION OF HORDEINS AND ISSR MARKERS FOR EVALUATION OF GENETIC DISTANCES IN BARLEY GENOTYPES

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Abstract

The new genotypes and prospective varieties with higher genetic variability are expected to be productive in a greater range of environmental conditions and thus more widely adapted, produce more stable yields when seasonal conditions vary, and offer broader protection against diseases. Evaluation and selection of parental forms for hybridization in relation to their genetic distance is essential for the breeding success. The environment can modify phenotypic expression of main traits at a different range determining yield and seed quality with respect to their quantitative inheritance. Therefore, defining the genetic distance based only on these traits is with limited value. Application of reliable laboratory methods for quick screening of a large amount of breeding materials on these indicators is necessary in this case.

Present study identifies the genetic diversity of 24 genotypes with different origin- national selection, France, Portugal, Syria, Japan,etc. Varieties and lines are with different seed quality /i.e. high and low protein content/ and biotype /spring, winter and spring-winter/. Distances between groups in dendrogram arebased on: (1) biometric analysis of main traitsdetermining productive potential such as height, number of tillers, length of spikes, grain mass;(2) specific hordein profiles and (3) products of amplification with 9 ISSR primers. Field experiments and laboratory trials have been conducted in Agricultural University of Plovdiv, Bulgaria during the period 2013-2016.

As a result, cluster analysis based on both genotyping and phenotyping produces two genetically distant groups of genotypes(Kamenitsa, Caravella, 82105326, 511 and 99105030 to 96105050, Kyfi, 96105027, Alexis and Orpheus). It is advisable to use pairs of parental forms from two clusters, to produce advanced germplasm in new breeding programs of two-row barley.
Keywords: Barley, cluster analysis, genetic distance, hordeins, ISSR.

1. Introduction

Hybridization is basic and one of the most reliable methods used to obtain valuable plant genotypes in barley breeding programs. Technique allows breeders to increase genetic variation by introducing favorable traits from landraces, varieties and related species (Korzun, 2003; Marcheva, 2003).The main productivity traits and genes determining grain quality are influenced bythe environmental factors due to their polygenic nature (Sleeper, 2006), which makes selection related to them quite difficult.Effortshave been made to predict the prospects of developing superior genotypes by genetic similarity and genetic distance between selectedgenotypes as a parents (Korzun, 2003). Application of reliable laboratory methods for quick screening of a large number of breeding materials on these indicators is necessary. The development of DNA marker technology has provided an effective tool to facilitate plant genetic resource conservation and management. Compared to morphological analysis, molecular markers can reveal differences among accessions at DNA level (Chauhan, 2015).

Several types of molecular markers are available for evaluating the genetic variation in main crops such as rice, wheat, maize, barley, sorghum etc. This includes isozymes, RAPD, AFLP, SSR,ISSR, etc. The applied isozyme technique makes possible to obtain specific profiles for the respective variety, regardless of the agro-climatic conditions(Marcheva 2005). Preference of ISSR marker system is based on theidentification of polymorphisms between repeated sequences in the genome. The system is relatively simple and inexpensive to develop because it requires only the presence of

purified genomic DNA, correct selection of primers and appropriate regime of amplification (Ivanova 2012; Vuchkov 2017).

The aim of current research is to present method for objective genetic distance evaluationbetween studied genotypes in relation to their selection as parental forms for hybridization.

2. Materials and Methods

The investigation wascarried out on the experimental field of the Agricultural University of Plovdiv, during the period 2013-2016.Laboratory trialshave been conducted at the Laboratory of Molecular biology to Genetics and Plant Breeding Department. Only the plants fully corresponding to the phenotypic descriptors of the UPOV were used for biometric analysis, protein and DNA extraction.

2.1 Plant Material

Twenty-four breeding lines (BL) and cultivars(CV) of *Hordeum vulgare ssp. distichum L.* were studied according to their genetic distance. Genotypes 82105326, 89105100, 96105023, 96105024, 96105027, 96105046, 96105050, 99105020, 99105030 and I-Da/102 were provided by the National Gene Bank (IPGR) – Sadovo. Perspective breeding lines 508, 511, 622results from the breeding work done in the Department of Genetics and Plant Breeding, Agricultural University - Plovdiv. There were also used cultivars: Alexis, Beta Ketzoras, Emon, Kamenitza, Caravella, Kaskadior, Obzor and newly established varieties Neda and Gorast as initial material (Table 1). Orphey and Kyfi were provided from the Institute of Agriculture, Karnobat.

Table 1. Genotypes, Used in the Study

Genotypes		*Origin*	*Biotype*	*Genotypes*		*Origin*	*Biotype*
82105326	BL	Germany	S	I-Da/102	CV	Syria	S
89105100	BL	Japan	W	Alexis	CV	Germany	S
96105023	BL	France	SW	Beta Ketzoras	CV	Hungary	SW
96105024	BL	France	SW	Emon	CV	Bulgaria	W
96105027	BL	France	S	Kamenitza	CV	Bulgaria	W
96105046	BL	France	W	Caravella	CV	Portugal	S
96105050	BL	France	W	Kaskadior	CV	Bulgaria	W
99105020	BL	France	S	Obzor	CV	Bulgaria	SW
99105030	BL	France	S	Neda	CV	Bulgaria	W
508	BL	Bulgaria	W	Gorast	CV	Bulgaria	W
511	BL	Bulgaria	W	Orphey	CV	Bulgaria	W
622	CV	Bulgaria	W	Kyfi	CV	Hungary	SW

2.2 Biometric Analysis

Subject to biometric measurement were main yield traits such asplant height /cm/, productive tillering, main spike length /cm/, spikelets and grains number, grains weight in spike /g./ and 1000 grains weight /g./. The accessions used in the present study were homogenized for the main approbation traits. Average values of the three consecutive years of presented study for each genotype were used. The results are statistically processed by the SPSS.

2.3 Hordein Profiling

Barley hordeins were extracted from 10 mg of dry seed flour with 0.5 ml of 0.05 M Tris-HCl buffer(ph 8.0) with 2.0 % SDS and 5 M Urea. Profiling is based on subsequent polyacrylamide gel electrophoresis with sodium dodecyl sulfate (SDS PAGE).All the gels were stained with Coomasie brilliant blue for about 30 minutes and distained in a 5 % methanol 20 % acetic acid. Hordeins were divided into four groups (A, B, C and D hordein) depending on their electrophoretic mobility.

2.4 ISSR Analysis

The genetic diversity was estimated by Inter Simple Sequence Repeat (ISSR) technique using 9 primers which demonstrate high reproducibility and polymorphism identification. Final primers selection was based on previous studies (Table 2). PCR reactions were performed in 25 ul volume with the following cycling regime: denaturing at 94°C for 3 min, 40 cycles of 94°C – 1 min, AT – 45 sec, 72°C – 45 sec, followed by final extension of 72°C – 4 min, where AT is the annealing temperature for each primer calculated according to Kochieva et al. (Kochieva 2002). PCR products were analyzed through separation in 2% agarose gels and staining with Ethidium bromide.

Table 2. Description of Tested ISSR Primers

Primer	*DNA sequence (3'-5')*	*Total number Establishedfragments*	*Number Polymorphicfragments*
ISSR_4	(AG)8C+TC	11	8
ISSR_6	(AC)8C+TG	9	5
ISSR_7	(AG)8C+TG	13	7
ISSR_8	(AC)8C+TT	11	6
ISSR_10	(GA)8T	4	-
ISSR_5	RY(GACA)3	10	10
ISSR_6a	(CT)8+RG	9	9
ISSR_7a	(CT)8+RC	7	-
ISSR_11	(GA)8A	9	-
	Total:	83.00	45.00
	Average:	9.22	7.50
			Polymorphisms: 54.22%

3. Results and Discussion

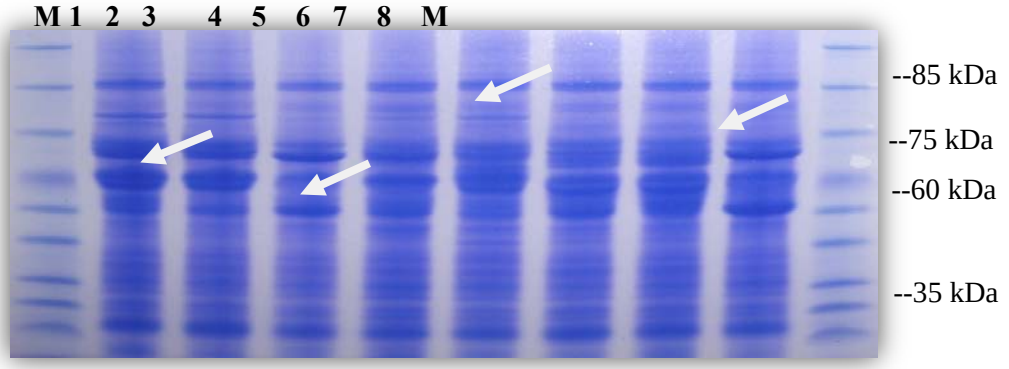
Biometric measurements of 20 plants from assessment were conducted. For each genotype, main morphological traits determining yield were studied. One of the main traits determines productive potential is plant height. Average values vary widely from 56.3 cm to 100 cm, where the highest is Emon cultivar (100 cm). In the group of the standard - Obzor (96.13 cm), relatively high plant are Beta Ketzoras (96.53 cm), Caravella (96.7 cm) and Orphey (98 cm). The remaining genotypes have optimal trait values (in range from 80 to 90 cm). Low values of plant height (less than 80 cm) have I-Da/102 (70.5 cm), Alexis (72.3 cm), Kaskadior (78.1 cm), Kyfi (71 cm), 96105046 (72.6 cm), 99105020 (78.3 cm), 99105030 (77.8 cm) and line 511 (56.3 cm).

For the purpose of combined breeding suitable donors for longer-grained plants are Orphey (9.42 cm), Kyfi (9.04 cm) and genotype 96105027 (11.4 cm). Breeding line 96105027 (33.4) and 508 (23.1), Alexis(27.9), Beta Ketzoras (26.8), Emon (30.57), Kamenitza (28.13), Caravella (27.3) and Kaskadior (29.22) were characterized with a larger number of grains and spikeletsin the main spike. A higher mass per 1000 grains was found in assessments 89105100 (52.64 g.), 96105023 (51.09 g.), 96105024 (57.62 g.), 96105027 (51.16 g.), Beta Ketzoras (55.13 g.), Emon (51.16 g.), Kaskadior (53.99 g.), Neda (52.46 g.) and Gorast (54.58 g.), reported for the standard Obzor, value of 46.58 grams.

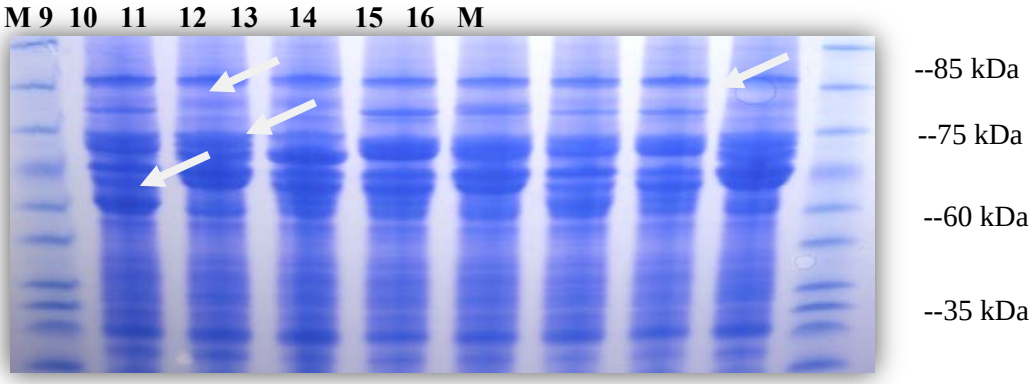
In addition, the characteristic of studied genotypes in relation to their phenotype expression of main traits determined productive potential showed that the most perspective ones in terms of spike parameters arebreeding lines 96105027 and 508, cultivars: Alexis, Beta Ketzoras, Emon, Kamenitza, Caravella, Kaskadior, Neda and Gorast.

Determining the genetic distance based on these traits is unreliable. To increase the reliability of the genetic distances obtained, it is necessary to use such characteristics which are not influenced by environmental conditions.In this connection, for more complete characterization of the genotypes, their hordein profiles were studied. The results are presented in Figure 1. The applied technique allows obtaining specific profiles for the respective lines and cultivars, regardless of the agro-climatic

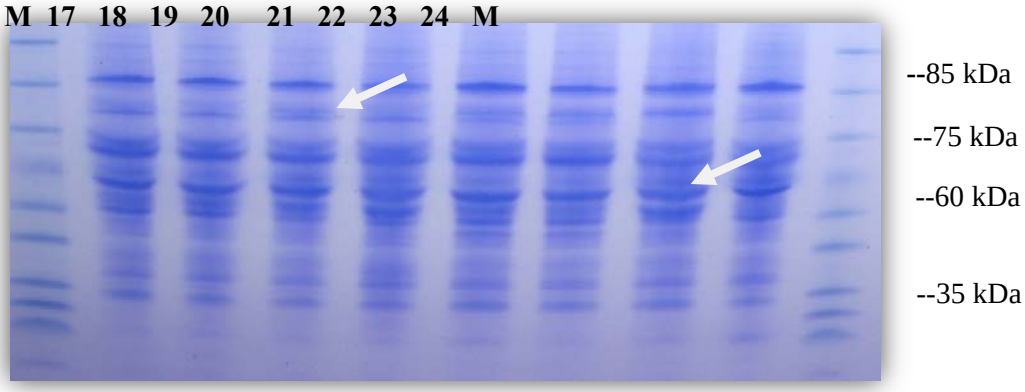
conditions. As a result of the electrophoretic separation of the hordeins, a total of 42 bands were obtained in the genotypes were tested. Of these, 15 exhibited polymorphism (Figure 1).



M) Marker, 1) 82105326, 2) 89105100, 3) 96105023, 4) 96105024, 5) 96105027, 6) 96105046, 7) 96105050, 8) 99105020, M) Marker



M) Marker, 9) 99105030, 10) 508, 11) 511, 12) 622, 13) I-DA/102, 14)Alexis, 15) BetaKetzoras, 16) Emon, M) Marker

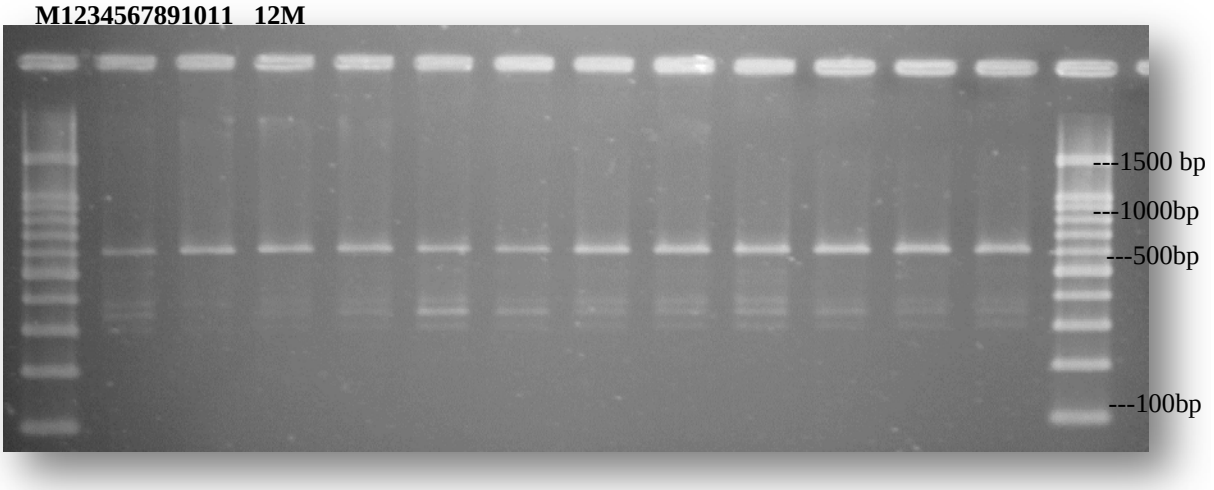


M) Marker, 17) Kamenitza, 18)Caravella, 19)Kaskadior, 20)Obzor, 21)Neda, 22)Gorast, 23)Orphey, 24) Kyfi, M) Marker

Figure1. Hordein Profiles of Accessions the Arrows Point to Polymorphic Bands

Most polymorphic bands appeared on lines 82105326, 96105023, 96105046, 96105050, 511 and Orphey. In addition to the obtained hordein profiles, the ISSR marker system was used to characterize genotypes at DNA level.

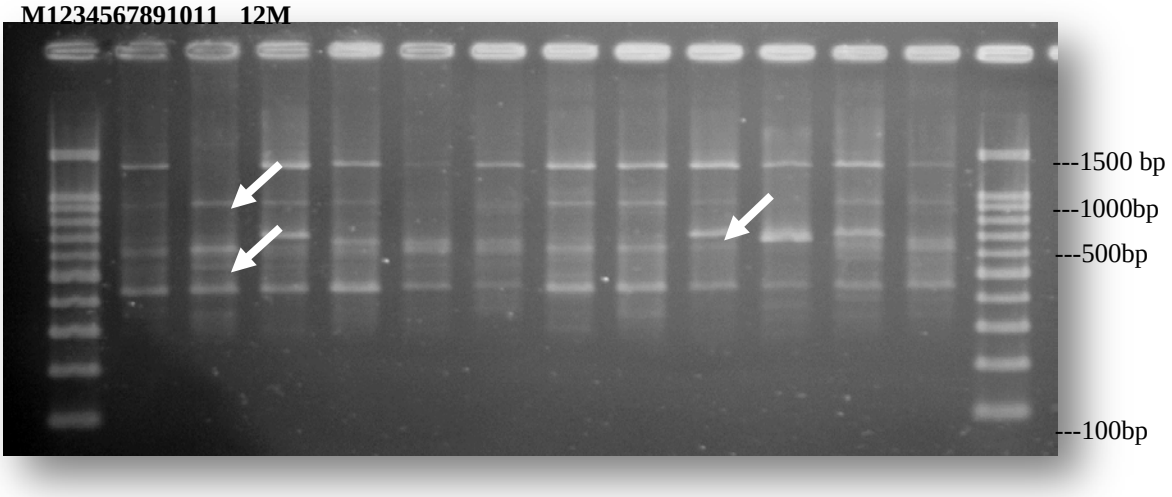
DNA extraction procedure obtained high-quality genomic DNA from all accessions. When the quantity or quality of the DNA was considered unsatisfactory the extraction was repeated. Due to reasons discussed above our system for screeningwas based on Inter-Simple Sequence Repeat markers (ISSRs). ISSR analysis detected a total of 83 DNA fragments of which 45 (54.22 %) were polymorphic (Table 2). PCR reactions with primers ISSR_10 (Figure 2), ISSR_7a and ISSR_11, resulted in the production of a number of products but failed to lead to the identification of polymorphisms between the studied genotypes.



M) Marker, 1) I-DA/102, 2)Alexis, 3) BetaKetzoras, 4) Emon, 5) Kamenitza, 6)Caravella, 7)Kaskadior, 8)Obzor, 9)Neda, 10)Gorast, 11)Orphey, 12) Kyfi, M) Marker

Figure 2. Amplification with Primer ISSR_10

Amplification with primers ISSR_4, ISSR_6, ISSR_7, ISSR_8, ISSR_5 and ISSR_6a led to the identification of polymorphisms between the single repeat sequences. Figure 3 clearly shows a significant number of polymorphic fragments.

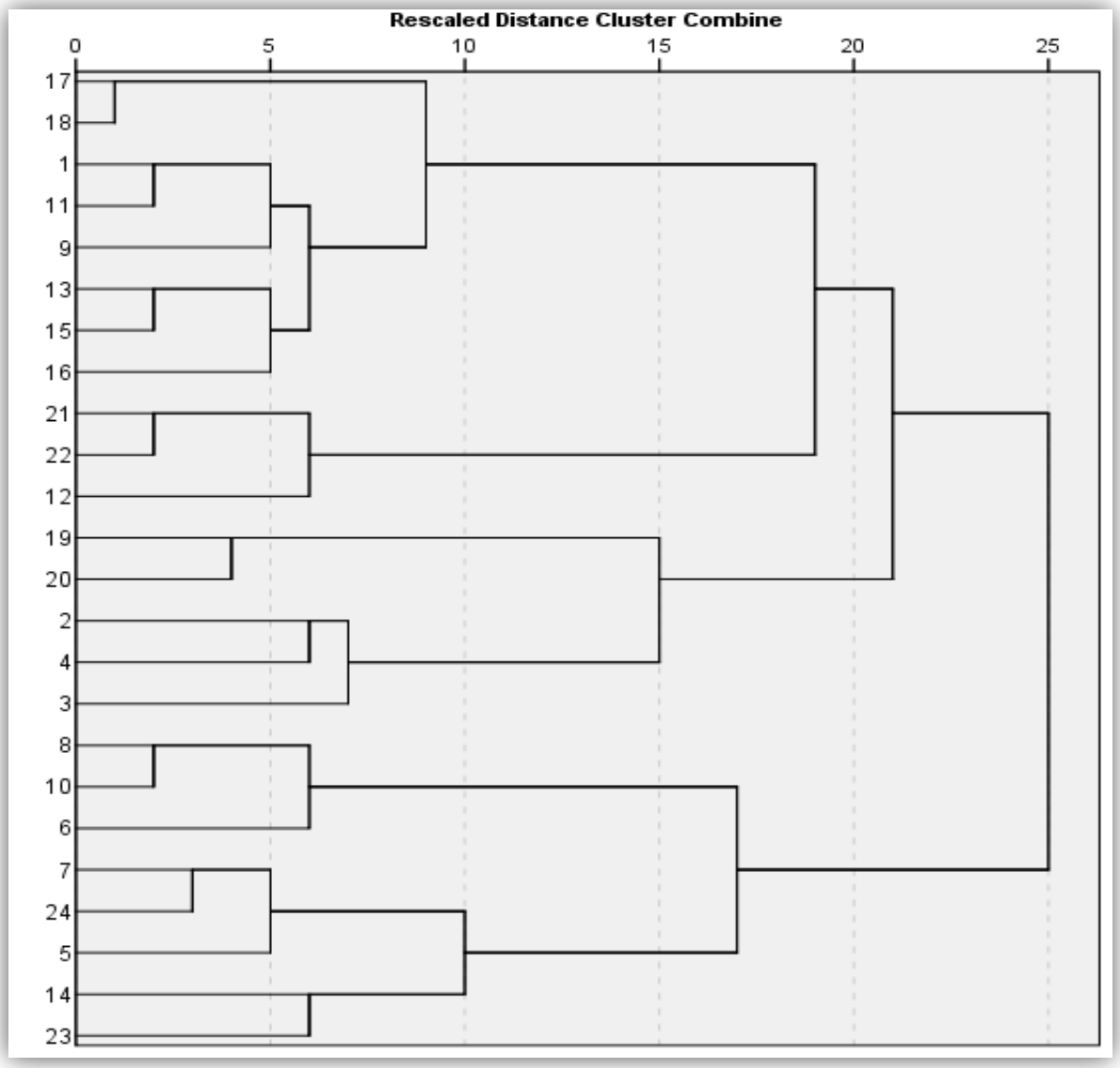


M) Marker, 1) I-DA/102, 2)Alexis, 3) BetaKetzoras, 4) Emon, 5) Kamenitza, 6)Caravella, 7)Kaskadior, 8)Obzor, 9)Neda, 10)Gorast, 11)Orphey, 12) Kyfi, M) Marker

Figure 3. Amplification with Primer ISSR_4 the Arrows Point to Polymorphic Bands

This and similar results obtained with the other markers allowed reliable differentiation of genetically closely related genotypes, which is also one of the objectives of this study. Combination of primers produced a clear DNA profile specific for each genotype. With the use of established polymorphic markers, clustering of the studied genotypes was performed and can be used to assist efficient selection.

Cluster analysis shows that the genotypes examined are divided into two distinguished groups (Figure 4). In the first cluster, predominantly genotypes of Bulgarian, Russian and Hungarian origin, having a winter biotype (with the exception of I-Da/102, Caravella and Kyfi varieties), are included. On the other hand, the genetic closeness of varieties with French origin forming the second cluster is confirmed.



1) 82105326, 2) 89105100, 3) 96105023, 4) 96105024, 5) 96105027, 6) 96105046, 7) 96105050, 8) 99105020, 9) 99105030, 10) 508, 11) 511, 12) 622, 13) I-DA/102, 14)Alexis, 15) BetaKetzoras, 16) Emon, 17) Kamenitza, 18)Caravella, 19)Kaskadior, 20)Obzor, 21)Neda, 22)Gorast, 23)Orphey, 24) Kyfi

Figure 2. Genetic Distance of Barley Varieties Based on Standardized Phenotypic Idata, Hordein Profiles and ISSR Markers

It is interesting to note that genetically similar lines exhibit some visible phenotypic differences. For example, line 99105020 and 508 are low-stem plants that clearly differ in spike parameters: number of grains and spikelets in the main spike, grain weight of a plant, and mass per 1000 grains. The more detailed analysis, however, revealed the similarity of the genotypes of the first sub-cluster of the first main group in terms of the phenotypic expression of traits: number of grains in the main spike, main spike grain mass, grain mass of the whole plant and mass of 1000 grains.

Genotype distribution on the dendrogram put Kamenitsa, Caravella, Beta Ketzoras, Emon, Neda and Gorast in one sub-cluster as genetically close to each other. Summarized results obtained on the basis of the combination of genetic evaluation of breeding lines/cultivars and their phenotypic traits expression, revealed that the significant genetically distant are: Kamenitza, Caravella, 82105326, 511 and 99105030, to 96105105050, Kyfi, 96105027, Alexis and Orphey.

Combining the data from the different types of analyzes has been able to provide a significantly fuller and more accurate picture of the genetic distance of the studied genotypes. This, in turn, has the potential to significantly alleviate the selection of parental forms from this work collection for the purposes of future selection programs.

4. Conclusion

Established polymorphisms ofhordein profiles and ISSR primers revealed that phenotypically different genotypesKaskadior and Obzor; 96105024 and 89105100; Kyfi and 96105050; 99105020 to 96105027 and line 508 are genetically related. Their selection as pairs of parental forms is not advisable for successful barley breedingprograms. The applied cluster analysis for complex genotyping assessment, based on the 1) phenotypic expression of the elements of productivity, 2) hordein profiles and the results of 3) ISSR marker system application can be use as a method for objective genetic distance evaluation. In particular,cluster analysis reveald as relatively genetic distant genotypes Kamenitsa, Caravella, 82105326, 511 and 99105030 to 96105050, Kyfi, 96105027, Alexis and Orpheus. As a result, it is advisable to use pairs of parental forms fromdifferent clusters, to produce advanced germplasm in new breeding programs.

Acknowledgment

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References

Chauhan, R., Jasrai, Y., Pandya, H., Gami, R., Tiwari, K. (2015). "Genetic Diversity Analysis of Six Major Cereal Crops Cultivars through RAPD Markers." Journal of Bioinformatics, Proteomics and Imaging Analysis.

Ivanova, B., Yancheva, S., Bojinov, B. (2012). "Molecular differentiation of Paulownia species and hybrids." Journal of Central European Agriculture 13(1): 73 - 84.

Kochieva, E. Z., N. N. Ryzhova, I. A. Khrapalova, V. A. Pukhalskyi (2002). "Genetic diversity and phylogenetic relationships in the genus Lycopersicon (Tourn.) Mill. as revealed by Inter-Simple Sequence Repeat (ISSR) analysis. ." Russian Journal of Genetics 38(8): 958-966.

Korzun, V. (2003). "Molecular markers and their applications in cereals breeding." Marker Assisted Selection: A fast track to increase genetic gain in plant and animal breeding. Session I: MAS in plants: 18 - 22.

Marcheva, M., Koteva, V. (2003). "Correlations between quantitative traits and quality parameters of barley, cultivated in different environments." University of forestry, 2nd International scientific conference Theory and Practice in Agriculture, Sofia: 25 - 30.

Marcheva, M., Stoyanova, S. (2005). "Evaluation of Hordein Spectra in barley germplasm created by the method of composite crosses." Bulgarian Journal of Agricultural sciences 11: 467-474.

Sleeper, D. A., Poehlman, J. M. (2006). "Breeding Field Crops."

Vuchkov, A., Kostova, M., Bojinov, B. (2017). "Genetic variation in two Bulgarian domestic goat breeds as detected with ISSR makers." XXII SYMPOSIUM ON BIOTECHNOLOGY, Čačak, Serbia, Zbornik radova(1): 387 - 394.

POVERTY ALLEVIATION STRATEGY FOR COFFEE FARMERS IN MALANG DISTRICT, EAST JAVA- INDONESIA

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Abstract

Poverty is still a scourge to be faced by the Government of Malang Regency, mainly because the number is still relatively large, ie 11.07% of the population in 2016. The concentration of poor people who still live in rural areas shows that the poverty level of agriculture sector is at a higher than urban sectors. Therefore, the revitalization of agriculture is very important to be re-emphasized. This study was conducted on coffee farmers in the dryland plains of Malang Regency, East Java, Indonesia, with a view to mapping the factors causing poverty of coffee farmers and formulating the mitigation measures. Based on data processing and information collected from various primary sources (farmers, traders, PPL and related officials) as well as secondary sources (literature and BPS) it was found that the factors affecting poverty are the relatively low quality of coffee farmers and also limited controlof agricultural land resources. Indeed, farmers work very hard to enlarge their income from their narrow land by cultivating it intensively and integrating it with livestock and additional work outside the farm. However, the results have not been able to lift farmers' income away from the poverty line. This is partly due to the very weak position of farmers when dealing with middlemen in the input market and output markets. Farmers have dependence on middlemen to fulfill capital requirement in farming. Meanwhile, government efforts through policy and service programs are not very effective. To help farmers out of the socio-economic difficulties they face, this study proposes the development of the People's Agribusiness Sentra (SAR Cooperative) which is driven by three basic principles (Principles of Cooperatives (PK), Principles of Business (PB) and Networking Principles (PJ). By applying these three principles, through Cooperative SAR farmers' position will be much stronger in the market because it will face the market collectively, benefit from "economics of scale", increase the value added of the product through processing, relinquish the dependence on venture capital from middlemen, and expand business activities through partnerships with agribusiness companies.
Keywords: Coffee farmers, cooperative, income, poverty alleviation, small farmers.

1. Introduction

Coffee is one of the leading plants in the subsector plantation in Malang Regency. Robusta and arabica coffee plant area of about 9.636 Ha and is a commodity with the second largest land area after cane commodity. Production centers spread in 4 sub-districts AMSTIRDAM (Ampel Gading, Sumbermanjing Wetan, Tirtoyudo, and Dampit). The production and productivity of Robusta coffee commodities in 2015 amounted to 8,304.6 tons and 695 kw / ha respectively. Coffee production from this region other than consumed domestically, also mostlyexported to other countries, especially Europe.

Although Dampit sub-district is well known as a center for coffee commodities, it appears that this area is also a poor area, reaching 7.761 people (21%) and some of them coffee farmers. This shows that agriculture has not been able to improve the living standards of farmers and become a mainstay sector for people to live prosperous.

The problems facing coffee farmers are still a scourge of agricultural and rural development. Problems such as labor productivity and low productive asset control are accompanied by dualism between traditional folk agriculture and advanced and modern large corporations. This condition leads to low income and high coffee farmer poverty. Therefore, agricultural development should be oriented towards improving the productivity of labor, income and welfare of rural farmers. In applying a rural income-generating improvement program in rural areas, research is needed to obtain information on the characteristics of small-scale peasant communities and their causal factors covering social and economic aspects.

2. Theoretical Background

Sumaryanto (2002) states that the largest share of Indonesian households, especially in rural areas, still rely on agriculture. It is therefore reasonable that inequality of rural incomes based on agriculture is closely related to the imbalance of land tenure structures (Nurmanaf, 2001). Farmers in rural areas can be identified with poor peasants accompanied by limited accessibility to economic opportunities as a source of income outside agriculture. Sumodiningrat, et al (1999) assume that poverty is caused by internal factors and external factors. Internal factors come from within a person or his environment. While external factors are factors beyond the reach of individuals that prevent a person to seize the opportunity. That is, not because someone does not want to work but the existing structure that becomes obstacles.

Meanwhile, various studies illustrate that the poverty of a community is characterized by the low quality of human resources (Quibria and Srinivasan, 1993, Sofwani, 1998, and Tjiptoherijanto, 1998), low control of productive assets such as agricultural land (Otsuka, 1993), and low accessibility community members on capital resources and economic opportunities (Siamwalla, 1993). Furthermore Kasryno and Suryana (1992) see that there are two characteristics of poor villages, namely the limited productive assets such as land and capital and the quality of human resources is largely very low. Both of these characteristics are suspected to be obstacles in applying a technology or optimally utilizing economic opportunities. Nevertheless, Binswanger and Braun (1991) prove that in general under certain circumstances technological change can have a positive effect on income generation for low income farming communities.

Basically farmers with narrow land face problems that are characterized not only by the low income levels but also the unstable income itself. Therefore, efforts to increase the income of small-scale farmers should pay attention to these two things. That is, the program should be directed not only to increase revenue but also to stabilize revenue together. In applying a rural income-generating improvement program in rural areas, research is needed to obtain information on the characteristics of small-scale peasant communities and their causal factors covering social and economic aspects.

3. Methodology

The location of the research was conducted on agro-ecosystem of dry land based on plantation and it was determined Malang Regency, East Java, Indonesia. From the district level selected one sub-district and two villages are classified based on production centers and ownership area, namely Amadanom Village and Sukodono Village, Dampit Sub-district, Malang Regency. In both villages randomly selected 44 poor and non poor households were interviewed using a structured questionnaire.

3.1 Research Framework

The person which is categorized as poor, theoretically influenced by several factors. These factors can be grouped into external factors and internal factors. When further reviewed, internal factors can still be divided into internal social factors and internal economic factors. In this research, various variables are analyzed to determine the most influential variables, which will be needed to formulate the improvement policy, as seen in Figure 1.

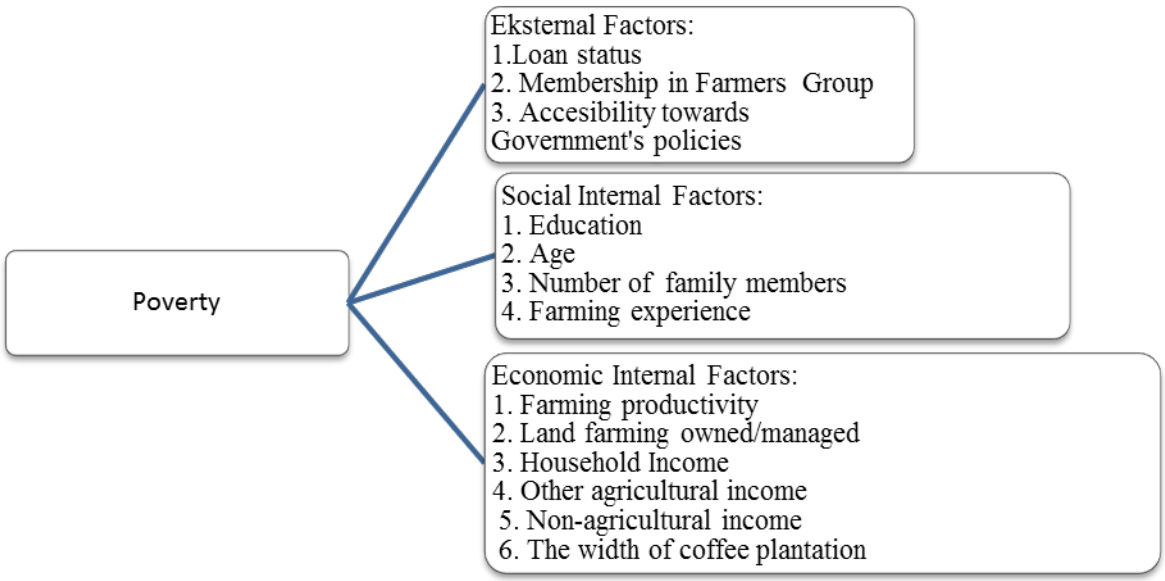

Figure 1. Research Framework

The method used to analyze the factors that most influence or cause of poverty is quantitative method, that is by using econometric analysis. For data processing using software Stata 6. The parameters in the analysis consist of several variables, as shown in the following econometrics equation model:

$$Y = \alpha_0 + \alpha_1X_1 + \alpha_2X_2 + \alpha_3X_3 + \alpha_4X_4 + \alpha_5X_5 + \alpha_6X_6 + \alpha_7X_7 + \alpha_8X_8 + \alpha_9X_9 + \alpha_{10}X_{10}$$

Where:

Y: Poverty (Proxy Revenue per capita)
X1: Old education of household head (year)
X2: Age of head of household (year)
X3: Number of family members (soul)
X4: Length of farming experience (year)
X5: Number of workers (soul)
X6: Area owned / controlled (ha)
X7: Credit lending status (1: borrow: 0: no borrow)
X8: Status of member of farmer group (1: member / board 0: not member)
X9: Coffee and intercropping income (IDR)
X10: Non-farm income (IDR)

Household income is the total of income within 1 year from various sources of all the family members added by other income generated without working such as from renting etc.

$$\gamma = \sum_{i=1}^{n} Xij + \sum_{i=1}^{m} \rho i$$

Where:
γ = is the total household income
Xij = income from j-j activity of the household member i
ρi = revenue earned without working i

Classification of poor and non poor farmer is based on poverty line established by Malang Regency's government[1]. The result of the analysis will be used as the base to formulate the recommendations on improving the welfare of smallholders coffee farmers.

[1] Poverty line in Malang Regency in 2016 is IDR280.000/capita/month

4. Result and Discussion

4.1 Coffee Farmer's Demographic Conditions

Dampit subdistrict is relatively strategic location, because the area is passed by a highway connecting Malang with Lumajang. Thus some villages have good accessibility and it only takes a few minutes to get to the district capital. But there are also some villages with low transport access and very limited population mobility because they are served only by motorcycle transportation facilities and take a few tens of minutes to the subdistrict capital.Based on the land use, the width of Dampit sub-district is 135.57 km2 and about 73.1% is agricultural land, namely: paddy field (10.9%), dry land (52.4%), plantation (18.9%). The remaining 12.0% is in the form of settlements and forestry and other areas (5.7%).

Table 1. Coffee Farmer's Household Characteristics

No	Factors	Economic Status	
		Poor (%)	Not Poor (%)
1	**Age** (Year): - 25 – 45	-	24%
	- 46 – 64	100%	56%
	- >64	-	20%
	Average (year)	55	55
2	**Education**: - Not graduated from primary school	50%	2%
	- Primary School	25%	46%
	- Elementary School	25%	24%
	- High School	-	24%
	- Graduate Program	-	2%
	Average	Primary School	Elementry School
3	**Number of family member (person)**: - 1-2	-	39%
	- 3-4	75%	61%
	- 5-6	25%	-
	Average	4	3
4	Number of family member involved in coffee farming	14	11
5	Coffee farming experiences (year)		
	5 – 10	50%	22%
	11-20	25%	17%
	21-40	25%	51%
	>40	-	10%
	Average (year)	16	27

Sources: Primary Data

In term of household characteristics, all of the respondents are classified as the productive age group, namely 25-64 years age group. Regarding to the formal education, there is slight difference between poor and not poor coffee farmer's education background in which poor farmer tend to have lower education which is primary school, and not poor farmer has slightly higher education in average which is elementary school. The average family member for poor farmer is bigger compare to not poor farmer, with the average of 4 members for the poor farmer and 3 members for not poor member. The same pattern appears in the number of the family involved in coffee farming in which the poor farmer has bigger procentage compare to not poor farmer. Regarding the coffee farming experience, the not poor coffee farmers have longer experiences with 27 years of average, compare to poor farmers that only have 16 years farming experience. The demographic characteristic of the poor and not poor coffee farmers in surveyed area is shown in Table 1.

Based on coffee farmer's condition, the poor and not poor farmers have different characteristics, in which not poor farmers have better house condition in general. The majority of not poor farmers use tile for their house flooring, while the poor farmers use cement. Majority of not poor farmers consume water from the spring that delivered through pipes to their houses, while poor farmers use water from many sources, such as river, private or public well and local water company. Regarding the condition of toilet, electricity, source of energy used for cooking, both categories have the same condition which 100% of respondents have had private toilet, use electricity in their houses and majority use liquid petroleum gas for cooking. The detail of coffee farmer's house condition is shown in Table 2.

Table 2. Housing Condition of Coffee Farmer

No	Aspects	Farmer's Category	
		Poor	Non-Poor
1	House ownership (%):- Self-owned	75	61
	- Inheritance	25	30
	- Both	-	9
2	House category (%):- Permanent	100	100
	- Semi-Permanent	-	-
3	Floor (%): - Tile	-	80
	- Cement	100	20
4	House wall (%): - Brick	91	100
	- Wood	9	-
5	Bath Room (%): - Private	100	100
	- Public	-	-
6	Toilet (%):- Private	100	100
	- Public	-	-
7	Water source (%):- Private well	25	23
	- Public well	25	-
	- Spring	25	47
	- Local company	25	14
	- Water vendor	-	16
8	Electricity Availability (%):- Available	100	100
9	Fuel/energy source (%):- Liquid Petroleum Gas	50	73
	- Kerosene	25	27
	- Wood	25	-

4.2 Land Ownership

There are several types of land which are managed by coffee farmers in survey area, namely plantation, rice fields and field. Based on the type of land managed by the farmers, as much as 73% of coffee farmers manage plantation, while the remaining of 27% manage more than one type of land. As many as 13% of coffee farmers manage plantation and field, 9% manage plantation and rice fields and 5% manage plantation, rice fields and field at once.The average land area manage by poor farmers is smaller than non-poor farmers, where poor coffe farmer manage 0,46 Ha plantation land and not poor farmer manage 0,56 Ha of plantation land. Table 3 shows the average land area owned by poor and non-poor coffee farmers.

Table 3. The Average Land Managed by Coffee Farmer

Farmer's Economic Status	Coffee Plantation (Ha)	Rice Field (Ha)	Dryland (Ha)
Poor Farmer	0,46	0	0
Not Poor Farmer	0,56	0,18	0,62

Source: Primary Data, 2017

4.3 Marketing System of Coffee

There are eight large coffe traders that absorb the coffee farmer's production in Dampit Subdistrict. All farmers sell most of their coffee directly to the large traders in Dampit and only a small portion of their product to other buyers. Similar system also applied to marketing system of the coffe farmers from Sukodono, in which they sell directly to traders in Dampit or sell to representatives of Dampit traders in their village. Figure 2 shows the marketing system of coffee in research area.

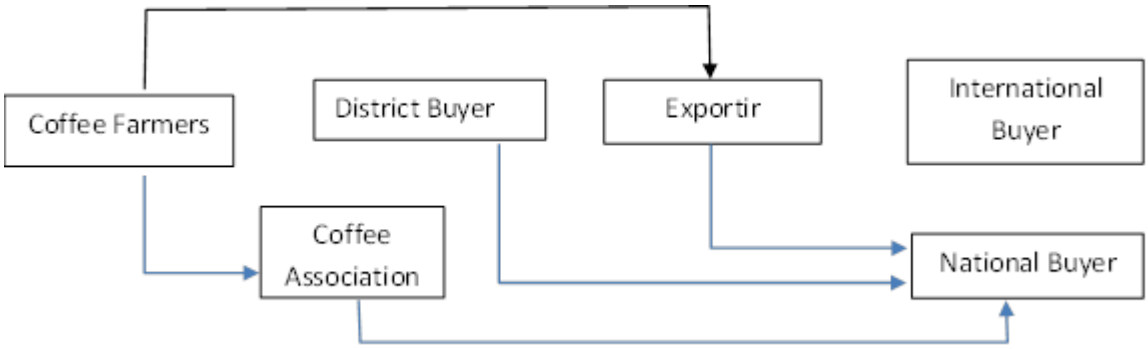

Figure 2. Coffee's Marketing System in Dampit Subdistrict

The price difference received by Amadanom and Sukodono farmers is only due to differences in the coffee's quality. The income difference between farmers from those villages is also influenced by transportation costs, since Amadanom's farmers spend much lower transportation costs than Sukodono's farmers.

4.4 Coffee Farmer's Income Performance

Most of the coffee farmers in surveyed area, generated their income not only from coffee plantation but also from others sources wether within or outside agricultural activities. Eventhough coffee plantation is still their main income source, but due to the narrow coffee plantation land, the income is quite low. The average income per capita for poor coffee farmer is IDR. 250,243/month and for the not poor coffee farmer is IDR. 1,354,253/month.

Poverty Index for Malang Regency in 2016 is IDR. 280,000/month/capita, thus average income of poor coffee farmers is even smaller than the Poverty Index. The income gap will be more visible if the coffee farmer's income compared to minimum wage of Malang Regency in 2017, which is IDR. 2,368,510/month. Even for non-poor farmers, the average income is only 60% or less of the minimum wage. This shows that agriculture has not been able to provide sufficient welfare for farmers.

With the narrow farming land, in which average land ownership for poor farmers is less than 0.5 hectare and non-poor farmers is 0.4-0.9 hectares, it can be said that the land ownership is far from efficient farming land. This condition will affect the level of coffee production and income of the farmers. To overcome the low income problem, the majority of farmers implement intercropping cultivation system, where the farmers also plant coconut, banana and other fruit also albizia or other wooden plant on their plantation land. Farmers can harvest coconuts every month, as well as bananas, papaya or jackfruit, and albizia or other wooden plant every 5-6 years. Coffee farmers also raise goats, where goat's litter is used as organic fertilizer for the coffee plant and also can be sold when the farm families need extra money.

The comparison of coffee farmer's income from agriculture and non-agricultural sector shows that for both of poor and non-poor coffee farmers, majority of their income source is mainly from the agricultural sector. However, the non-poor farmer's income from non-agricultural sector is bigger compare to poor farmer. The condition is caused by the capital and opportunity that non poor farmer has which is bigger that allow them to worked outside agricultural sector such as in trading sector etc.

Table 4. Income Sources of Coffee Farmers, 2017

Income Sources	Coffee Farmer's Income (IDR/Year/Hectare)		Procentage to Total Income	
	Poor	Not Poor	Poor	Not Poor
A. Agriculture:	10.088.750	31.880.465	94,4%	80,7%
1. Coffee	6.382.500	15.649.721	59,7%	39,6%
2. Intercropping plants	3.481.250	14.943.535	32,6%	37,8%
3. Husbandry	225.000	1.287.209	2,1%	3,3%
B. Non-agricultural sector	600.000	7.609.302	5,6%	19,3%
Total income per year	10.688.750	39.489.767	100,0%	100,0%

Source: Primary data, 2017

The income from agriculture sector for poor and non-poor coffee farmers, mostly comes from coffee plantation, which for poor farmer the income from coffee plantation is 59, 7% and non poor farmer is 39, 6%. This is in line with the result of Fadipe et al (2014)were the farm income is the most important source of income for rural households. This means that the role of coffee plants for poor farmers is greater. Another main source of coffee farmer's income is from intercropping plants, where poor farmers gathered 32, 6% of their income from this system and not poor farmers gathered 37, 8%. The condition is due to the fact that the land is narrower on poor farmers and poor farmers have limited capital to plant other crops in their coffee plantation. Given that the crops in intercropping systems can be harvested many times within a year, this system creates better income stability for the coffee farmers.

Besides farming, many of coffee farmers (40%) also raise goats, with the average of 3 goats per farmers.Goat breeding has an important role for coffee farmer's household and coffee farming. Goat's litter is processed to be manure (organic) for coffee plants. The farmers also used grass that grows in coffee plantation to feed the goats. The goats also playing role as saving when the farmer's household need emergency money.

Another strategy undertaken by farmers as part of multiple livelihood strategies is to migrate to cities or work abroad. Family members also works in various fields suach as trading or service area as maid, porters, farming laborers etc. to gathered the family's income. The labor works especially conducted by the poor farmers, as for not poor farmers, their major income beside from coffee farming comes from intercropping plants and trading.

4.5 Statistical Analysis

To determine the most influential factors which affect the poverty of coffee farmers, some factors has been analized by using regression test. The results are shown in Table 5.

The value of coefficient of determinant is equal to 0.6699 or equal to 66.69 percent. It means that 66.69 percent of the poverty variables can be explained by the independent variables in the model, while the rest is explained by other factors outside the model.

To find out whether the independent variables together have a significant influence or not to the dependent variable is shown by Prob> F value of 0.000 and the value is smaller than the 5 percent real level. It shows that there is at least one parameter that is not equal to zero. Thus, the variables used in the study together have an influence on the dependent variable.

Furthermore, to know the independent variable by parsial have significant influence or not to dependent variable indicated by existence of some significant variable partially influence income level per capita coffee farmer in Malang. The significant variables are: educational variables, number of family members, the land width, total income from coffee farming and intercropping, and non-farm income.

Table 5. Regression Result: Estimating Factors which Affect the Poverty

No	Variable	Result			Standard Error
		Coef	p>|t|		
1	Education (X1)	0.0632	0.075	*	0.0344
2	Age (X2)	0.0062	0.558		0.0105
3	Number of family member (X3)	-0.2480	0.013	**	0.0939
4	Length of farming experience (X4)	0.0054	0.467		0.0074
5	Number of workers (X5)	0.0003	0.977		0.0013
6	Coffee plantation width (X6)	0.4312	0.061	*	0.2222
7	Loan status (X7)	0.1250	0.440		0.1599
8	Membership status in farmer group (X8)	0.1163	0.584		0.2104
9	Income from coffee and intercropping (X9)	0.2535	0.003	***	0.0778
10	Non agricultural income (X10)	0.0837	0.004	***	0.0267
No. of obs		44			
R^2		0.6669			
Adj R^2		0.5659			
Prob > F		0.0000			

Note: *** = Significant level 1%; ** = Significant level 5%; * = Significant level 10%

The farmers education variable has probability value of 0.075 or significant level of 10% and has a coefficient of 0.0632 which means the longer the education pursued by farmers, the bigger income per capita by 0.0632 percent. This can be happened because higher education level can increase the knowledge of the farmers to produce and manage farming better, ceteris paribus. The number of family members has a probability value of 0.013 or significant level at 5%. The coefficient value of this variable is -0.2480, which means a significant negative effect. It means that the increase of 1 person of family member will decrease 0.2480 percent income per capita. The large number of family members will increase the family burden and reduce income per capita.

The width of coffee plantation has a probability value of 0.061 or significant at the level of real 10 percent. The coefficient value of this variable is 0.4312 which means that every 1 hectare increase of coffee plantation area will increase 0.4312 percent per capita income. Increasing the size of the land will increase the production level and will affect the income per capita eventually. The total of coffee farming income and intercropping income have significance of 0.0003 or significant level of 1%. The coefficient value of this veariabel is 0.2535 which means that any increase of IDR 1 will increase 0.2535 percent income per capita. The last variable that has a significant probability is income from non agricultural sector. The variable has a probability level below 5%. The coefficient value of the variable is 0.0837, which means that if non agricultural income increase by IDR 1, then it will increase income per capita by 0.0837 percent.

4.6 Coffee Farming Management Strategy

Efforts to boost agricultural performance through improved farming efficiency and increased production should be supported by appropriate strategies and carried out in a sustainable manner. In order for better condition of coffee farming in the surveyed area, a management model is needed to: 1) Increase land productivity, 2) increase farmer productivity, 3) develop coffee-based agribusiness, and 4) increase income of the farmers. The proposed strategies to achieve those goals includes: (1) Assurance of market certainty, (2) Improvement of farmer's human resources capability, (3) Development of nurseries and coffee production centers, (4) Empowerment of farmers, (5) Increase the role of agricultural institutions, (6) Partnership with various parties, (7)Provision of capital facilities, promotions and market information, and (8) Enhanced local government's active role.

Therefore the recommendations of this study to improve coffee farmer’s livelihood are to form farmer's schools in order to increase the capacity of farmers, strengthening the existence of farmers

through creating effective marketing chain and strengthening farmer institutions. Coffee farmer cooperative is one of the most appropriate institutions in order to answer all the problems that exist. Figure 3 below, explained the role of cooperatives in answering the problems of coffee farming.

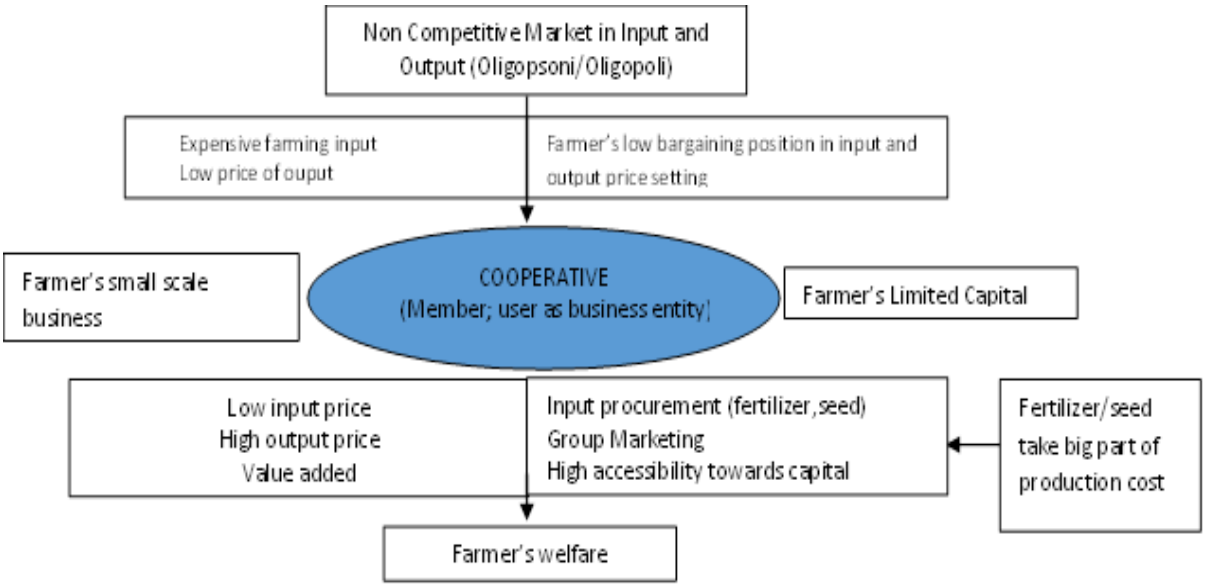

Figure 3. Cooperative Model for Coffee Farming Development

Increasing farmers' income through secondary product development, building the superiority and competitiveness of local products and develop product storage facilities are some of the most important strategies to address all existing problems. The cooperatives proposed to be developed in the surveyed area is People Agribusiness Center Cooperative with three basic principles namely Principles of Cooperatives, Business Principles and Network Principles.

Farmer's Agribusiness Center Cooperative with 3 Principles above, is a type of cooperative based on the principles of traditional cooperative where the institution serves to maximize the welfare of its members, but also integrated with the principles of modern business in the same time. In this cooperative the managers are professionals who truly understand the principles and practices of modern business, develop business with economics of scale. Meanwhile, in its function to develop the capacity and welfare of the members, this cooperative is done by other party's involvement, private parties through partnership and guidance and assistance from the government through its policy cooperation with

5. Conclusions and Recommendation

5.1 Conclusions

1. The poor coffee farmer households when compare to not poor household in surveyed area has characteristics as follows: lower education and bigger family members. In terms of age, both poor and not poor farmers are within 24-64 years old group or in the productive age group. The econometrics analysis shows that variables which are significantly affected coffee farmers poverty rate are the number of family members, the width of coffee plantation and the agricultural and non-agricultural income.
2. The low income of coffee farmers is due to the condition of resources constraints, such as land assets, lack of accessibility to sources of capital, individual marketing strategies which create weaker position for the coffee farmers compare to traders, which lead to farmer's low income. In addition, oligopolistic market conditions in which the market is dominated by a handful of large traders, caused

the farmers to have lower bargaining power in determining the price of inputs and outputs. The low bargaining power always put farmers in vulnerable condition and make them hard to leave the poverty line.

5.2 Recommendation

1. Strategies developed to improve the welfare of coffee farmers include: (1) creating market certainty, (2) improving farmer's capacity, (3) increasing the role of agricultural institutions, and (4) applying partnership pattern. Therefore, the establishment of farmers agribusiness centers cooperatives as a business entity is expected to be the answer to increase the welfare of coffee farmers.
2. To strengthen the bargaining position and competitiveness of coffee farmers, as well as other conditions leading to farmer poverty, the policy model recommended is to develop Farmer Agribusiness Center Cooperative.
3. The Cooperative institutional model is a business entity that will organize farmers in all of stages from cultivation to marketing. The cooperative will be equipped with production infrastructure business unit, capital unit and marketing unit. The cooperative should has Triple Basic Principles namely Principles of Cooperatives, Business Principles and Network Principles.

References

Binswanger, H.P. and Braun, J. (1991). Technological Change and Commercialization in Agriculture:the Effect on the Poor.*World Bank Research Observer*, -- Vol. 6, no. 1 (January1991),pp.57-80.Retrievedfrom: http://documents.worldbank.org/curated/en/966261468739230729/Technological-change-and-commercialization-in-agriculture-the-effect-on-the-poor.

Fadipe, A.E.A. Adenuga, A.H. & Lawal Trakia, A. (2014). Analysis of income determinants among rural households in Kwara State, Nigeria. *Trakia Journal of Sciences, vol. 4*: 400-404.doi:10.15547/tjs.2014.04.010

Kasryno, F. dan A. Suryana. (1992). *Proverty Alleviation with Sustainable Agricultural and Rural Development in Indonesia*. Proceeding of National Seminar and Workshop. Bogor, January 7th-10th, 1992. pp. 60-76.

Nurmanaf, A.R. (2001). *An Analysis of Economic Inequalities Between Household in Rural Indonesia*. Dissertation Findings in Brief. Faculty of Business and Computing. Southern Cross University, Coff Harbour Campuss, Australia.

Quibria, M.G. dan T.N. Srinivasan. (1993). *Rural proverty in Asia*. Oxford University Press, Hongkong.

Saputro, A.E.S. and Agung P.U. (2010). Macro factors affecting poverty in the fifteen provinces in 2007. *Organization and Management Journal, Volume 6*, Number 2, September 2010, 89-100

Siamala, A. (1993). *Rural credit and rural proverty*. In Quibria, M.G. (ed). *Rural proverty in Asia: Priority, issues and policy options*. Oxford University Press, Hongkong. pp. 287-299.

Sumaryanto (2002). "Land issues in Indonesia and its implications tofollow-up agrarian reform". R&D Center for agricultural socio-economic, Agricultural Research Agency. Bogor.

Sumodiningrat, G.B. Santosa and M. Maiwan (1999). *Poverty: Theory, Facts and Policy*. First Edition. Publisher: IMPAC, Jakarta.

Xu Hui and Li Dongsheng (2011). Typically related analysis from educational human capital influencing on farmers' income. *Agricultural Technology Economy*, 2011 (8):44-49.

FACTORS AFFECTING OVERWEIGHT AND OBESITY AMONG URBAN ADULTS: A CASE OF SAMSUN PROVINCE, TURKEY

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Abstract

The prevalence of overweight and obesity have increased at alarming rate in Turkey. This cross-sectional case study was to assess overweight and obesity among urban adults and to examine the factors such as socio-demographic, genetics, psychological, eating and activity habits affecting on overweight and obesity. The study was carried out among 384 adult individuals residing in the urban area of Samsun province of Turkey. The Body Mass Index (BMI) was used to determine overweight and obesity among the urban adolescents. The ordered probit model was used to estimate factors affecting overweight and obesity. The prevalence of overweight and obesity among the adults were observed as 32,29% and 20,57, respectively. The ordered probit model indicated that while the higher age, the higher numbers of sibling, being married, the number of obese people in the family, mother's BMI and,duration of breastfeeding had significant positive effects on both overweight and obesity among the urban adolescents, the factors of being employed and paying attention to salt and oil in the meals had significant negative effects on both overweight and obesity. The study concluded that there has been an urgent need for the development of health programs for preventing overweight and obesity among adolescents.

Keywords: Overweight, obesity, urban adults, ordered probit, Turkey.

A STUDY OF EFFECTIVENESS OF THE FARMER'S AGRO-METEOROLOGY INFORMATION ON WHEAT PRODUCTION IN IRAN

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Abstract

Meteorological information (MI) and weather forecasts for the production of agricultural products is vital. The aim of this study was to evaluate the effectiveness of agro-meteorology information from the perspective of farmers in Kohgiluyeh-va-Boyerahmad (KB) Province. In this study the relationship among the effectiveness of agro-meteorology at different stages of wheat cultivation and farmers socio-economic and demographic characteristics were examined. The method in this study is survey research and statistical population consisted of all wheat farmer in KB Province. Questionary validity using face validity, and reliability with Cronbach's alpha coefficient with quantity of 0.82 to 0.87 was approved. Using stratified random sampling, 335 farmers were determined. Statistical analysis of data using descriptive statistics (such as mean, percentage distribution, standard deviation and coefficient of dispersion) and inferential statistics (including correlation coefficient, T test and logistic regression) and was conducted using SPSS statistical software. Effectiveness basis, has been the decisions of farmers in wheat cultivation in 1393-94. The results showed that most farmers believe, MI to determine the order of priority in cases of wheat sowing, pest control, seeding levels and increase the quality of wheat are effective. Communication resources, with weak and medium intensity correlation, had positive impact on the effectiveness of MI. The results of logistic regression revealed that individual factors such as the confidence, farmer attitude, dryland farming and education on the effectiveness of MI are effective, respectively. Therefore, improving these factors, is expected to increase the effectiveness of MI.

Keywords: Agro-meteorology, attitude, effectiveness, logistic regression,wheat cultivation.

ANALYZING THE IMPACT OF CLIMATE CHANGE ON WHEAT PRODUCTIVITY IN KHYBER PAKHTUNKHWA PROVINCE, PAKISTAN

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Abstract

This research endeavor was designed to assess the Impact of Climate Change on Wheat productivity in Khyber Pakhtunkhwa (KP) Province, Pakistan. The major aim of the study was to explore wheat productivity nexus with selected climatic variables which include temperature, precipitation and humidity. Panel Data for the period of thirty years (1985-2015) regarding wheat crop's primary inputs and aforesaid climatic variables were gleaned from Agricultural Statistics of KP and Pakistan Metrological Department, Peshawar. Various econometric diagnostic tests were employed to confirm the validity of the data. The Chow test estimates corroborate that the data requires to be checked for the structural breaks. Therefore, the data set was split into two groups i.e. panel data for 1985-2000 and 2001-2015. Estimates of Hausman Test had suggested Fixed Effect Model to compute the data. The major findings divulge that temperature has significant but negative association with wheat production. This implies that by soaring one Celsius degree Centigrade (^{0}C) temperature can plunge down the wheat productivity by 0.074 percent. Correspondingly, the impact of precipitation was also observed negative with wheat crop in the panel data since 1985 to 2000. This study concludes that in various span of time, an increase in temperature and precipitation has inverse correlation with wheat production while humidity is positively associated with wheat production. It is recommended that concerned policy makers may give due attention in providing high temperature resistant wheat varieties and disseminate the exalted adaptation strategies with respect to climate change to overhaul their existing crop management practices.

Keywords: Climate change, wheat productivity, panel data, fixed effect model, climatic variables & Khyber Pakhtunkhwa.

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MODELING EXIT FROM AGRICULTURE UNDER OCCUPATIONAL UNCERTAINTY AND SUNK COSTS

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Abstract

The movement of labor away from the agricultural sector is an important element characterizing the development of an economy. The neoclassical model sees inter-sectoral movements of labor as an investment decision and argues that farm workers will move to non-farm jobs if their expected returns outside of agriculture exceed those achieved in the farm sector, net of migration costs (Barkley, 1990)[1]. This approach has two shortcomings: movement to non-farm sector a-) is assumed to be reversible (i.e., there are no sunk costs to switching sectors); b-) presents itself as a now or never proposition (i.e., there is no delaying of the decision). I argue that even in the presence of a positive wage differential between two sectors, people do not always move to the sector offering the higher earnings because leaving agriculture for non-farm jobs is not a reversible decision; it is typically associated with large sunk costs. Furthermore, workers may delay their decision to exit from farm jobs if there is too much uncertainty about the opportunities in the non-farm sector. As a result, the responses of migrants to wage differentials may be characterized by nonlinearities due to the existence of sunk costs and what is called an "option value of waiting" that results from the uncertainty involved in the decision.

The objective is modeling determinants of exit from agricultural work using a real options model of sectoral migration that is consistent with large sunk costs and uncertainty involved in changing occupations. I use a dynamic panel threshold model that is consistent with potentially large wage thresholds implied by large opportunity costs of leaving agricultural work (Seo and Shin, 2016)[2]. The empirical application is on the agricultural labor market in the United States. State-level panel time-series data on farm and non-farm employment and income between 1980 and 2016 are compiled from Bureau of Economic Analysis (BEA) – Regional Accounts, and Bureau of Labor Statistics (BLS) - Quarterly Census of Employment and Wages (QCEW).

Preliminary results favor the real options framework, which accounts for occupational uncertainty and sunk costs, over the conventional net present value approach. The response in exit from agricultural employment with respect to relative non-farm returns is regime-dependent and varies depending on the size of inter-sectoral wage gaps. The estimates are used to compute the threshold level of sectoral wage gaps that trigger exit from agriculture and the elasticities of out-farm migration with respect to wage differentials. Results have important implications for policy objectives intended to inhibit the flow of labor and other resources out of the farm sector through the use of price supports or direct payments.

Keywords: Agricultural labor; exit from agriculture; non-farm work; threshold panel GMM; real options.

[1]Barkley, A. P. (1990). TheDeterminants of the Migration of Laborout of Agriculture in the United States, 1940-85. AmericanJournal of AgriculturalEconomics 72(3): 567-573.

[2] Seo, M.H. &Shin, Y. (2016). Dynamicpanelswiththresholdeffectandendogeneity. Journal of Econometrics 195(2): 169-186.

THE ROLE OF AGRICULTURE IN THE ECONOMY OF AFGHANISTAN

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Abstract

The aim of this study is to identify the contribution of agriculture in Afghanistan economy by examining the experience of 34 provinces as documented in case studies commissioned and various secondary sources, (CSO yearbook, FAO reports, government publications, USAID reports, NGOs reports, journals and websites) for the period of 2016 - 2017. Agriculture is the backbone of the Afghan economy, the contributions of agriculture to the country's gross demotic product (GDP) is 23% in 2017, while the labor force engaged in this sector is around 61.6%. The annual growth rate in Afghanistan is predictable 3.6 percent. Afghanistan produces organic fruits, nuts, grain, vegetables and livestock products including cashmere, skin, wool, and a significant amount of these commodities is moving towards the export market. Agriculture represents for about one-quarter of national GDP and is the second largest sector after services. Over the 70 % of the population are poor living in rural areas, and agriculture plays an important role in their livelihoods. The most Afghan farms are very small and their productivity is low over the years that farmers produce to satisfy the food needs of their household, with limited agricultural production entering commercial marketing channels and the trade account deficit overall. The GDP including opium was US$ 20.3 billion with GDP per capita of US$ 697. The agricultural sector is entirely run by private enterprises, including farmers, cooperatives, input suppliers, herders, agribusiness processors, and exporters.
Keywords: Agriculture, economy, contribution, GDP, Afghanistan.

1. Introduction

The majority of the Afghan population lives in rural areas, where poverty and deprivation are the most severe. Since almost all rural households depended directly or indirectly on agriculture and given the sector's large contribution to the global economy, agriculture can be expected to be a key element of growth and development (Diao et al. 2007). The country has not yet met the criteria of a successful the revolution of agricultural and production factor in agriculture lags far behind the rest of the world.

Afghanistan's economy has faced widespread devastation over the last thirty years due to war and political instability wiping out the economic infrastructure and institutions across the country. The agriculture sector makes up approximately one-second of GDP and is vulnerable to wide fluctuations depending on weather and policy actions of Afghanistan's neighbors. Despite representing one-second of the economy, agriculture employs an estimated 60 percent of Afghans. The agriculture sector overall is very dependent on cereal and other annual field crop production which accounts for an estimated 23 percent of total agricultural GDP (Jalal & Ward, 2011). Agriculture has good growth potential and highly for reducing poverty and creating jobs both on and off the farm.

"*The most people in the world are poor, so if we knew the economy of poverty, we would know much of the economics that really matters.Most of the world people poor depend on agriculture, so if we knew the economics of agriculture, we would know much of the economy of poverty*" (Cervantes & Dewbre, 2010).

Through the varied geography and topography, out of 652,000 square kilometers of total land area, only an estimated 12 percent is arable, 3 percent of the land is considered forest covered, 46 percent is

under permanent pasture, and 39 percent is mountainous, not usable for agriculture (CSO, 2016). There is cultivation plant by land face water and rainfall also rainfed wheat essential for cereal production. Wheat is the primary crop for production of cereal. Also, wheat uses for consumption 89% comparison too there grins. Fruits including watermelon, melon, apricot, pomegranate, and almond are essential for exports (ASY, 2016-17).

To rapidly increase the rate of agricultural growth, rather than trying to drive the whole agricultural sector forward at the same time, it may be more sensible to focus attention on a few “first movers:” priority on imported products and export traditional crops, and drive value chains for these hard for growth and creation job in the expectation that the rest of the sector will follow. Such anapproach is very similar to that of the Asian Green Revolution, where a first thrust on the substitution of wheat and rice imports in high-potential irrigated areas has led to significant growth in agricultural employment and to rural transformation (World Bank, 2014). The study shows that despite recent skepticism, agricultural growth is still vital for most low-income in Afghanistan. The ability of Afghan farmers to find pathways out of poverty and to contribute actively to the growth process depends on improving infrastructure and education, distributing key technologies and inputs, and promoting producer and marketing organizations that link small farmers to new market chains. The challenge is therefore to develop new institutionalarrangements between the public and private sectors that foster private sector development without leaving smallholder farmers isolated during the transition.

2. The Methodology of the Review

The review adopted a sampling, data collection, analytical tools used and methods of evaluation have consisted of technical studies on agriculture economic growth,contribution to national income, job creation and well-being for rural populationssectoralcontribution GDP, and key subsectors (food supply source, livestock, and horticulture), to understand their structure, performance, and potential for development . The data of study collected from various secondary sources, (CSO, FAO reports, government publications, USAID reports, NGOs reports, journals, and websites) for the period of 2016 - 2017. Lack of sufficient time-series data on crop and livestock production, domestic consumption, exports, and their respective prices made the quantitative evaluation of the sector very difficult. There are serious gaps in the data collected during the years of conflict, and many of the data available are of uncertain quality and contain noteworthy contradictions. The years of conflict saw a dearth of field-based studies on important agricultural issues. Many agricultural activities also failed or were disrupted during the conflicts, leaving few successful models that can be scaled up. Further, the deteriorating security situation greatly limited field trips during the review period.

3. Agriculture Economics Growth

Afghanistan is an agricultural country with 80% of the population lives in rural area. Most of the Afghan economy's output comes from agriculture. Agriculture is the most important sector of the economy, as the majority of the population is dependent on crops and has a long tradition in horticulture and livestock production, including for export. A major part of this production is wheat, and more generally cereals, produced for domestic consumption. The agricultural value added is estimated at Afs 316510 million or about 23% of GDP in 2016-2017 respectively. Overall the Agriculture sector has increased compared to last year by 12.4 percent (World Bank, 2014). The reason for this increase was due to enough rainfall in spring, which effected Agriculture production. Agricultural production in Afghanistan is an almost totally depends on melted snow and spring rains to provide water. The good weather contributed to high cereal production, even in good years. Maximizing growth in agriculture will require investing more in the expansion of irrigated land; improving the conveyance of irrigation water and the on-farm management of this water, and developing services for generating knowledge and disseminating technology. The agriculture sectors share in overall employment in Afghanistan is 60 %. The total officially recorded exports from Afghanistan was USD$ 482 million and imported $ 3.77B, resulting in a negative trade balance of $ 3.29B, during the last five years the exports of Afghanistan products have decreased at an annualized rate of -15.486%, from $ 531M in 2011 to $ 482M in 2016. The major export items were carpets and rugs (17% of the total export of the country), dried fruits 37%, medicinal plants 6%, fresh fruits 5%,

skin 2% and other items 33%. Hence, dry fruits constitute an important export item from Afghanistan. The major export country of Afghanistan is India ($ 220M), Pakistan ($ 199M), Iran ($ 15.1M), Iraq ($10.1M) and Turkey ($ 9.1M).Afghanistan's agricultural products earned a global reputation for excellence, particularly almonds, pomegranates, pistachios, raisins, and apricots. Afghanistan is now re-establishing its place on the international market.

3.1 Contribution to National Income

The financial value of all the finished goods and services produced within the borders of a country during a given period. Although GDP is generally calculated on an annual basis, GDP includes all private and public consumption, government outlays, investments, private stocks, paid construction costs and the foreign trade balance (exports are added, imports are subtracted). Simply put, GDP is a broad measurement of a nation's overall economic activity (Anonymous, 2017). In order to show economic condition in the country, GDP for Afghanistan is compiled into two categories; GDP includes opium and GDP exclude opium. GDP including opium was 1373275 MillionAfs) US$ 20.3 billion (with GDP per capita of Afs 47030 equal to US$ 696. GDP excluding opium was (1333812 Million Afs) US$ 19.7 billion (with GDP per capita of Afs 45678 equal to US$ 676. (CSO, 2017). Table 1 shows the agriculture contribution Gross Domestic Product (GDP) in Afghanistan from 2013 – 2017, while cereals crops contribution is 8.5%, Fruits 3.3 %, livestock 2.9 and others agriculture production is 8.4% in the year of 2017. Table 2 shows the agriculture % GDP growth rate at the constant price from 2015 – 2017, whereas the GDP growth rate in cereals crops is –4.7%, Fresh Fruits 32.1%, livestock 0.2 and others agriculture production is 6.3% in the year of 2017. Table 3 shows the Gross Domestic Product (GDP) Agriculture Activity in Current Price 2015 -2017, as the agriculture production is 316510million Afs (Afghanistan currency) in 2017.

Table 1. Agriculture Contribution as % of GDP

Sector	**2013**	**2014**	**2015**	**2016**	**2017**
Agriculture	**25.4**	**24.7**	**24.1**	**21.8**	**23.0**
1. Cereals	10.6	10.6	11.0	9.7	8.5
2. Fruits	2.4	2.1	2.6	2.5	3.3
3. Livestock	3.1	3.0	3.0	3.0	2.9
4. Others	9.3	9.1	7.5	6.6	8.4

Table 2.Agriculture % GDP Growth Rate at Constant Price

Sector	**2017**	**2016**	**2015**
Agriculture	**12.4**	**-16.9**	**3.7**
1. Cereals	-4.7	-14.2	3.7
2. Fresh Fruits	32.1	7.2	18.9
3. Livestock	0.2	0.4	0.1
4. Others	6.3	-2.2	-14.9

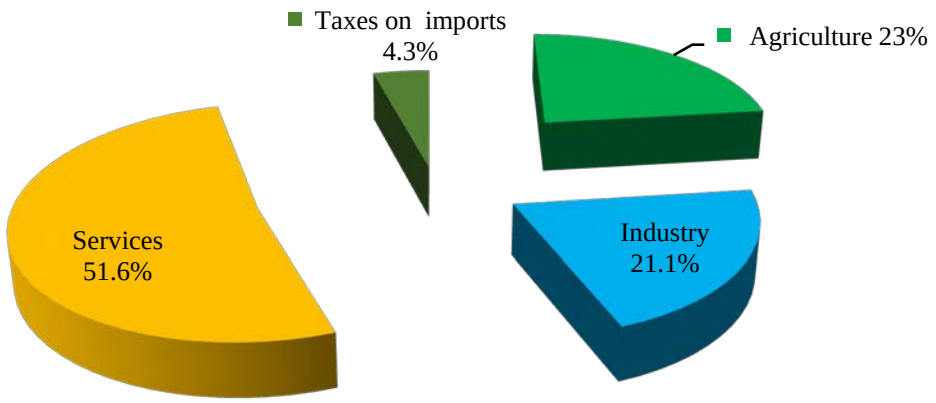
Table 3: Gross Domestic Product in Agriculture Activity in Current Price Figures in Million Afs

Sector	**2017**	**2016**	**2015**
Agriculture	**316510**	**274103**	**294038**
1. Cereals	116568	121693	134306
2. Fruits	44654	31556	31822
3. Livestock	40102	37629	36580
4. Others	115186	83225	91329

Source: Afghanistan Statistic Organization Yearbooks, 2017.

3.2 Sectoral Contribution GDP

Agriculture sector in Afghanistan contributed 23% to the Gross Domestic Product (GDP), while industry contribution is 21.1%, Services 51.6% and tax on imports 4.3% as shown in Figure 1.



Source: Afghanistan Statistic Organization Yearbooks, 2017

Figure 1. Sectoral Contribution GDP

3.3 Food Supply Source

Agriculture is the essential source of food supply for all countries, whether they are underdeveloped, developing or even developed in the world. The table 4 shows the quantity of cereals crops production (tons), the total average cereals crops production are 6.189 tons in Afghanistan between 2013 -2017. In 2017, cereal production for Afghanistan was 5.525 million metric tons. The deceleration in growth was primarily driven by the decline of the agriculture sector. Wheat is a major crop for food. Every year cultivated on irrigated and rainfed area the average wheat production in 2013-2017 was4.96 million tons. The average of rice production was 0.463 million tons which decreased in 2017 by 13.03% compared to previous year. This decrease in production was due to a decrease in the area of cultivation. The average production of barley was 0.448 million tons compared to last year decreased by 25.09% and maize production was 0.313 million tons. The production of both rain-fed and irrigated wheat, which account for almost 80 percent of Afghanistan's entire output of cereals, fell, mainly due to low rainfall. By contrast, the fruit output increased by around 7 percent. In 2017, the production of cereals declined by an additional 2.1 percent, with the per hectare yield of wheat falling by 8 percent due to crop diseases and pests.

Table 4. Cereals Crop Production Tons

Indicator	2017	2016	2015	2014	2013	Average
Total cereal	**5525177**	**5802040**	**6744259**	**6507329**	**6364000**	**6188561**
Wheat	4555110	4673040	5370259	5169235	5050000	4963529
Rice	356565	410000	537000	512094	500000	463132
Barley	301856	403000	521000	514000	504000	448771
Maize	311646	316000	316000	312000	310000	313129

Source: Ministry of Agriculture, Irrigation, and Livestock

Table 5 shows the crop yield of agricultural products(Kg/Ha), the total average wheat production is 2067 Kg/Ha, rice 2646 Kg/Ha, barley 1442 Kg/Ha, maize 2229 Kg/Ha, potato 12894 Kg/Ha, sugar beet 9184 Kg/Ha, sugar cane 16963 Kg/Ha and almond 1779 Kg/Ha in Afghanistan between 2015 - 2017.

Table 5. Crop Yield of Agricultural ProductsKg per/ Ha

Indicator	2017	2016	2015	Average
Cereal				
Wheat	1980	2196	2024	2067
Rice	2996	2500	2441	2646
Barley	1377	1429	1521	1442
Maize	2052	2146	2488	2229

Source: Ministry of Agriculture, Irrigation, and Livestock

3.3.1 Livestock

The livestock sub-sector is another key component in Afghanistan's economy; livestock currently contributes about 15 percent of agricultural GDP. Afghanistan exports some livestock products mostly skins, wool, and cashmere. Livestock Products such as wool, milk, meat, skin, and fat are an important source of income for the farmers and a good food source for the farmer households. Based on the last three years reports by the ministry of agriculture, irrigation, and livestock, the average numbers of animals are cattle's 5.2 million, sheep 13.3 million, goats 7.4 million, camel 0.17 million, horse 0.17 million, ass 1.4 million and chickens 11.9 million.

Table 6. Livestock Stock by Type of Animal Figures in Thousand

Animal	2017	2016	2015	Average
Cattle	5234	5261	5349	5281
Sheep	13265	13218	13485	13323
Goat	7448	7723	7059	7410
Camel	170.5	170	171	170.5
Horse	171.2	173	171	171.7
Ass	1472	1481	1441	1464.7
Mule	24.9	24.5	24	24.4
Chicken	11899	11863	11098	11620

Source: Ministry of Agriculture, Irrigation, and Livestock

3.3.2 Horticulture

Horticulture subsector plays a vital role in providing livelihood to the farmers; horticulture contributes 34 percent of agricultural GDP. The major fruit varieties are apple, pomegranates, apricots, mulberries, grapes, and almonds. Fruit cultivation area was 181 thousand hectares. However, orchards products are the major source of income for farmers in many areas of the country, and the majority of large and medium-sized orchards are exclusively for markets.According to the ministry of agriculture, irrigation, and livestock, the fruit production in the year of 2017 was 1.2 million tons, whereas production of vegetables was 427.9 thousand tons,Potato and onion are major vegetables they are specially used for food in the country.

Table7. Fruit Production and Area

Nuts	Products (ton)	Area (hectare)
Peach	15306	3110
Almond	32843	19481
Pomegranate	99871	9721
Apple	140903	19365
Grape	874541	82450
Walnut	6515	3949
Potato and beet	429499	96946
Potato	427917	35699
Sugar beet	1582	202
Sugarcane	17364	1333

Source: Ministry of Agriculture, Irrigation, and Livestock, 2017

3.3 Job Creation and Well-Being of Rural Populations

In Afghanistan, more than 60% of the total labor force is dependent on agriculture. Agriculture provides large-scale employment opportunities for rural people in underdeveloped and developing countries. It is an important source of livelihood. Typically, landless workers and marginal farmers are engaged in non-agricultural jobs such as handicrafts, furniture, textiles, leather, processing industries, and in other service sectors. To raise the agricultural surplus caused by increasing agricultural production and productivity tends to improve social well-being, particularly in rural areas.

4. Conclusion

From the explanation of above conclude that the agriculture plays an important role in the economic development of a country. It has already made an important input to the economic prosperity of advanced countries and its role in the economic development of the least developed countries is the essential importance. “The increase in agricultural output and the rising per capita income of the rural community, as well as industrialization and urbanization, leading to an increased in the demand for industrial production"(Gradinaru & Mocuta, 2017). Agriculture provides employment opportunities for rural people on a large scale in underdeveloped and developing countries. It is an essential source of livelihood. Theagriculture sector development ofwould tend to increase the farmers purchasing power, which will help the growth of the non-agricultural sector of the country. It will provide a market for increased production.

Investment in research, extension and irrigation infrastructure is key to transforming the agricultural sector in Afghanistan. The role of the government is to improve research stations, which play a significant role in the development of new varieties to increase productivity, shelf life, and marketability. The extension is the key to disseminating new technology among farmers through field days and demonstration programs. Improving irrigation infrastructure and on-farm water management will help farmers achieve self-sufficiency and productivity.

References

Diao, X., Hazell, P. B., Resnick, D., & Thurlow, J. (2007). *The role of agriculture in development: implications for Sub-Saharan Africa* (Vol. 153). Intl Food Policy Res Inst.

Jalal, A. & Ward, M. (2011) Afghan Agricultural Economy Update: Afghanistan.

World Bank (2014). *Afghanistan: Pathways to Inclusive Growth.* Washington, DC: World Bank.

Samuel Hall Consulting, 2012.“Social Assessment of the National Horticulture and Livestock Project.” Kabul: Samuel Hall Consulting.

World Bank, (2014). Islamic Republic of Afghanistan Agricultural Sector Review. Revitalizing Agriculture for Economic Growth, Job Creation, and Food Security. The government of Afghanistan, 2008. Afghanistan National Development Strategy: Agriculture and Rural Development. Kabul.

Quddus, M. A. (2009). Roles of Agro-Industry in Bangladesh Economy: an Empirical Analysis of Linkages and Multipliers. *Bangladesh J. Agric. Econs*, 31-48.

Goeldner, K. (2004, December). Roles and opportunities for rural credit initiatives in Afghanistan's opium economy.In*Workshop Paper* (Vol. 2).

Deininger, Klaus, 2014. "Securing land rights for smallholder farmers." In P. Hazell and A. Rahman (eds.), *New Directions for Smallholder Agriculture*. Oxford: Oxford University Press.

De Weijer, F. (2005). "National Multi-Sectoral Report on Kuchi." Kabul: Afghanistan Ministry of Rural Rehabilitation and Development.

GovernmGSMA Intelligence, 2014.Measuring mobile penetration. *"Untangling subscribers, mobile phone owners and Users"*.

Poulton, C. and Lyne, M. (2009). "Coordination for market development." In J. Kirsten, A. Dorward, C. Poulton, and N. Vink, eds., *Institutional Economics Perspectives on African Agricultural Development.* Washington, DC: International Food Policy Research Institute, http://www.ifpri.org/sites/default/files/publications/oc61abr_0.pdf.

Samuel Hall Consulting (2012). "Social Assessment of the National Horticulture and Livestock Project." Kabul: Samuel Hall Consulting.

USAID (2010)."Assessment of Agricultural Research in Afghanistan."Kabul: USAID. USAID (2012). "Land Reform in Afghanistan: Gender Assessment." Kabul: United States Agency for International Development.

The government of Afghanistan, Ministry of Agriculture, Irrigation, and Livestock (MAIL), (2009). Change Management Program Document. Kabul: MAIL, April.

The government of Afghanistan, Central Statistics Organization (CSO).(2016). Agriculture Development. Kabul: CSO.

Anonymous (2017). Gross Domestic Product (GDP) - Investopedia, IncURL (access date: 31.01.2018). https://www.investopedia.com/terms/g/gdp.asp#ixzz55mlmaa9R

Gradinaru, I., & Mocuta, D. (2017). Farm Structures In The European Union. *Growth, 17*(1).

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IMPORTANCE AND CHALLENGES OF SUSTAINABLE CONSUMPTION

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Abstract

Nowadays concept of sustainability has changed significantly – more and more attention is focused on social welfare, its preservation and increase; besides the issue of production and use of resources. Therefore these purposes are also the ultimate goal of sustainable consumption. To achieve these goals, however, the contribution of all economic actors is also necessary – sustainable consumption is unimaginable for example without education and awareness raising on sustainable consumption and lifestyles providing consumers with adequate information. Furthermore, it is essential to create a value system and infrastructure – as the contribution of the public sector – or developing effective, knowledge based technologies and products from the side of businesses or different other stakeholders. Hence, it also requires a systemic approach and cooperation among actors operating in the supply chain, from producer to final consumer in order to achieve the Sustainable Development Goals determined by the United Nations. Considering the efforts made since the 1990's in the interests of sustainable consumption, we conclude there is no unified action to facilitate the change of consumption patterns and, on the other hand, the progress made so far is actually marginal.

The current paper is intended to summarize the most important related literature and provide a better understanding of sustainable consumption and its challenges through the global consumption trends. This study focuses mainly on Sustainable Development Goals of the United Nations in the context of its challenges in the near future. Moreover, the expected result of this present paper is to investigate the responsibility of the different economic actors and their further contributions to sustainable consumption.

Keywords: Sustainable consumption, consumer behaviour, challenge, sustainable development goals, contribution.

1. Introduction

Since the 1980's, the concept of sustainability has been given more and more attention and also changed considerably – the researchers have started to focus on social welfare, its preservation and enhancement. Among other things, the above mentioned areas have become the ultimate goal of sustainable consumption. To achieve these goals, however, the contribution of all actors in the economy is essential: for example, the change of consumption patterns towards sustainability is unimaginable withouteducation, knowledge transfer and awareness raising. On the other hand it is essential to create an appropriate value system and infrastructure (ie. the contribution of the public sector) or developing effective technologies and products(from side of businesses).

Through the information society came to the fore, and all elements of our environment change rapidly, knowledge transfer has a continuously increasing role – not only in our daily life but in long term consumer patterns. Due to the changing and expanding concept of sustainability researchers determined and evaluated new sub-dimensions which are significantly connected to the economic and social well-being. However, looking at the efforts made since the 1990's in the interests of sustainable consumption, we conclude that, on the one hand, there is no integrated and unified measure to promote the change of consumption patterns and, on the other hand, the progress made so far is marginal. Global consumer patterns show that our behaviour has become more and more unsustainable.

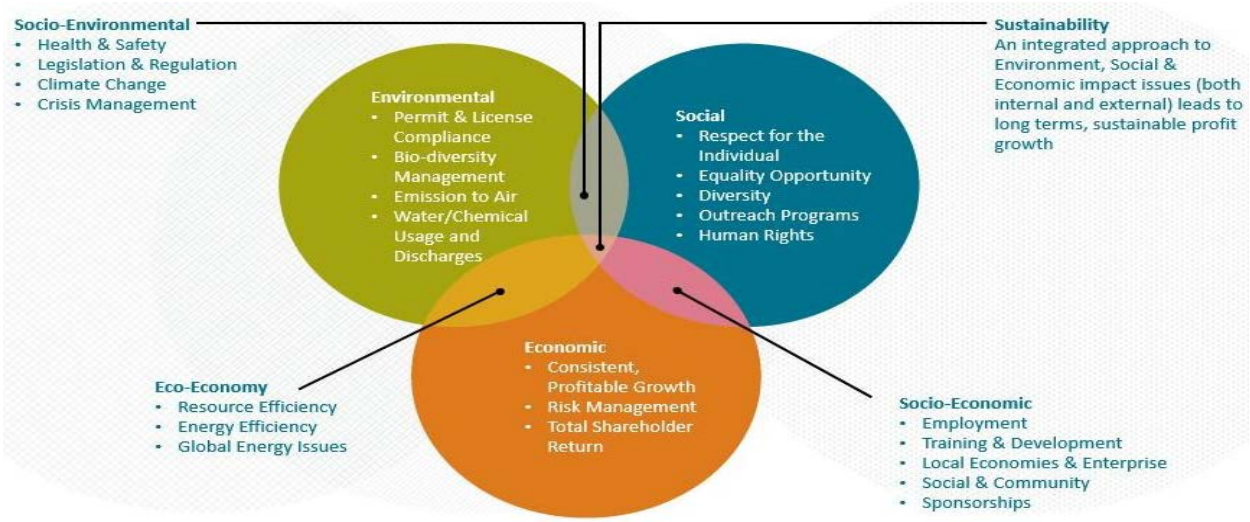
Therefore, it can be clearly seen that a number of critical areas has to be changed to find the most appropriate solutions.

The main objective of this paper is to summarize the most relevant literature in order to find the relationships among the sustainable consumption and production, the reformulated sustainable development goals and the global consumption patterns focusing on the example of water as a natural resource. Moreover, the study also offers a brief introspection into the responsibility and contribution of the different economic actors towards the long-term sustainability.

2. Sustainable Development

2.1 Changing Concept of Sustainable Development

In order to understand the role of sustainable consumption and its challenges in achieving the reformulated sustainable goals of the United Nations, it is essential to know the most relevant definitions and relationships in this particular area. In the last few decades, attention to sustainability or sustainable development is increasing – more and more researchers started to deal with this area.Original definition of sustainability derives from the Brundtland Report of 1987 which determined sustainable development as the "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." (WCED, 1987). Similarly to the original concept, major part of researchers evaluate the sustainability in a traditional way – they start out from the side of production and use of resources, and are mainly connected to its different dimensions. For example, Daly (1996) defined sustainable development as "development without growth beyond environmental limits." Keszi Szeremlei and Magda (2015) provided a wider description, however, still remaining the production side – according to them sustainability comprises of production and utilization that are sustainable from environmental, social and economic aspects as well as of the highest level of energy efficiency that current technology allows.



Source: Adapted from Barcan (2016).

Figure 1. Pillars of Sustainability

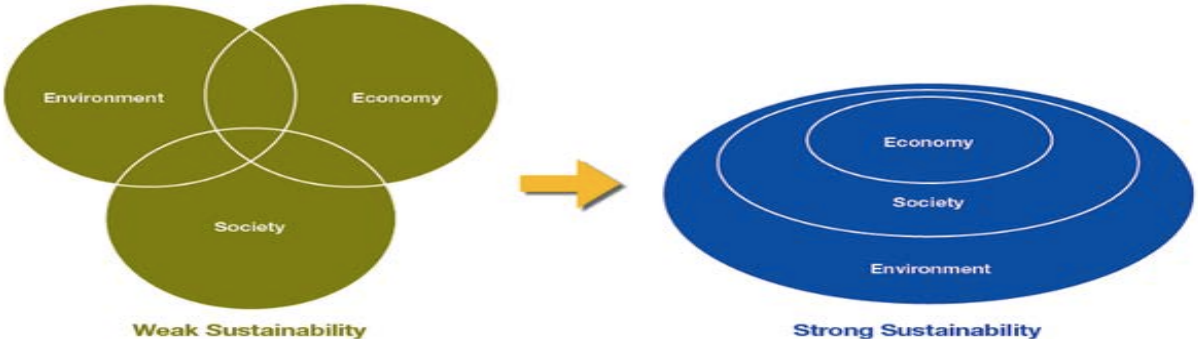
Nevertheless, recently a more practical and detailed approach has spread which said that sustainability is simply the ability to continue a well-defined behaviour indefinitely without the degradation of natural, physical, human, and intellectual capital (Crittenden et al. 2011). According to Meadows et al. (2015) one of the reasons and also the result of sustainability is the diversity both in nature and society. Despite of many different definitions it is clear that sustainability is universally thought to have the following three components as pillars: environment, society and economy. Moreover it is also true, that nowadays researchers have not been talking about only three main categories, but also the following sub-dimensions can be evaluated (as can be seen in Figure 1) –

expanding the original structure and starting out from the side of consumers:

- socio-economic: thecommon section of social and economic dimensions e.g. jobs creation, trainings, business ethics, sponsorships etc.,
- socio-environmental: the common section of social and environmental dimensions e.g. health&safety, climate change or crisis management,
- eco-efficiency or eco-economy: the common section of economic and environmental e.g. resource efficiency, energy efficiency or life-cycle management.

2.2 Weak and Strong Sustainability

Nowadays sustainable development has two different approaches or interpretations: weak and strong sustainability (see Figure 2). Above mentioned categorization – which can be seen in Figure 1-, belongs to the weak sustainability which means that economic and environmental considerations are equally taken into consideration in the decisionmaking process. It assumes that natural capital and manufactured capital are essentially substitutable and considers that there are no essential differences between the kinds of well-being they generate. In contrast, strong sustainability does not allow substitutability between natural capital and produced capital (either physical or human)(United Nations, 2013).



Source: Adapted fromHart (2017).

Figure 2. Two Different Interpretations of Sustainability

Pelenc et al. (2015) summarized the main differences between strong and weak sustainability based on the research of Mancebo (2013), as can be seen in Table 1.

Table 1. Main Differences between Strong and Weak Sustainability

	Strong Sustainability	**Weak Sustainability**
Key Idea	The substitutability of natural capital by other types of capital is severely limited.	Natural capital and other types of capitals (manufactured etc.) are perfectly substitutable.
Consequences	Certain human actions can entail irreversible consequences.	Technological innovation and monetary compensation for environmental degradation.
Sustainability Issue	Conserving the irreplaceable stocks of critical natural capital for the sake of future generation.	The total value of the aggregate stock of capital should be at least maintained or ideally increased for future generation.
Key Concept	Critical natural capital.	Optimal allocation of scarce resources.
Definition of Thresholds and Environmental Norms	Scientific knowledge as input for public deliberation (procedural rationality).	Technic/scientific approach for determining thresholds and norms (instrumental rationality).

Source: Adapted fromPelenc et al. (2015).

2.3 Sustainable Development Goals

Moreover, planning for sustainability requires the use of programmatic approaches and strategies that favor long-term program maintenance (Shediac-Rizkallah and Bone, 1998), thus, the sustainable development is a long term strategy for the humanity – both individually and organizational level. Furthermore, national governments and international institutions can try to influence the behaviours and habits of people towards sustainability through the education and awareness raising also. Due to the unsustainable behaviour, Sustainable Development Goals (SDGs) were reformulated by the United Nations in 2015 (Global e-Sustainability Initiative 2017). The 17 redefined Sustainable Development Goals can be seen in Figure 3.

Source: United Nations (2015).

Figure 3. Sustainable Development Goals

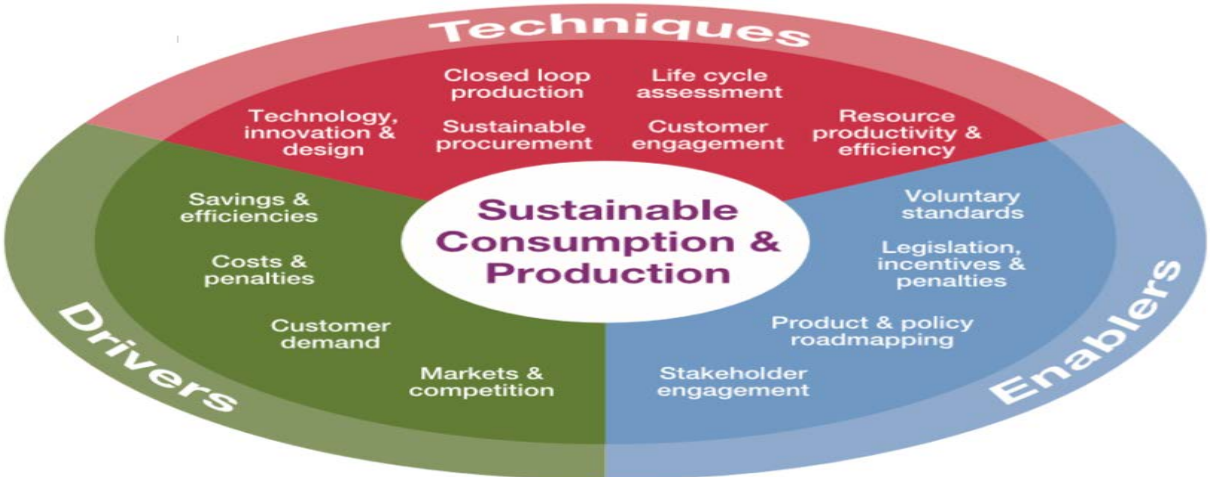
3. Sustainable Consumption

Promoting sustainable consumption and production are important aspects of sustainable development, which depends on achieving long-term economic growth that is consistent with environmental and social needs (OECD, 2008). More and more international policy organizations and national policy makers have become to recognize and realize that current consumer patterns and habits are not ecologically sustainable anymore (Lim, 2017). Nevertheless, policy makers across the world are facing the challenge of encouraging people to engage in sustainable consumption behaviour (Sharma and Jha, 2017).

Original working definition of sustainable consumption proposed by the Soria Moria Conference (1994) as “the use of goods and services that respond to basic needs and brig a better quality of life while minimising the use of natural resources, toxic materials and emissions of waste and pollutants over the life cycle, so as not to jeopardise the needs of future generations” (UNCSD, 1994).

Based on the study of Sharma and Jha (2017) who summarized the most relevant approaches of sustainable consumption, there are some researchers who determine sustainable consumption behaviour as an act of voluntary simplicity or anti-consumption (Shaw and Moraes, 2009; Black, 2010) whereas others explain it as the adoption of green lifestyle practices (e.g. Gilg et al., 2005). Diverse views make sustainable consumption behaviour a complex phenomenon to explain and predict. According to some marketers and policy makers it is necessary to understand social and institutional actions that may encourage the progress of environment-friendly behaviour among consumers (Vlek and Steg, 2007; Phipps et al., 2013). Others have proposed an exploration of the role of personal values in influencing sustainable behaviours (Thøgersen and Ölander, 2002; Grunert and Juhl, 1995; Sener and Hazer, 2008). According to Zukin and Maguire (2004), consumption is a social, cultural and economic process of choosing goods which enables consumers to form and express their identity.

According to Sabapathy (2007) the essential challenge of sustainable consumption and production is how to de-link economicdevelopment from environmental degradation, in order to operate within the limits of the planet's ecosystems. Meeting this challenge will require technological innovation, rethinking current business models and political determination. The Author also summarized the most important drivers, enablers and techniques of sustainable consumption in Figure 4 (Sabapathy, 2007).



Source: Sabapathy (2007).

Figure 4. Techniques, Drivers and Enablers of Sustainable Consumption

As the main environmental consequences of unsustainable consumption, the resource abrasion, the excessive environmental pollution, hence the Earth's waste disposal capacity and the loss of biodiversity can be described. However, the unsustainable mode of consumption (both under-consumption and over-consumption) is not only an environmental problem, but it has also a number of unfavorable effects of social level:

- According to the Human Development Report published by UNEP in 1998, as a result of studying consumer patterns, emphasized that the security of the environment and the local economy in the under-consuming countries greatly influences the stability of food supply, which may have a serious impact on the frequency of poverty and the deterioration of the poor population (UNEP, 1998).
- Nevertheless, the over-consumption, which is associated with the short lifecycle of the products, also can lead to cultural endowment (UNEP, 2001).

It can be stated with confidence that unsustainable consumption has also an economic cost, as the economy relies on the ability of environment that provides it both natural resources and healthy human resources. If they are not solved or not insured, they have a significant impact on the efficiency and competitiveness of the economy (Csutora and Hofmeister-Tóth, 2011).

4. Global Consumption Trends and Challenges

The Oxford Commission's Sustainable Consumption forecasts has already warned in 2002 that current consumption is unsustainable because:

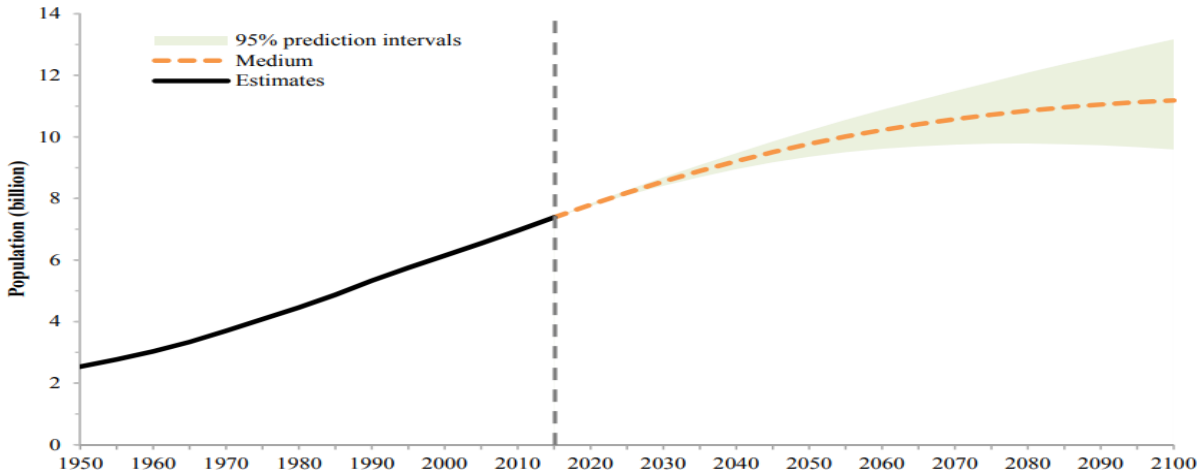
- Increasing consumption in industrialized countries does not increase the quality of life of the population, while the cycle of "work and shopping" only increases stress and dissatisfaction.
- The distribution of current consumption patterns is unfair among countries due to the large and ever increasing differences in income and quality of life.
- Increasing global environmental impacts are associated with the spread of resource-based consumption (Michaelis, 2003).

The different international policy organizations have already summarized the most important global consumer trends, however, this study is exclusively focusing on demographic changes, environmental degradation and changing economic factors as the key challenges of the sustainable consumption:

4.1 Demographic Changes

- World population growth

Nowadays, the world's population is continuously growing. Figure 5 demonstrates that the global population reached 7 billion in 2011 and it is growing by 1.10% per year, yielding an additional 83 million people annually. The world's population is projected toincrease by slightly more than one billion people over the next 12 years, reaching 8.6 billion in 2030, andto increase further to 9.8 billion in 2050 and 11.2 billion by 2100. Africa and Asia are expected to be the largest contributors to future growth (United Nations, Department of Economic and Social Affairs, Population Division, 2017).



Source: United Nations, Department of Economic and Social Affairs, 2017.

Figure 5. World Population Growth

- Increasing longevity and growth of life expectancy - globally, life expectancy at birth rose by 3.6 years between 2000-2005 and 2010-2015, or from 67.2 to 70.8 years. Furthermore, it is projected to rise from 71 to 77 years by 2050. Future growth will be influenced not only by future levels of fertility, mortality, and migrationbut also by the current age distribution of the world's population (United Nations, Department of Economic and Social Affairs, Population Division, 2017).

4.2 Economic Challenges

- Globalization

Considering the rapidly and continuously changing business environment, the impacts of globalization and digitalization, staying competitive is a great challenge. In the new, knowledge-based economy knowledge transfer has a continuously increasing role – due to the different types of Information and Communications Technologies (ICT) knowledge can be more easily identified, captured, organized, created, learnt and disseminated globally (regardless time and location). At the same time, innovations and technology developments continue to be concentrated in a small number of advanced economies. Moreover, the changes in global production are reflected in changing global trade patterns (United Nations, 2013).

- Financialization

Financial globalization has led to rapidly increasing and more volatile international capital flows, macroeconomic imbalances and more frequent crises (United Nations, 2013).

- Changing Consumer Behaviour and Lifestyle

According to the forecasts, the number of middle-class consumers will rise to three times by 2030 (an additional 2 billion people compared to the current), ie. the middle class will account for 80% of the total population. Two-thirds of the world's population is currently supplied by low-income consumers whose consumption structure based on the food with highest weight (WBCSD, 2008).

4.3 Environmental Degradation

One of the most important challengesrelated to the natural resources is the scarcity. Some of these resources have a limited quantity, and it is the common responsibility of the different economic actors to solve the problem. The influence and change of the different economic actors' behaviour will have an impact to all key pillars of sustainability. For example, more fruit and vegetable consumption requires us to produce more products which would lead to the needs of more water, more soil and land which is not possible without significant environmental effects and these effects react to the health condition again (as a loop). Similarly, long term lifestyle changes would require more technological developments and also several sub-political interventions would be essential in the economy in the future. However this section will exclusively focus on the water and its relation to the sustainability, as an example of natural resources.

According to the United Nations (2015) water is at the core of sustainability and is critical for socio-economic development, healthy ecosystems and for human survival itself.Water is also vital for adaptation to climate change, serving as the crucial link between the climate system, human society and the environment. The most important facts, trends and challenges are listed below:

- Today, more than 1.7 billion people are living in river basins where water use exceeds recharge, leading to the desiccation of rivers, depletion of groundwater and the degradation of ecosystems and the services they provide.
- Global water demand is estimated to increase by 55% by 2050. Similarly, by 2025, two thirds of the world's population could be living in water-stressed countries if current consumption patterns continue.
- The economic loss from the inadequate delivery of water and sanitation was estimated to amount to 1.5% of GDP.
- 80% of wastewater is discharged without treatment.
- 748 million people still do not have access to an improved drinking water source and 2.5 billion people will be without access to improved sanitation.
- Water-related disasters are the most economically and socially destructive of all natural disasters.
- If we look at the different sectors' contribution, it is obvious that agriculture is by far the thirstiest consumer of water globally, accounting for 70% of water withdrawals worldwide. By 2050, world agriculture will need to produce 60% more food globally, and 100% more in developing countries. Therefore, more consumption will require more water that will have other environmental impacts also. Industry and energy sectors account for 20% of water demand. More-developed countries have a larger proportion of freshwater withdrawals for industry than less-developed countries, where agriculture dominates. Domestic sector accounts for 10% of total water use.

5. Opportunities for the Future – Contribution of Economic Actors

5.1 Responsibility of Individuals

There is no doubt that the key of sustainable consumption is the consumer itself and the conscious consumer behaviour. Environmental awareness characterized by Zsóka (2007) through ecological knowledge, environmental values, attitudes and willingness to act. Health conscious behavior involves all consumer attitudes, behaviors, behaviors and activities that aim to achieve a longer and healthier life, whether taking health considerations into decision-making, conscious nutrition, healthy lifestyle, or healthcare informed consumer behaviour (WHO, 2016).

Environmentally conscious consumers are able to offset some of their environmental impacts by purchasing green products. Individual eco-conscious behaviors and strategies may be more moderate in terms of environmental exposure than non-environmentally behaviors, however, this cannot fully counterbalance the environmental impacts determined by the socio-economic structure and the income level, which means that consumers with higher incomes often cause greater environmental impacts and larger ecological footprint. Similarly, the environmental impact of higher-income countries is

largerdespite that their citizens are more environmentally conscious and their environmental policies are more developed.

The following list written by Trott (1997) consist of examples of opportunities to raise the awareness of individuals:

- Education and training

The relationship between education and sustainable development is complex. Generally, researchers stated that basic education is the key to a nation's ability to develop and achieve sustainability targets (UNESCO 2005). The concept of Education for Sustainable Development (ESD) was mentioned and firstly discussed at the World Summit on Sustainable Development held in 2002. According to UNESCO (2005) ESD consists of the following five elements:

- education that allows learners to acquire the skills, capacities, values and knowledge required to ensure sustainable development;
- education dispensed at all levels and in all social contexts (family, school, workplace, community);
- education that fosters responsible citizens and promotes democracy by allowing individuals and communities to enjoy their rights and fulfil their responsibilities;
- education based on the principle of lifelong learning; and
- education that fosters the individual's balanced development.

- Human health

Improved health, building health awareness, or health promotion and disease prevention enable us to reduce the need to consume health product and services and enhances our ability to participate in society.

- Motivation

Due to the widespread use of social media, health 2.0 is now commonly used terminology. Last few years brought the phenomenon and use of the social media to the mainstream of health communication, information generation and dissemination. Similarly, the patients have been becoming from to information generators and sharers from the simple consumers of Internet content. The commercial operations can help the organizations to make their consumers more conscious and motivated both in their family life and during their work.

5.2 Responsibility of Businesses and their Stakeholders

Making consumption more sustainable will require changes to the systems in which businesses and government operate: a change to much longer time horizons than most businesses and governments currently consider; changing accounting systems to account for externalized costs; and changing accounting systems to capture measures of human well-being and the degree to which society's goals are met through economic activity, as opposed to merely measuring the volume of economic activity (Allaway and Kochan, 2012). It can be clearly seen that the role of government and non-governmental organizations and other businesses is also huge in the development of sustainable consumption - changing the individual consumption patterns requires different government measures. Policy makers need to design their programs and communication strategies such that they are more efficient and effective (Sharma and Jha, 2017). There are many tools available to policy makers from soft, influential measures (such as guidelines, corporate reports) to hard, coercive measures (compulsory rules, laws etc.). The following list summarizes the most frequently used examples:

- marketing devices – information leaflets, campaigns, media and advertising, PR, labeling of goods, recommendations etc.
- regulation – different laws, compulsory standards, licenses, international agreements, national policies, sectoral policies etc.
- financial devices – taxes (e.g. eco-taxes), supports, other fiscal measures. For example the national government can support and stimulate the use of different renewable resources such as the use of sun collectors in Hungary.
- through the physical structures
  - urban design: land use planning has emphasized the rate of urban and suburban areas and nature.

- transportation systems – for example, it is necessary to deal with the pollutants of the huge number of cars worldwide and providing infrastructure such as appropriate public transport.
- resource management – extensive extraction and use of natural resources (minerals, water, land and air) result in a perceived right to free access and use, thus pollution and waste etc. that require greater consumption to mitigate (Trott, 1997).

- CSR (corporate social responsibility) – through innovation, choice influencing (use of marketing and awareness-raising campaigns), choice editing (the removal of unsustainable products and services from the marketplace).

6. Conclusion and Recommendations

Likely, the most important challenge to sustainable development to have arisen in the last decades is the unfolding global ecological crisis that is becoming a barrier to further human development. From an ecological perspective, the sustainable development efforts have not been successful yet. Based on the related literature and global consumer patterns it can be stated, on one hand, there is no integrated and unified measure to promote the change of consumption patterns and, on the other hand, the progress made so far in the last few decades is marginal. The abovementioned consumer patterns can be modified several ways. Primarily, due to the scarcity of natural resources the price is continuously increasing that stimulates people to save, thus influences the consumers' habits and behaviours. Secondly, different measures of the governments or education can promote the awareness of the population.

The present work also supported the importance of the different economic actors in contribution to the sustainable consumption. Global consumer patterns demonstrate that our current consumption is unsustainable, therefore a number of critical areas has to be changed to find the most appropriate solutions.

References

Allaway, D. and Kochan, L. (2012). Literature Review: Key Challenges in Sustainable Consumption. (Accessed: 2018.03.10). Retrieved from: http://www.oregon.gov/deq/FilterDocs/2050-KeyChallengesSustCons.pdf

Barcan, C. (2016). How to Identify Your Brand's Sustainable Pathway. (Accessed: 2018.03.05). Retrieved from: http://www.vinylinfo.org/news/how-identify-your-brand%E2%80%99s-sustainable-pathway

Black, I. (2010). Sustainability through anti-consumption. Journal of Consumer Behavior 9(6): 403-411.

Crittenden, V. L., Crittenden, W. F., Ferrell, L.K., Ferrell, O. C., and. Pinney C. C. (2011). Market-Oriented Sustainability: A Conceptual Framework and Propositions. Journal of the Academy of Marketing Science 39: 71-85.

Csutora, M. and Hofmeister-Tóth, Á. (2011). Sustainable consumption? The economic questions of sustainable consumption (in Hungarian). Budapest: Aula Kiadó.

Daly, H. E. (1996). Beyond Growth: The Economics of Sustainable Development. Boston: Beacon Press.

Gilg, A., Barr, S. and Ford, N. (2005). Green consumption or sustainable lifestyles? Identifying the sustainable consumer. Futures 37(6): 481-504.

Global e-Sustainability Initiative (2017). Summary Report. #SystemTransformation. How digital solutions will drive progress towards the sustainable development goals. (Accessed: 2017.09.17). Retrieved from: http://systemtransformation-sdg.gesi.org/160608_GeSI_SystemTransformation.pdf

Grunert, S. C. and Juhl, H. J. (1995). Values, environmental attitudes, and buying of organic foods. Journal of Economic Psychology 16(1): 39-62.

Hart, M. (2017). Sustainable measures. (Accessed: 2017.10.10). Retrieved from: http://www.sustainablemeasures.com/node/26

KesziSzeremlei, A. and Magda, R. (2015). Sustainable production and consumption, Visegrad Journal on Bioeconomy and Sustainable Development 42: 57-61.

Lim, W.M. (2017). Inside the sustainable consumption theoretical toolbox: Critical concepts for

sustainability, consumption, and marketing. Journal of Business Research 78: 69-80.
Mancebo, F. (2013). Développement durable. Arman Colin, 2ème edition: Paris.
Meadows, D., Randers, J. and Meadows, D. (2005). The limits to growth after 30 years (in Hungarian). Budapest: Kossuth Kiadó.
Michaelis, L. (2003). The Oxford Commission on Sustainable Consumption. Journal of Cleaner Production 11: 931-933.
OECD (2008). Promoting Sustainable Consumption. (Accessed: 2018.03.20). Retrieved from: https://www.oecd.org/greengrowth/40317373.pdf
Pelenc, J. Ballet, J. and Dedeurwaerdere, T. (2015). Weak Sustainability versus Strong Sustainability. (Accessed: 2018.03.20) Retrieved from: https://sustainabledevelopment.un.org/content/documents/6569122-Pelenc-Weak%20Sustainability%20versus%20Strong%20Sustainability.pdf
Phipps, M., Ozanne, L., Weaver, T. et al. (2013). Understanding the inherent complexity of sustainable consumption: A social cognitive framework. Journal of Business Research 66(8): 1227-1234.
Sabapathy, J. (2007). Sustainable Consumption and Production. Cambridge: University of Cambridge
Sener, A. and Hazer, O.(2008). Values and sustainable consumption behavior of women: A Turkish sample. Sustainable Development 16(5): 291-300.
Sharma, R. and Jha, M. (2017). Values influencing sustainable consumption behaviour: Exploring the contextual relationship. Journal of Business Research 76: 77-88.
Shaw, D. and Moraes, C. (2009). Voluntary simplicity: An exploration of market interactions. International Journal of Consumer Studies 33(2): 215-223.
Shediac-Rizkallah, M.C. and Bone, L.R. (1998). Planning for the sustainability of community-based health programs: conceptual frameworks and future directions for research, practice and policy. Health Education Research 13 (1): 87-108
Thøgersen, J. and Ölander, F.(2002). Human values and the emergence of a sustainable consumption pattern: A panel study. Journal of Economic Psychology 23(5): 605-630.
Trott, M. (1997). Sustainable Consumption: Issues and Challenges. (Accessed: 2018.03.30). Retrieved from: http://www.indeco.com/pdfs/sc.pdf
UNCSD (1994). Report of the Commission on Sustainable Development on its Second Session. New York: Press of United Nations.
UNESCO (2005). UNESCO and Sustainable Development. Paris: UNESCO
UNEP (1998). Human Development Report 1998. New York: Oxford University Press.
UNEP (2001). Consumption Opportunities: Strategies for Change — A report for decision-makers. Paris, United Nations Environmental Programme, Geneva, 69p.
United Nations (2013). World Economic and Social Survey 2013: Sustainable Development Challenges. New York: United Nations Publications.
United Nations (2015). Water and sustainable development. (Accessed: 2018.03.28). Retrieved from: http://www.un.org/waterforlifedecade/water_and_sustainable_development.shtml
United Nations Department of Economic and Social Affairs (2017). World Population Prospects: The 2017 Revision, Key Findings and Advance Tables. Working Paper No. ESA/P/WP/248
Vlek, C. and Steg, L.(2007). Human behavior and environmental sustainability: Problems, driving forces, and research topics. Journal of Social Issues 63(1): 1-19.
WBCSD (2008). Sustainable Consumption Facts and Trends from a Business Perspective. (Accessed: 2017.01.05)Retrieved from: http://www.wbcsd.org/Clusters/Sustainable-Lifestyles/Resources/Sustainable-Consumption-Fact-and-Trends-From-a-Business-Perspective
WCED (1987). Report of the World Commission on Environment and Development: Our Common Future. p. 43.
WHO (2016). Health Impact Assessment. (Accessed 2016.10.05). Retrieved from: http://www.who.int/hia/evidence/doh/en/
Zukin, S. & Maguire, J.S. (2004). Consumers and consumption. Annual Review of Sociology 173-197.
Zsóka, Á. N. (2007). The prerequisite of sustainable consumption: the environmental conscious sustainable consumption. In: Gulyás, E. &Vadovics, E. (eds.) FenntarthatófogyasztásMagyarországon 2007. Budapest.

EFFECT OF FARM SERVICE CENTRE (FSC) PROGRAM ON AGRICULTURAL PRODUCTION TECHNOLOGIES ADOPTION IN KHYBER PAKHTUNKHWA, PAKISTAN

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Abstract

The insignificant contribution of conventional agricultural extension program has diverted policy makers' and researchers' attention towards testing the effectiveness of new programs for improving crops production and farmers' welfare. The government of Khyber Pakhtunkhwa (KP) has started a new Farm Service Centre (FSC) program for providing a platform to farming community to resolve their common issues. This study investigated the effect of Farm Service Centre (FSC) program on farmers' adoption of high yielding certified wheat varieties (HYWV) in Khyber Pakhtunkhwa, Pakistan. A sample of 336 wheat growers from Northern, Central and Southern climatic zones of Khyber Pakhtunkhwa was selected using multi-stage stratified random sampling technique. The selected wheat growers were interviewed face to face for data collection using pretested questionnaire. A binary logistic regression model was used to quantify the effect for FSC program on the adoption of HYWV and identify and controls the effect of other important determinants. Results confirm that membership in FSC is the most important determinant, and its marginal effect value of 0.42 suggests that farmers having membership in FSC are 42 percent more probable to adopt HYWV as compared to others. Head's education level and farmland size are other important variables having positive significant effects on adoption of HYWV. Based on these findings the study recommended rural educational program for farmers' awareness of FSC program. The study also recommended the development of less costly formal education facility for rural community and effective extension system for quick dissemination of information on modern agricultural technologies.
Keywords: Farm service centre, wheat crop, logistic regression & modern agriculture technologies.

FACTORS OF MIGRATION IN AGRICULTURAL AREAS

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Abstract

This paper provides empirical evidence of the factors of migration in agricultural areas in Hungary. We will analyse the most important factors which cause internal migration in rural parts of Hungary. Source of data is the *Territorial Information System* database,which is available in settlement level at the Hungarian Statistical Office. We find that people have a better intention to migrate when dissatisfied with life and life circumstances. On one hand, our selection focused on those settlements, where there is a significant agricultural area available in terms of land use, and on the other hand, where there is significant income of local individuals have income from agricultural activities. The socio-economic variables and macro-economic conditions directly or indirectly affect the intention to migrate to other cities or settlements of the country. This paper analyses general tendency experienced in the changing rural-urban profile of Hungary and explores the major determinants and factors causing the population flow from one place to another within the country. Other less developed countries facing the same problem, although the patterns, level and consequences of internal migration in Hungary differs from others. We study the most essential variables in our analysislike unemployment and other well-being indicators. At all levels of life satisfaction, individuals with similar characteristics have greater intentions to migrate from rural areas to urbanised cities, which negatively effects the labour force of agriculture too. In terms of model, we did regression analysis in order to see which factors have significant effect on migration and create the clusters to identify the group of settlements. And our findings explain the determinant factors causing outmigration from agricultural areas of Hungary based on socio-economic variables and macro-economic conditions.
Keywords: Internal migration, social economic factors, regression.

1. Introduction

Transition to market economy has been accompanied with rapid urbanization in Hungary. That is, the major industries were established or moved to cities and towns, particularly to the eastern part of the country, which led to significant income gaps between rural and urban areas and forced the population to move from rural to urban centres. To be clearer, the development of the western cities leaded to move the eastern part of Hungary from the rural areas populationto urban parts, who were suffering from a lack of employment and income opportunities, unfavourable infrastructure and little access to basic public services, to the relatively developing urban centres, especially to the capital city - Budapest.

Rural-urban migration in Hungary has been accompanied with mostly negative also less positive consequences for the areas of origin and destination. That is, in the short run, the rural-urban migration has helped to alleviate poverty by creating new income and employment opportunities for rural

population, facilitating rural-urban economic and social integration and motivating the expansion of urban sectors, while in the medium run, this steady migration process has led to overpopulation, congestion, unemployment, pollution and poverty in urban areas and depopulation, gender and age imbalances and decrease in productivity in rural areas.

The state organization has estimated that the rural-urban profile of the country has been significantly changing in the recent years. According to the data provided by Territorial Information System (TEIR) organization, more than half of the total population of Hungary lives in urban areas, and most of them reside only in the capital city at present (TEIR). That is, irregular urbanization process is characteristics for the case of Hungary, which creates serious problems for the capital city, such as overpopulation, congestion, pollution, and unemployment. At the same time, rural-urban migration which mainly involves the most active and youngest group of rural population leads rural areas to a more stagnant situation. Considering that most rural migrants are employed in temporary urban sectors such as private sector and construction, the underdevelopment of other sectors, particularly traditional rural sectors, can have significantly negative consequences for the country in the long run.

This paper explores the major determinants and factors causing the population flow from one place to another within the country. We review the country-specific patterns, determinants of internal migration in Hungary.The study underlines that managing rural-urban migration is important from the viewpoint of reducing regional disparities and achieving socio-economic development of the country.

2. Literature Review

As rural-urban migration has been experienced in some countries at different levels of their process, the literature has given extensive work on migration, its driving, determinants and results. Rural-urban migration has been widely studied by economists, sociologists, demographers, regional scientists and geographers from different perspectives, and various theories, models and approaches have been introduced and developed. Some of these theories, such as the models introduced by Arthur Lewis (1954) and Michael Todaro (2003), explain rural-urban migration from urban perspective and consider the movement of population from rural areas to urban centres because of high income differentials between stagnant rural sectors and developing urban sectors. Everett Lee (1966), who goes beyond pure economic factors highlighted by Lewis (1954) and Todaro (2003), explains rural-urban migration both from rural and urban perspectives. Lee (1966) determines push (unemployment, lower income, little access to basic public services, conflicts in rural areas) and pull (employment opportunities, higher incomes, better provision of basic public services in urban areas) factors causing rural-urban migration.

Some studies have dominated the most important pressure, factor-pulling factors (perception of high wages) of economic drivers (rural credit failure, unemployment, ineffective land, general rural poverty). Also, a few studies suggest that rural-urban migration is facilitated by the concentration of migrants of same origin in the destination city (Mora and Taylor, 2005).

Gugler and Flanagan (1978), Fields (1975) suggested an inclusion in the HarrisTodaro model of the differential access to information for rural workers and urban residents, the cost of living, and education levels when computing the probability of a migrant securing an urban job. To understand people's movement that occurred in the country in the beginning, it is important to study migration patterns. Arzaghi and Rupasingha (2013) argued that urban rural migration has occurred due to diversification. Iversen (2006) in terms of rural urban migration, argues that a model for internal migration is a dynamic transition. The reasons of migration are social network, multipliers, spillovers, and caste affinities and the job opportunities in urban areas.

Rural urban migration in developing countries, according to the scientist Mc Catty (2004), there are two types of migration-volunteer forces and involuntary forces - these forces due to both push-pull migration forces located in these countries. Among the volunteer forces there are business opportunities,education, health facilities, per capita income, high living standard higher transportation facilities, etc., and among involuntary forces, there are strikes, political disputes with its neighbours when moving, ignorance, lack of natural disasters, etc.

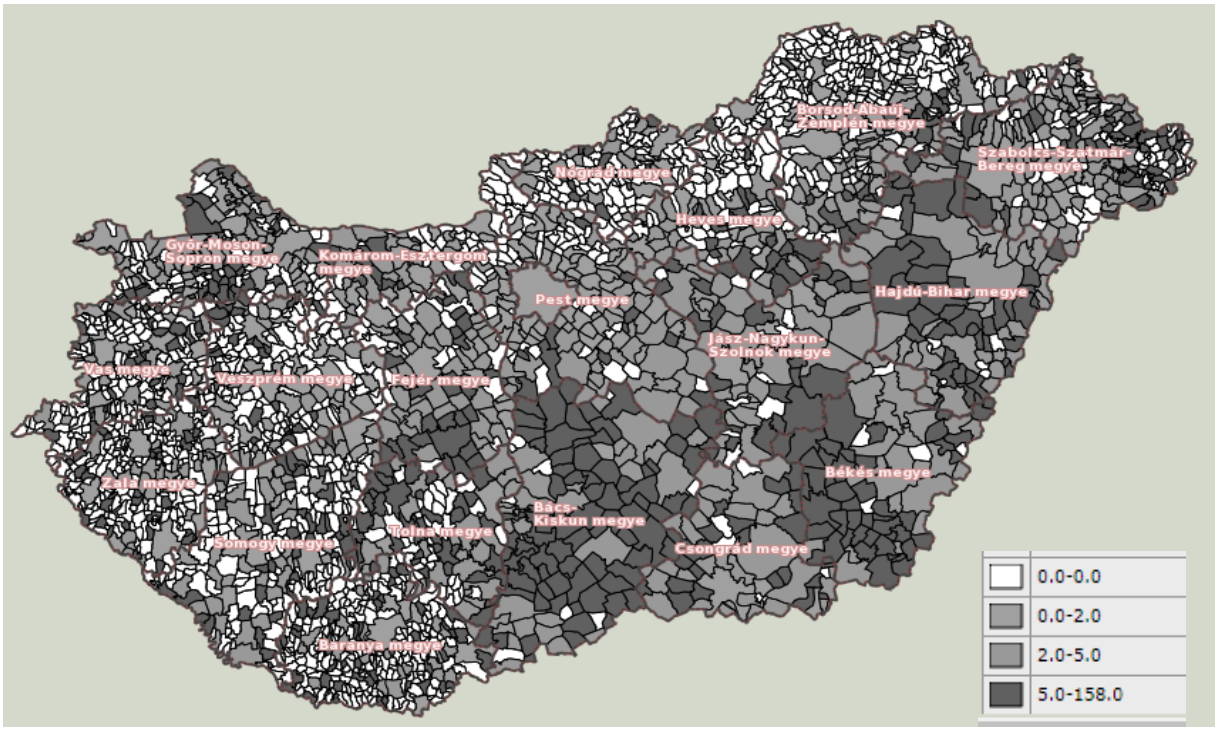
On the other hand, there are limited available studies in Hungary regarding the migration in agricultural areas. Our study will be focused on factors and determinants of internal migration in

Hungary. We will analyse the socio-economics variables to investigate that what are the drivers of the moving individualsare.

3. Data and Methods

The data of the following analysis is derived from the National Regional Development and Territorial Information System (TEIR) database. The data provided by the Central Statistical Office of Hungary have been downloaded on settlement level. We used the most recent territorial data from 2016. In this analysis, we investigate the out-migration factors of agricultural areas of Hungary.

In order to select agricultural settlements, the most important characteristic is to have a decent agricultural area within the settlement. In terms of agricultural land use, an area can be agricultural land, forest, reed, and fishery too. Agricultural land, includes arable land, gardens, vineyards, fruitery and grasslands. 81% of the total area of Hungary is used for agricultural purposes (including reed, forests and ponds), 60% is used strictly as agricultural land, from which 90% of arable land, which is half the total territory.



Source: Own construction based on TEIR database.

Figure 1. Number of Primary Producers to 1000 Inhabitants in Settlements of Hungary, 2016

Selection of agricultural settlements was carried out in two-step method. On one hand, our selection focused on those settlements, where there is a significant agricultural area available in terms of land use, and on the other hand, where there is significant income of local individuals have income from agricultural activities. In other words, the first criteria was to have an agricultural land in the settlement, and here we were focusing on arable land only, since the majority of the agricultural production is done on arable land, most of the agricultural income is coming from arable land use. In addition to the arable land use criteria, we added another essential item, which we believe is also important in characterising agricultural settlements, which is number of agricultural smallholders (primary producers) in the settlement, whose income comes from agricultural production. Figure 1 shows the density of primary producers across Hungary. Darker colour shows more producers per 1000 inhabitant.

Out of 3152 Hungarian settlements, there are 1470 where agricultural primary producers are present, they have income from this agricultural activity. Among these, 78 settlements has agricultural

land lover that 10% of the total territory, these settlements were not included in our analysis. The remaining 1392 settlements were classified into three categories somewhat agricultural settlement, rather agricultural settlement and highly agricultural settlement according to its agricultural area of 10-30%, 31-55% and 56% respectively.

The proportion of arable land is also consistent with the obtained agricultural categories. Non-agricultural settlements may have arable land, but since there are no primary agricultural producers in the settlement and there is no income from primary agricultural production, these settlements are not subject of this research.Table 1 shows the decomposition of Hungarian settlements based on the above mentioned agricultural aspects. Further analysis will include the 566 highly agricultural settlements of Hungary.

Table 1. Number of Settlements in each Settlement Category

	Frequency	Percent
Non-agricultural settlements	1760	55.8
Somewhat agricultural settlements	342	10.9
Rather agricultural settlements	484	15.4
Highly agricultural settlements	566	18.0
Total	3152	100.0

Source: Own calculation based on TEIR database.

With our analysis, we are investigating the threats which may cause the outmigration from the highly agricultural settlements of Hungary. We performed a multiple regression analysis in order to study individual effects of the studied factors on the out-migration. In this analysis we use the rate of out-migrants compared to the total population of each highlyagricultural settlement in 2016 as a dependent variable. Our factors are chosen based on literature research and the general assumptions about normality, multicollinearity and homoscedasticity. The independent variables are the number of cars per 1000 inhabitants (2016), the number of available kindergarden places per 1000 inhabitants (2016), number of registered for-profit organisations per 1000 inhabitants (2016), rate of higher educated among the total population within the region (2016) and rate of registered long-term jobseekers among the population (2016).

With the above listed variables we investigate some of the important external factors why the agricultural areas suffer out-migration in Hungary. Number of cars per inhabitant is highly correlating with the most complex development indicators (Bíró−Molnár 2004, Faluvégi 2004), therefore, our intention with this indicator is to study how the general well-being of the inhabitants is effectingout-migration. The number of for-profit organisations is referring to the economic potential and the willingness for entrepreneurship. The rate of higher educated people within the region, we believe, clearly reflect the social capital potential of the region as well as innovation potentials. Nevertheless, we believe that educated people attract more educated people and the presence of higher educated people in a small settlement help the fulfilment of local interests.

For a more reliable result, outlying cases (3 interquartile range) have been removed from the analysis.

4. Results

According to our research there is considerable internal migration in the country, and people migrate to where quality of life is expected to be better. Outmigration from agricultural areas of Hungary endangers the agricultural production, while depopulation results in lack of workforce too. To understand the determinants of out-migration from agricultural settlements, we present our result of the regression analysis.

Table2. Socio-Economic Factors of Out-Migration in Highly Agricultural Settlements in Hungary – Multiple Regression Model Results, 2016

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	4.278	1.373		3.116	0.002
Cars per 1000 inhabitant	0.012	0.003	0.168	3.561	0.000
Rate of higher educated	-0.053	0.045	-0.053	-1.161	0.246
Number of crime per 1000 inhabitant	101,525	18.054	0.253	5.623	0.000
Number of business organisations per 1000 inhabitant	-0.007	0.003	-0.106	-2.442	0.015
Number of kinder-garden places per 1000 inhabitants	-0.091	0.013	-0.290	-6.857	0.000
Rate of long-term unemployment	0.042	0.017	0.102	2.418	0.016

r^2=0.183

Source: Own calculation based on TEIR database.

Our analysis show, that among the six examined variables, five of them has significant effect on the out-migration patterns. Only rate of higher educated within the micro-region seems not to have a significant unique effect on the out-migration. Surprisingly, based on the standardised betas, number of kinder-garden places affects out-migration the most. More places in kinder-garden results in smaller groups, and more attention to the children generally. More places in kinder-garden can literally decrease out-migration. Security of the people in a settlement seems also to be very important in terms of migration decisions. More crime experienced in the settlement – in terms of our results – result in higher out-migration. Nevertheless, higher unemployment is also leading to an increasing out-migration process.

Our second goal was, to create relatively homogeneous groups of agricultural settlements based on those indicators, which are proved to be determinants of out-migration. Based on a hierarchical method, we determined the number of clusters to four. As a next step, four clusters have been created by the K-means clustering algorithm. The result of the cluster analysis can be seen in Table 3.

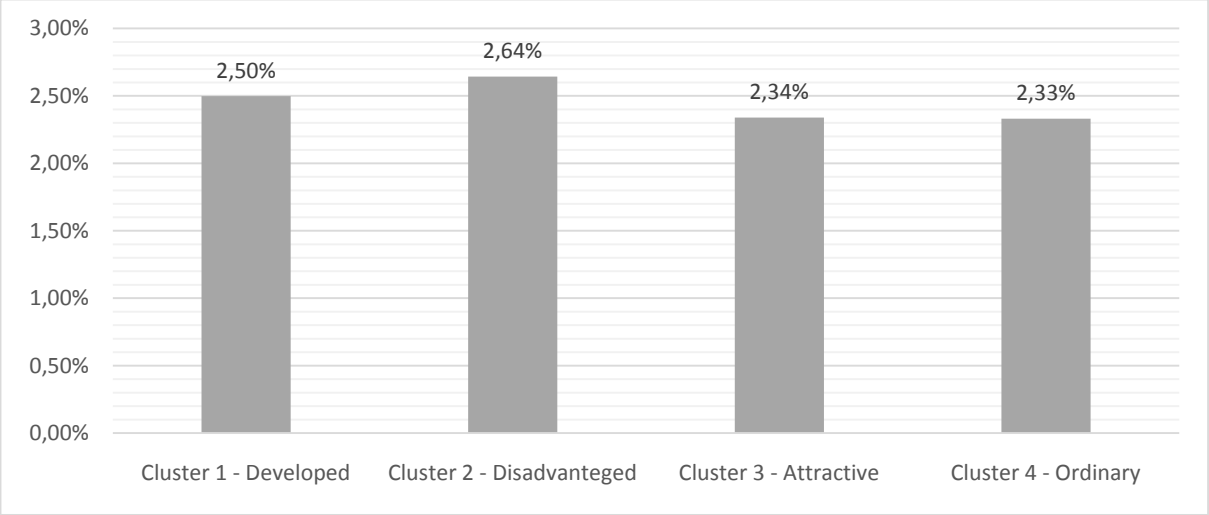
Table 3. Clusters of Highly Agricultural Settlements in Hungary Based on the Main Factors of Out-Migration, 2016

	Cluster 1 Developed	Cluster 2 Disadvantaged	Cluster 3 Attractive	Cluster 4 Ordinary
Number of settlements	*85*	*117*	*158*	*162*
Cars per 1000 inhabitant	390.51	221.14	277.37	335.49
Rate of higher educated	0.0171	0.0232	0.02	0.0182
Number of crime per 1000 inhabitant	0.30	0.26	0.28	0.27
Number of business organisations per 1000 inhabitant	44.37	44.81	40.23	42.45
Number of kinder-garden places per 1000 inhabitants	24.51	22.79	25.5	26.42

Source: Own calculation based on TEIR database.

Cluster analysis results show that there are significant differences between the homogeneous groups of settlements. Cluster 1 is outstanding in its high cars per inhabitant, and in its high economic potential, since we can observe the highest number of business organisations in this group. This reflects high well-being, where the high well-being implies with high good economic and livelihood potentials. In contrast to this, cluster 2 is associated with low well-being and low economic potentials, which is implying low security to the citizens. Cluster 3 is different form cluster 2, that these settlements have the lowest kinder-garden facilities, which, as we assumed, reflects the well-being of the youngest generation of the settlement. Cluster 4 is ordinary in terms of most indicators. We named the groups of settlements as developed, disadvantaged, attractive and ordinary, respectively.

In the next section we are studying the out-migration characteristics of these above-mentioned groups. The out-migration data is presented based on the aggregate number of out-migrants compared to the aggregate total population in each cluster. Our data is referring only to internal migration.



Source: Own calculation based on TEIR database.

Figure 2. Rate of Out-Migrants Compared to the Total Aggregate Population in each Cluster, 2016

Not surprisingly, the disadvantaged cluster has the highest out-migration data (Figure 2). These settlements suffer from depopulation, which also affects the available work-force in these regions. It is a general phenomenon is the disadvantaged regions of Hungary, that agriculture lacks experienced work-force. Being a disadvantaged agricultural settlement is cause and consequence of high out-migration.

5. Conclusions

Based on given data and variables, most of them have significant effect on out migration from rural areas. Interestingly, most affecting variable is experienced kindergarden which means that households take into consideration to decide to out migrate to provide better socio-economic conditions for their children. On the other hand, as it is mentioned in table 2, that other indicators explain our model in terms of determining the migration factors.

Therefore, clustering the settlements illustrates the characterise of the residential and differences of the areas based on the given data and variables as it shows in table3. Cluster 1 is with high economic condition, although the out-migration rate is not the lowest here. Not surprisingly, the disadvantaged cluster has the highest out-migration data.

References

Africa Gugler J Flanagan W, (1978). Urbanization and social change in West Publisher: Cambridge University Press pp: 235

Arzaghi M Rupasingha, (2013). A migration as a way to diversify: evidence from rural to urban migration in the US. Journal of Regional Science vol: 53 (4) pp: 690-711

BíróPéter, Molnár László, (2004): A kistérségiszintűrelatívfejlettségmeghatározása-Determining relative development in micro-regions, Területi Statisztika, 22 p.

Blaskó, Zs., Ligeti, A.S. and Sík, E, (2014). Magyarokkülföldön – Mennyien? Kik? Hol? (Hungarians abroad – How many? Who? Where?). In TársadalmiRiport 2014. Eds.: Kolosi, T. and Tóth, I.Gy., Budapest, TÁRKI, 351–372

Faluvégi Albert, (2004). A társadalmi-gazdaságijellemzőkterületialakulásaésvárhatóhatásaiazát menetidőszakában-Changes and possible effects of socio-economic characteristics within the transition period, Hungarian Academy of Sciences, Institute of Economics, Discussion Papers, MT–DP.

Lee, S.E., (1966). Theory of Migration. Demography, vol.3, No-1, University of Pennsylvania

Lewis, W.A, (1954). Economic development with unlimited supplies of labour. The Manchester School of Economics & Social Studies, 22, 139-192.

McCatty, M, (2004), The Process of Rural-Urban Migration in Developing Countries. Carleton University, Ottawa, Ontario.

Mora, J. and J.E. Taylor, (2005). Determinants of Migration, Destination and Sector Choice: Disentangling Individual, Household and Community Effects. In ÇaglarÖzden and Maurice Schiff, Eds., International Migration, Remittances, and the Brain Drain. New York: Palgrave Macmillan.

Population Association of America, 47-57

Territorial Information System https://www.teir.hu/

Todaro, M.P. and Smith, S.C., (2003). Economic Development. Boston: Addison Wesley 50 p.

POLISH AND TURKISH SMES TOWARDS CSR AND SUSTAINABLE DEVELOPMENT CHALLENGES

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Abstract

In this period of global economic integration, corporate social responsibility emerges as an important and necessary concept in terms of sustainable economic development. Corporate social responsibility provides the firm with global competitive advantages, enabling the employment of qualified labor force. Although Milton Friedman argued that an enterprise would not have a social purpose other than profits, corporate social responsibility would have to be a social responsibility. It has been accepted by the companies as an effective way to cope with the social, economic, political and environmental problems starting with industrialization.

Business is more and more involved in achieving sustainable development goals. The importance of socially responsible practices in building a competitive advantage on the market and creating innovative solutions is increasing.

The aim of the article is to present the results of research on the issue of corporate social responsibility in the field of entrepreneurship of small and medium enterprises in Poland and Turkey. The detailed objectives of the conducted research are:

- the level of knowledge of entrepreneurs from the SME sector on CSR,
- recognition of the approach (differences and similarities) to the implementation of CSR solutions in the surveyed enterprises.

The research covered enterprises of the SME sector in Poland in the Masovian Province and Turkey in the Antalya and Mersin regions.

Quantitative surveys were used within the quantitative methods, which were carried out by the authors of this study in January and February 2018.

The article is a contribution to further research on the relations of CSR strategies conditioned by the historical and cultural differences of both countries. In the SME sector, the strategy is still little known. Entrepreneurs are more and more often implementing CSR solutions specific to their strategies, thus benefiting from specific benefits. Factors such as: strengthening the brand's reputation, attracting and retaining talented employees, increasing efficiency, meeting society's expectations, protecting the natural environment, creating new business opportunities are highlighted. as: increased trust in the company on the market, energy saving, employment of better quality human capital, improvement of economic results

Keywords: Sustainable development, market, environment, employees, society.

ANALYSIS OF SWOT AND EFFECTIVENESS OF FARMER FIELD SCHOOLS (FFS)'S PROGRAMS ABOUT DEVELOPING IPM IN IRAN

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Abstract

Integrated pest management with farmer field school approach (IPM/FFS) as an approach of the participatory extension, several years in order to protect the environment and control pests and plant diseases in in the country's agricultural sector is ongoing. The main objective of this study was to evaluate for extension programs field school on the promotion of knowledge, skills and attitude of farmers participating in the program compared with farmers participating in courses traditionally is teacher-centered. In the other study, to assess the strengths, weaknesses, opportunities and threats extension programs IPM/FFS as SWOT analysis were the views of experts and facilitators. Survey research is based on correlative-descriptive method with comparison approach. The study population consisted of two distinct groups of farmers. The first group of participants in courses FFS and the second group, participant's extension is traditionally teacher-centered that number 97 of the first group and the second group of 98 were randomly selected. Information through questionnaires and interviews with farmers and facilitators of discussions with experts and participating in programs of IPM/FFS, were collected. Face validity, by experts and agronomists, and reliability with Cronbach's alpha coefficient (0.79-0.91), were approved. The results showed that the indexes the knowledge, skills and attitude of farmers participating in extension programs IPM/FFS were more than teacher-centered extension courses, and its differences in the level of one percent error (P=0.01) is significant. Analysis of SWOT related to the extension programs IPM/FFS showed that the best strategy for the development of these programs, is competitive strategy, that should be applied, all strengths and capabilities IPM/FFS's programs to deal with the possible threats.
Keywords: Attitude, effectiveness, FFS/IPM, knowledge, skills, SWOT.

1. Introduction

During the 1960s, it became clear that excessive use of pesticides and other chemicals can not only cause resistance of new emerging new generations of pests, but also threat factory environmental sustainability and human health. To prevent the phenomenon of pests and diseases resistance to the effects of chemical pesticides, researchers sought to replace controlling biotic factorswith chemical pesticides. In this regard, integrated pest management (IPM) as an ecological strategy was proposed that was based largely on natural control factorssuch as natural enemies of pests, and it seeks controlling tactics that create the least disturbance in these factors as possible.The success of extension participatory-oriented approaches such as farmer field school (FFS) with the support of FAO since late 1980s in Indonesia and Thailand and other South East Asian countries increased paying attention to participatory approaches in integrated pest management (Amiri Ardekani, 2009). Integrated pest management approach with farmer field school (IPM/FFS) approach emphasizes on four important principles t including healthy crop production, protection of natural enemies of pests, regular monitoring on fields and conversion of farmers to pest management through getting their activeparticipation consent (Brown *et al*., 2000). Integrated pest management with approach of farmer field school (IPM/FFS) contributed to compatibility of activities and outcomes of the research, extension and agricultural development systems with the actual conditions of farmers and rural communities by focusing on farmer participation and by institutional coordination and integration of activities, design, implementation and evaluation of programs in farmers conditions and by using local

facilities and resources reduce inefficiency in the use of crisis causing resources in systems of extension and research and provide opportunity for these systems to allocate their resources more effectively (Rizal, 2010). In this regard, following welcome of global approach of IPM/FFS, Iranian agricultural extension authorities used this approach in the implementation of integrated pest management (IPM) projects in different regions of the country on several products since 2002. Furthermore, with the development of educational and extension programs of Integrated pest management with approach of FFS not only the knowledge of farmers increased, but also because of the participatory nature of these programs, the skills of farmers on integrated pest management increased and by repeating these programs, attitude of farmers to pest management issues will improve naturally.

Education and extension programs of IPM in light of government policies in the field of sustainable agriculture and an emphasis on production of healthy products in different cities of Kohgiluyeh-va-Boyerahmad (KB) province and with the aim of extension of integrated management of pests and its gradual change towards a comprehensive management of protection of product and an attempt to promoting production of healthy products and sustainability of production sources was implemented since 2005-2006 on the products of apple, citrus and corn, which in the next few years, the number of sites and variety of products increased. Since the principle of these programs with the approach of the farmer field school is an exported proposal, it will be faced with the problems and issues. Therefore, the main problem of this study is whether the new approach implemented in KB province compared to past educational and extension methods is effective in improving knowledge, skill and attitudinal dimensions of farmers or not.

2. Research Objectives

a)Comparison the knowledge, skill and attitude levels of farmers of participant group in IPM/FFS and those who did not participate.

b) SWOT's analysis and determining the strengths, weaknesses, opportunities and threats of the IPM/FFS from the perspective of agricultural extension experts and researchers.

3. Review of Literature

Several studies in the world and Iran examined the effectiveness of the FFS approach that are briefly discussed here.

Mancini *et al*. (2008) examined the impact of the FFS approach on social and environmental sustainability of cotton fields in the State of Indian Pradesh Andera. In this study,it is stated thatusing FFS by cotton farmers in this State caused that their needed information to be transferred easily and chemical consumption to decrease increasingly, while product yield did not reduce. Yang *et al*. (2008) also examined the impact of FFS method on integrated management training of pests and small farmers in China. The result of this study shows significant progress in knowledge of pests of vegetables, natural enemies of the pests and ecology of diseases among farmers who participated in farmer field school, while this progress was not seen in the traditional educational methods. Studies conducted by Davis *et al.* (2009) in Africa suggest that the courses of IPM/FFS by enhancing the information of farmers not only to increase yield and reduce the use of pesticides, but also it was associated with great movement in the development of sustainable agriculture.

Van Doren study (2003) also showed that this approach had significant role in increasing the information of Cambodian rice farmers to comprehensive field management so that by using it, product yield of these farmers increased by 50% in short term. Study of Chi *et al* (2004) in Vietnam suggests that accurate observation and practical experience of farmers during the IPM/FFS had no much impact in increasing their information and caused change in attitudes about appropriate use of insecticides. David (2007) showed that social skills and communication skills, such as increased self-esteem, leadership of school groups in the field, listening to the words of others and respect for there are obtained following attending farmer filed school classes.

Ghorbani Pir Ali Dehi*et al*. (2011) in a study entitled examining the effectiveness of the farmer field approach among gardeners of Kermanshah showed that the farmer field school leads to improved knowledge, improved attitudes, skills, and wishes of participating gardeners compared to non-

participating gardeners.The researchers recommended the development of this approach is other cities of Kermanshah. Ghane *et al.*, (2010) evaluated the effectiveness of integrated cotton pest management courses from the perspective of farmers city of Garmsar city showed that most of studied subjects know these courses useful. The most important introduced effects include removal of chemical pesticides from pest control system and the use of resistant cultivars in planting stage and the effectiveness of biological methods in human health. Furthermore, the results showed that there are significant positive relationship between personal variables such as age, work experience and education level and the variables of knowledge, attitudes and skills. Aghapour Sabbaghi and Mousavi (2011) conducted a study entitled investigating the success of farmer field in increasing efficiency of Hamidieh wheat farmers.

Mirzaee *et al.* (2010) conducted a study entitled farmer field school project impact on increasing the palm farmers' information of integrated management issues.The results showed that the mean difference of farmers' information of IPM/FFS and their counterparts who were trained using teacher-centered approach with the possibility of one percentage of error was significant. In other words, the first group farmers with principal usingof participatory learning had more information about integrated pest management issues compared with another group. Furthermore, the correlation results showed thatexperience of palm planting, education, attending in meetings and age of studied group and their information level of IPM issues have significant positive relationship. According to various researchers, the effectiveness of farmer field school program at areas of knowledge, skills and attitudes has been assessed and evaluated, but they have not been conducted in a coordinated and cohesive form. The present study with the aim of filling this information gap seeks to examine the effectiveness of farmer field school approach in the dimensions of knowledge, skill and attitude and to identify the effective factors in this regard.This information can play rolein making decision relating to the continuation or cessation programs and adjusting some of these goals.

4. Materials and Methods

4.1 Validity and Reliability

Assessing the validity of indices and the items in the questionnaire after several stages was finally revised by specialists and it was confirmed finally using face validity.To determine the reliability of the questionnaire, a pilot study was performed and the reliability of the questionnaire was assessed by Cronbach's alpha test. Thus, a pilot study with 25 questionnaires was used as base to assess the reliability. It should be noted that Pedhazur (1982) considered the reliability between 0.5 and0.8acceptable for non-experimental research. In this study, obtaining alpha coefficient between 0.79-0.91 for different scales of the questionnaire indicated the appropriate reliability of questionnaire designed (Table 1).

Table 1. Displays of Cronbach's Alpha Coefficients for Scales of Measuring Tool

Scales of meaning tool	Number of items	Cronbach's Alpha coefficients
Effectiveness of IPM/FFS Programs	12	0.914
Measuring the knowledge of farmers of IPM issues	10	0.790
Measuring the skill of farmers of IPM issues	11	0.858
Measuring the attitude of farmers of IPM issues	9	0.887

4.2 Sampling Method and Statistical Analysis

Sampling method is this study is Krejcie and Morgan (1970) method. First, a list of all participants in in extension classesof farmer field school plan IPM/FFS was taken from Jihad agricultural organization extension management of province. Accordingly, total number of farmers continuously participated in these classes was 135 people. Based on the sampling method, 97 people were randomly selected. The number of people participated in teacher-centered classes was 98 people selected randomly. In the next step, according to the characteristics and addresses of these people taken form extension management, the required information was obtained by the questionnaire completion and

interview. For the analysis of data in this section, descriptive statistics such as mean, standard deviation, and to describe and categorize the indexes, interval of standard deviation from the mean (ISDM) were used. In the analytical section,independent t-test and Kruskal-Wallis (K-W) test were used. Data processing was performed with use of SPSS software package.

4.3 Analysis of SWOT[1]

In the qualitative part of the study, we evaluated SWOT analysis of FFS/IPM programs. SWOT's technique is one of the management tools used to evaluate internal factors (weaknesses and strengths) and external factors (opportunities and threats) that affect a system (Kurtilla *et al*., 2000). This tool is ultimately used to measure the situation and formulate a strategy or strategy to guide and control the system. SWOT's technique was first proposed by Albert Humphrey, professor at Stanford University, during the conferences held between 1960-1970 (Humphrey, 2005). He describes the formation of this technique as a result of the efforts of the community of corporate planners to identify the causes of the failure of the corporate planning style during this period and to find solutions to its problems. The statistical population of this section includes all experts, researchers and facilitators who were directly and indirectly involved in FFS/IPM promotion programs in the province. All experts and facilitators tried to find this and, using a brain storming approach, used their views on a participatory workshop prepared for this purpose. SWOT is the first letters of the English equivalents are four strengths (S), Weakness (W), Opportunity (O) and Threat (T). The conceptual model of SWOT analysis in the system of extension programs for integrated pest management with a school approach at the farm (FFS/IPM) is shown in Figure1:

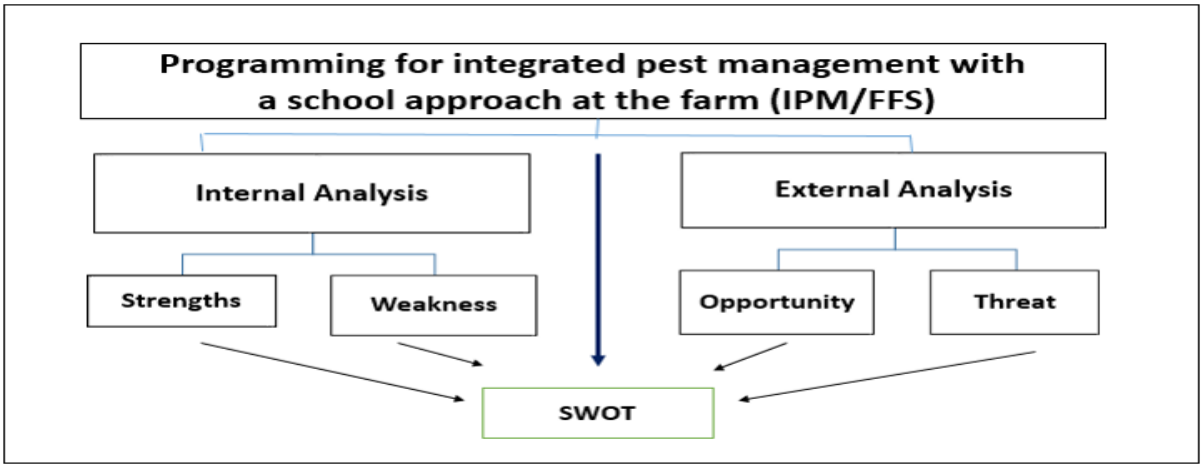

Figure 1. SWOT's Framework for Strategic Planning IPM/FFS

5. Results

5.1 Assessment and Evaluation of Knowledge, Skills and Attitude of Farmers

According to Table 2, the knowledge level of farmers participating in the farmer field school classes with mean of 5.75 was more than teacher-centered group with mean of 5.17 on issues related to the IPM. However, T test results showed that this difference in probability level of (P=0.01) is not significant. In other words, farmers participating in FFS classes compared to their counterparts in the other group have almost the same level of knowledge in integrated pest management (IPM). Skill level of farmers participating in the farmer field school classes with mean of 41 was more than that in teacher-centered group with mean of 33.9. T test results showed that this difference in probability level of (P=0.01) is significant. In other words, farmers participating in FFS classes compared to their

[1]Strength-Weakness-Opportunity-Threats (SWOT)

counterparts in the other group have almost the higher level of technical skill in integrated pest management (IPM) area.

Table 2. Results of Independent T-Test, Comparing the Means of Knowledge, Skills and Attitudes of Two Groups of Learners on IPM Issues

Evaluation İndex	Group	Mean index	T value	df	p-value
Knowledge	Participants in the FFS school program	5.75	1.69	193	0.093
	Participants in teacher-centered program	5.17			
Skill	Participants in the FFS school program	41.0	4.441	193	0.000
	Participants in teacher-centered program	33.9			
Attitude	Participants in the FFS schoolprogram	38.2	6.139	193	0.000
	Participants in teacher-centered program	30.3			

* and ** respectively show significant at the probability level of 5 and 1%

Attitude level of farmers participating in the farmer field school classes with mean of 38.2 was more than that in teacher-centered group with mean of 30.3. T test results showed that this difference in probability level of 99% (P=0.01) is significant. In other words, the overall attitude of farmers participating in FFS classes compared to their counterparts in the other group is higher than that in other group on integrated pest management (IPM) area. Therefore, IPM/FFS approach could take positive steps to change the beliefs and attitude of farmers on integrated pest management.

5.2 Assessment of Environmental Analysis (SWOT)

Based on SWOT's analytical framework for strategic planning of the IPM/FFS promotion programs described in the research methodology (Figure 1), the strengths and weaknesses (internal factors) and opportunities and threats (external factors) related to IPM/FFS promotion programs from the perspective of the experts and facilitators, we are explicitly explaining the following:

5.2.1 Internal Factor Evaluation (IFE)

Internal factors include the strengths and weaknesses that usually originate within the system. Based on SWOT analysis, the initial list of strengths and weaknesses obtained from the questionnaire was first categorized based on their frequency and then again in a collaborative workshop with the presence of experts, facilitators and researchers directly related to the IPM/FFS, these weaknesses and strengths were evaluated and eventually prioritized and ranked. Prioritization was first determined on the basis of the importance coefficient from 1 to 10, and then the numbers were normalized. So that the sum of coefficients is equal to one.The final score is the result of multiplication of the importance factor and rank. The most important strengths and weaknesses of the IPM/FFS promotion programs included in the internal factor assessment matrix, along with their concessions, are presented in Table 3 for use in subsequent analysis and determination of the appropriate strategy.

5.2.2 External Factor Evaluation (EFE)

External factors include opportunities and threats that usually come from outside the system. Based on the Swat analysis framework, the initial list of threats and opportunities obtained from the questionnaire was first categorized based on their frequency and then again in the workshop with the presence of a number of experts, facilitators and researchers directly involved with the IPM/FFS promotion programs All of the threats and important opportunities were evaluated and ultimately prioritized and scored.The most important threats and opportunities of the IPM/FFS promotion programs included in the external factors evaluation matrix, along with their concessions, are set out in Table 4 to determine the appropriate strategy.

Table 3. Internal Factor Assessment Matrix (Strengths and Weaknesses) for IPM/FFS Promotion Programs

Explains the Internal Strategic Factors	Weight Factor (Normalized)	Current Situation Score	Weighted Score
Strengths			
S_1 - Use of native farmers' knowledge and experience	0.077	4	0.308
S_2 - Conducting collaborative work in a practical way in combating pests in fields and gardens	0.077	3	0.231
S_3 - Knowledge transfer from farmers coming to less experienced farmers	0.077	4	0.308
S_4 -Training on the correct implementation of agronomic operations based on the appropriate agronomic calendar	0.069	4	0.276
S_5 - The use of propagators and experts in FFS courses in face-to-face contact with farmers on the farm	0.062	3	0.186
S_6 -Improve the attitudes and insights of the exploiters and enhance the practical skills of combining pests	0.054	4	0.216
S_7 -Training to preserve the natural enemies of pests to control the biological factors of harmful agents and the optimal use of pesticides	0.046	4	0.138
S_8 - Saving on agricultural production costs	0.038	3	0.114
S_9 - The use of farmland as an appropriate training ground	0.031	4	0.124
S_{10} -Continuous training with a short interval to remind previous training in the FFS discussion	0.023	4	0.092
S_{11} -Analysis of the practical activities and inspections carried out on the farm and its accomplishments	0.015	3	0.045
S_{12} -Improving social relations among farmers in the village	0.008	3	0.024
Weaknesses			
W_1 - Failure to implement the FFS program extensively throughout the province	0.077	2	0.154
W_2 - Lack of allocation of credits to the promotion section for the continuous implementation of the FFS program	0.069	2	0.138
W_3 - Lack of necessary equipment and equipment in the pest consolidation campaign	0.062	1	0.062
W_4 - Limit natural enemies to biological control against all the corrosive factors	0.054	2	0.108
W_5 - Failure to implement all the pest control commands for the farmers' lack of information	0.046	1	0.046
W_6 - Disapproval of innovations related to the combating of pests by some farmers	0.038	1	0.038
W_7 - The lack of cooperation of all farmers in the implementation of the Pest Conservation Program	0.031	2	0.062
W_8 - Not receiving all farmers in one area in such programs	0.023	2	0.046
W_9 - Absence of laboratory of pests diagnosis at agricultural service centers	0.015	1	0.015
W_{10} - Lack of continuous viewing of gardens by experts and researchers after the implementation of the FFS scheme	0.008	1	0.008
Total	**1**		**2.739**

Table 4. External Factor Assessment Matrix (Opportunities and Threats) forIPM/FFS Promotion Programs

Explains the External Strategic Factors	Weight Factor (Normalized)	Current Situation Score	Weighted Score
Opportunities			
O_1 - Possibility of production and development of healthy and organic products in the region	0.093	4	0.372
O_2 -To motivate and encourage farmers to apply new farming methods	0.084	3	0.252
O_3 -Reducing diseases in human societies through the use of healthy products	0.075	3	0.225
O_4 -Environmental protection and water conservation for future generations	0.065	4	0.260
O_5 - Increased exports of agricultural products	0.056	3	0.168
O_6 -Investing more and creating jobs in the agricultural sector by leading farmers	0.047	4	0.188
O_7 -The possibility of developing designs in other pilot projects by farmers participating in the scheme for other farmers in the province	0.037	3	0.111
O_8 -Encouragement of young and creative forces towards the agricultural sector	0.028	4	0.112
O_9 - Interaction with research centers and experts from advanced countries	0.019	3	0.057
O_{10} -Creating new jobs, including the production of biological agents (beneficial insects, fertilizers and biological poisoning)	0.009	4	0.036
Threats			
T_1 - Lack of a good market for organic and organic products	0.093	1	0.093
T_2 -Loss of farmers due to crop cuts after implementing the FFS plan	0.084	1	0.084
T_3 -The lack of refrigerator for the storage of healthy and organic products	0.075	2	0.150
T_4 -The lack of packaging and processing equipment for healthy products	0.065	1	0.065
T_5 - Lack of biological agents for the correct implementation of FFS programs	0.056	2	0.112
T_6 -Lack of cooperation and support of banks and financial institutions in the development of the production of healthy products in the agricultural sector	0.047	1	0.047
T_7 -Failure to prolong the FFS plan and eliminate farmers' incentive to combine pests	0.037	2	0.074
T_8 -Lack of effective promotional visits after the implementation of the plan	0.019	2	0.038
T_9 - Environmental factors including temperature and humidity changes	0.009	2	0.018
Total	**1**		**2.462**

5.3 SWOT Matrix Analysis

SWOT's matrix assessment of IPM/FFS's collaborative partnerships showed that the total score of internal factors that manifests itself in the strengths and weaknesses of its system is equal to 2.739 and the total points of external factors that represent the opportunities and threats of its system are equal to 2.462 was calculated. According to the four-dimensional strategy matrix table (Figure 2), the best strategy or strategy for the development of IPM/FFS promotion partnerships is the ST strategy or competitive strategy. In a competitive strategy, the strengths and abilities of these programs should be used to deal with existing threats. In other words, the custodians of the IPM/FFS collaborative programs should try to reduce or eliminate the effects of external threats using their own internal strengths. Therefore, in the present study, ST strategy was selected as the best option for continuing IPM/FFS extensions in Iran

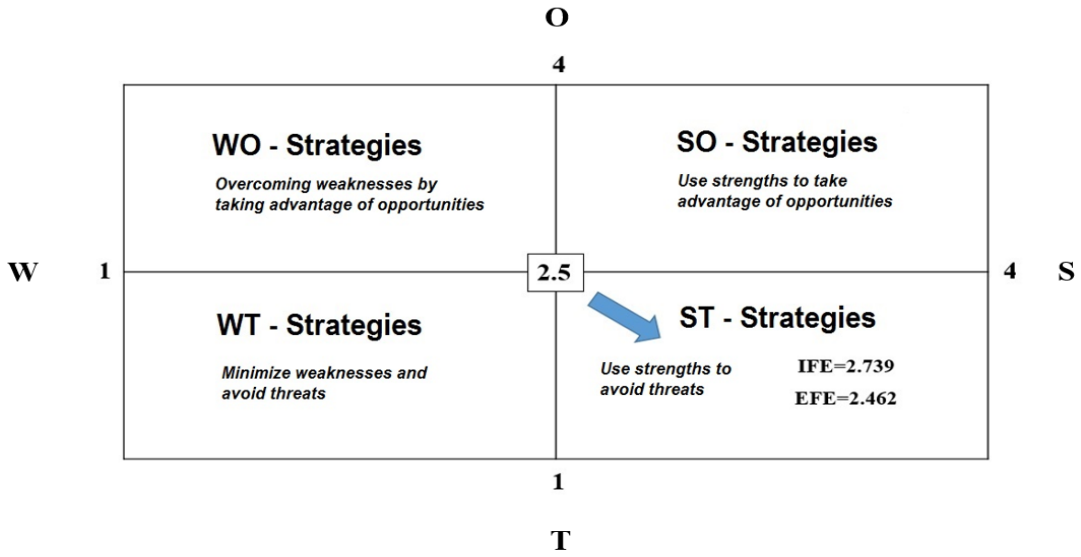

Figure 2. Analysis of the Fourth Strategy Matrix of the IPM/FFS Promotion Program

6. Discussion and Conclusion

Education and extension programs of IPM in light of government policies in the field of sustainable agriculture and an emphasis on production of healthy products in different cities of KB province and with the aim of extension of integrated management of pests and its gradual change towards a comprehensive management of protection of product and an attempt to promoting production of healthy products and sustainability of production sources was implemented since 2005-2006 on the products of Apple, citrus and corn. Since the principle of these programs with the approach of the farmer field school is an exported proposal, it will be faced with the problems and issues. Therefore, the main problem of this study is whether the new approach implemented in KB compared to past educational and extension methods is effective in improving knowledge, skill and attitudinal dimensions of farmers or not. Meanwhile, in this study SWOT analysis sought the strengths and weaknesses as well as the opportunities and threats of the IPM/FFS extension program, which would ultimately be the best strategic option for continuing work.

In general, effectiveness of IPM/FFS programs form the viewpoint of farmers based on ISDM quality evaluation index was at the level of "good". However, effectiveness of this program from the viewpoint of 13% of the subjects on integrated pest management was at "poor" level, 14% at "moderate" level, and 70% in the good level and 2 percent in the "excellent" level. Kruskal-Wallis test results also showed a significant difference at the confidence level of more than 99% between the mentioned quality levels. Based on these results, we can say that the IPM/FFS approach was a positive step in affecting farmers on integrated pest management in KB province. This finding is consistent with result of Pir Ali Dehi *et al* (2011) on gardeners of Kermanshah province and the study conducted by Yung *et al* (2008) among China vegetable farmers. Knowledge level of farmers participating in the

farmer field school classes with mean of 5.75 was more than teacher-centered group with mean of 5.17 on issues related to the IPM. However, T test results showed that this difference in probability level of (P=0.01) is not significant. In other words, farmers participating in FFS classes compared to their counterparts in the other group have almost the same level of knowledge in integrated pest management (IPM). Skill level of farmers participating in the farmer field school classes with mean of 41 was more than that in teacher-centered group with mean of 33.9. T test results showed that this difference in probability level of (P=0.01) is significant. In other words, farmers participating in FFS classes compared to their counterparts in the other group have almost the higher level of technical skill in integrated pest management (IPM) area. Attitude level of farmers participating in the farmer field school classes with mean of 38.2 was more than that in teacher-centered group with mean of 30.3. T test results showed that this difference in probability level of 99% (P=0.01) is significant. In other words, the overall attitude of farmers participating in FFS classes compared to their counterparts in the other group is higher than that in other group on integrated pest management (IPM) area. Therefore, IPM/FFS approach could take positive steps to change the beliefs and attitude of farmers on integrated pest management. This result is consistent with findings of study conducted by Mirzaee*et al* (2010) on palm farmers of Khuzestan province and the study conducted by David (2007) on participants in FFS classes in Cameron and the study conducted by Arbagh and Donarmir (2005) in Uganda country.

SWOT's matrix assessment of IPM/FFS's collaborative partnerships showed that the best strategy or strategy for the development of IPM/FFS promotion partnerships is the ST strategy or competitive strategy. In a competitive strategy, the strengths and abilities of these programs should be used to deal with existing threats. In other words, the custodians of the IPM/FFS collaborative programs should try to reduce or eliminate the effects of external threats using their own internal strengths. Therefore, in the present study, ST strategy was selected as the best option for continuing IPM/FFS extensions in Iran.

Recommendations

According to the results of this research, the following extension programs of IPM/FFS are recommended:

1. As FFS classes in the integrated pests management in terms of creating the opportunity for dialogue and exchange of view among researchers, extension workers, and farmers and due to observation and gaining experience in real agriculture environment and other useful features from the viewpoint of apple gardeners had very good and excellent effectiveness, it is recommended that this kind of extension programs to be included in agenda of agriculture Jihad authorities for other agricultural products of the province that have great importance such as grapes, nuts, and rice.
2. As farmer field school classes with a participatory learning approach compared to teacher-centered classes have more on the impact on increasing the knowledge and skills, and attitude of farmers on integrated pest management, it is recommended that extension programs of IPM/FFS to be developed in province by private sector such as agricultural consulting services companies and to be replaced by teacher-centered extension and educational approaches.
3. According to the four-dimensional strategy matrix of SWOT analysis table, the best strategy or strategy for the development of IPM/FFS promotion partnerships is the ST strategy or competitive strategy. In a competitive strategy, the strengths and abilities of these programs should be used to deal with existing threats. In other words, the custodians of the IPM/FFS collaborative programs should try to reduce or eliminate the effects of external threats using their own internal strengths.

References

Aghapour Sabbaghi, M. Mousavi. S.H. (2011). Evaluation of the farmer field school plan success in increasing efficiency of wheat farmers of Hamidieh. *Agricultural Extension and Education Research*. 4 (4), 42-55.

Amiri Ardekani, M. (2009). Farmer field school approach in agriculture extension, research organizations, education and extension agriculture, agricultural education publications,Tehran, 444p.

Braun, A.R., Thiele, G. and Fernandez, M. (2000). Farmer field school and local agricultural research committees: complementary platform for integrated decision-making in sustainable agriculture. Agricultural Research and Extension Network (AgREN). NO. 105.

Bunyatta, D.K., Mureithi, J.G., Onyango, C.A. and Ngesa, F.U. (2006). Farmer fieldschool effectiveness for soil and crop management technologies in Kenya, *Journal of International Agricultural and Extension Education*, 13 (3), 515-526.

Chi, T.T.N., Hossain, M. and Palis, F. (2004). Impact of Integrated Pest Management Farmer Field Schools (IPM- FFS) on Farmers' Insect Pest Management Belief, Attitude and Practice (KAP) in Vietnam. Omonrice Journal, 12 (2004), 109-119. Retrieved July 08 2008. from http://clrri.org/English/.

David, S. (2007). Learning to think for ourselves: knowledge improvement and social benefits among farmer field school participant in Cameroon, *International Extension and Education*, 14 (2), 35-48.

Davis, K., Nkonya, E., Ayalew, D & Kato, E., (2009). Assessing Impact a Farmer Field Schools Project in East Africa, Proceeding of the 25th Annual Meeting, International San Juan Resort, Puerto Rico. pp.136-137.

Dianati, M, Erfani, M. (2009). Competence, concepts, and applications. *Tadbir Journal*, 206, 14-19.

Etehadi, M., Rusta, K., Muhammad Quli Nia, J. (2011). Factors influencing knowledge, attitudes and skills of participants in the farmer field school approach towards the development of integrated pest management technology, *Agricultural Extension and Education Research*, 4 (16), 13-28.

Ghane, F., Namdar, and Chizari. M. (2010). Evaluation of effectiveness of courses held on cotton pest management effectiveness from the perspective of farmers of Garmsar city. *Journal of Agricultural Research and Education Management.* 8, 59-67.

Ghorbani Pir Ali Dehi, F., Zarafshani. K. And Jalileans. F. (2011). The effectiveness of farmer field school among farmers of Kermanshah province based on KASA model. *Rural studies*. 4 (4), 183-207.

Habibpour, K. and Safari, R. (2011). Comprehensive guide for application of SPSS survey research (quantitative data analysis), Motafakeran Publications, Tehran, 861 p.

Humphrey, A. (2005), SWOT analysis for management consulting, SRI Alumni Newsletter (SRI International): pp:7-8.

Jamini D., Ghadermarzi H., Mafakheri A., Jamshidi A., and Nikbakht S. (2013). Investigation and assessment of factors that influence sustainable farming: a case study of rice farmers in Shirvan Cherdavel Town, Ilam province, Iran. *International Journal of Agri-science*, 3 (6), 444-452.

Krejcie, R.V., & Morgan, D.W. (1970). Determining sample size for research activities. *Educational and Psychological Measurement*, 30, 607-610.

Kurtilla, M., M. Pesonen, J. Kangas & M. Kajanus. 2000. Utilizing of the analytical hierarchy process (AHP) in SWOT analysis- a hybrid method and its application to a forest-certification case, Forest Policy and Economics, 1, 41-52.

Mancini, F., Termorshuizen, A., Jiggins, J., Bruggen, A. (2008). Increasing the environmental and social sustainability of cotton farming through farmer education in Andhra Pradesh, India. *Agricultural Systems*, 96 (1-3), 16-25.

Mirzaee. A., Movahed Mohammadi. H. and Tahmasebi. M. (2010). Investigating the effect of farmer field school project on increasing information level of palm farmers of integrated pests management and *Journal of Agricultural Economics and Development*. 42 (4), 491-499.

Pedhazur, E.J. (1982). Multiple Regressions Behavioral Research: Explanation and Predication, New York: Harcourt Brace College Publishers. 1058 p.

20.Radnya, H. (2000). Beyond Silent Spring, Karaj, Agricultural Education Publications.

Rizal, R. (2010). Effect of integrated pest management farmer field school (IPMFFS) on farmer's knowledge, farmersgroup's ability, process of adoption and diffusion of IPM in Jember district. *Journal of Agricultural Extension and Rural Development*, 2 (2), 29-35.

Talebi, P., Khorramshahi, A. (1994). Knowledge on integrated pest management. Tabriz: Amidi Publications.

Thijssen, R. (2002). Farmer Field School or Participatory Technology Development? A Comparison of Principles and Result of TwoParticipatory Approach. International Learning Workshop on FFS. Emerging Issues and Challenges. 21-25 October 2002, Indonesia.

Van Duren, B. (2003). Report of Consultancy on the Assessment of the Impact of the IPM Program at the Field Level. IPM Farmer Training Project Cambodia. Royal Government of Denmark, Ministry of Foreign Affairs, Danida and Royal Government of Cambodia, Ministry of Agriculture, Forestry & Fisheries, National IPM Program. DAALI, Phnom Penh.

Yang, P., Liu, W., Shan, X., Ping, L., Zhou, J., Lu, J., Li, Y. (2008). Effects of training on acquisition of pest management knowledge and skills by small vegetable farmers. *Crop Production Journal*, 27 (12), 1504-1510.

PARTICIPATORY APROACHES AND DEVELOPMENTS

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Abstract

Agriculture has so significant role for people because of for their feeding, clothing, economy. Agriculture extension also is so important in the branch of the agriculture. You can produce something but it does not matter without training and extension. It looks like some producer produce new product but without advertisement they cannot spreading and they cannot expand and so it can have said that agriculture extension is like to advertisement of agriculture and production. The purpose of extension is to raise the standard of living of farmers and their families in rural areas. Extension studies are often described as "helping people to help themselves". This approach is valid for many countries in the world and has traditionally focused on farmers and rural communities. The basic model for agricultural extension include: technology transfer, farmer first and participatory approaches. Participation is the active participation of the local community in setting and determining agendas for their communities, rather than allowing them to decide on their needs and priorities, using the skills of foreign donor organizations. The level and type of this involvement directs the development process in society and affects its sustainability. This study aims to address basic understanding and concerns about participation. This work, which has become an important tool for developmental interventions, will try to answer the questions that the participation realizes and aims to reach and the traps of the method in practical and theoretical practice.
Keywords: Participatory extension, extension system.

1. Introduction

Approximately 75% poor people, who are living in developing countries, are based on livelihoods of agriculture (World Bank, 2008 in Chowa et al 2013). Since Economic growth depends on agriculture in this societies, for fighting against poverty(ibid); thus participation seeks to help farmers by creating themselves a space for knowledge to be shared, created and acted upon. Farmers should be provided for innovation by the government, local institution and private extension agents(ibid).

Variety of private sector organizations supply information' transfer and advice to farmers with aims to develop solutions and solve their problems. For example, in Agriculture extension; transfer of technology based on how farmers learn new information and ideas. Because awareness of knowledge is so important for farmers, they are the key factor of livelihoods in risky and uncertain environments (Gartforth,2005). The capacities, preferences, and resources of farmers need to be considered for participation to be effective."

According to Gartforth (2005); four key elements are so important; the resourcing and motivation of extension staff, the 'message' focus, poor implementation and lack of communication channels. Especially main problem is low level of contact between farmers and field assistants. Limitation of staff at field level were compounded by low levels of motivation and priorities and conflicting incentives.

Public extension services have significant role in natural resources and sustainable management; especially in effective materialization of programs pertaining to rural development due to lack of human resources and financial constraints (Ozcatalbas et al. 2011). Humanhood needs a basic food which is convenient and reliable for people. Indeed, the governments which aim on raising the life standard of their citizens should both provide basic necessities to farming community and also, facilitate and involve people from all streams of life including health, education, public administration,

and industry. As a matter of fact, a very basic concept of Extension work is "helping people to help themselves"(Ozcatalbas et al. 2011).

2. Participatory Agriculture Extension

Agriculture extension models are a farmer first, technology transfer, and participatory approach (Vanclay and Lawrence, 1995; in Ozcatalbas et al. 2011). The first model is a top-down approach, that involves taking the thoughts, plans and schemes from researchers down to the farmers' community. Contrariwise, a bottom top model takes the opinion, problems and suggestions of the farming community up to the researchers so as to aid them in making practical and result-oriented research programs.

Besides these approaches is added an another approach the participatory approach; which involves integrating and expanding of the first two models from some angles. The participatory approach model involves both farmers and the researchers and bring on-board stakeholders from other streams of society (Foster et al.1995 in Ozcatalbas et al. 2011). Nowadays participatory approach is being adopted by a large number of organizations (Ozcatalbas et al. 2011). Government and non-government organizations increasingly recognize the need of direct participatory approach to identifying and acquiring farmers and rural communities from their development goals through top-down instruction and pure technology transfer.

According to Chowa et al (2013); interaction actors can improve coordination teams at different levels. This is based not only on farmers' livelihoods but also the interests of actors in various businesses to help them reach their goals in their organizations. Local governments need to strengthen their role as a tool in decentralized extension. It shows a weak mechanism of monitoring by the local government to ensure that the behaviour of the actors is responsible of actors' actions to provide the farmers with the tools they show they need. A decentralized extension can be built up by policy interference to fund multi-stakeholder learning platforms and fund farmers' marketing needs which would enhance the interaction and improve coordination of various actors in innovation system (Chowa et al., 2013). Participatory extension, contrary to conventional extension services, does not merely communicate new research and technologies to the farmers. Moreover, in participatory extension knowledge and skills are provided to farmers to develop an understanding of their problems and enhance their problem-solving capacities. Thus, sustainable agriculture and sustainability of the farming community largely depends on how skilful and independent are the farmers in solving their problems at the basic levels and participatory extension plays a major role in achieving this aim (Diop et al., 2001).

Participation has many definitions; one point participation is to increase efficiency '*people are more likely to show agreement and support for the new developments and services if they're involved in the process and other review of participation as a fundamental right, in which the main aim is to initiate mobilization for collective action, empowerment and institution building'* (Pretty,1995, p.1251). Indeed, awareness of participation is increased by development projects because "participation" is one of the key issue of success.

The policy promotors and project beneficiaries should be associated with an increased mobilization of intellectual property, understanding and social cohesion, more efficiency; more cost-effective services, greater accountability and transparency, strengthened capacity of people to learn and act, increased empowering of the poor and disadvantaged (Kottak 1991, in Prety,1995).

Thus, the concepts, "popular participation" and "people's participation" became widespread in many non-government organizations (NGOs), development agencies, financial bodies and government agricultural departments (Adnan, Alam and Brustinow, 1992; in Pretty,1995). Common idea is that participation look as part of their work and has been used to justify external decisions to devolve power and decision making away from external agencies, as well as to build local capacity and self-reliance. It has been used for data collection as well as for interactive analysis. However, "more often, people are asked or dragged into partaking in operations of no interest to them, in the very name of participation" (Pretty, 1995, p. 116).

For this reason, one agricultural support organizations' aim, is threatened for sustainable agriculture, and must be further strengthened and incorporated into various groups of people. The

dilemma of the union's authorities is even the people need participation, they are afraid. But this fear decreases the chance of promoting knowledge or skills be printed on farming communities.

This highlights the fact that it is all but important that the relevant decisions should be made keeping in view the type of participation in use. The conventional or traditional rural development plans and schemes focus on the participation of local community and encourage them to trade their goods in exchange for other basic goods and services. Such approaches are harmful to farmers by deteriorating perceptions, developing addictions. This paternalism undermines sustainability goals and produces rarely continuing effects after the end of the progeny (Pretty,1995).

Table 1. A Typology of Participation: How People Participate in Development Programs and Projects

Typology	Characteristics of each Type
1. Manipulative participation	Participation is simply a pretence with "people's" representatives on official boards but who are unelected and have no power.
2. Passive participation	People participate be being told what has been decided or has already happened. It involves unilateral announcements by an administration or project management without any listening to people's responses. The information being shared belongs only to external professionals.
3. Participation by consultation	People participate by being consulted or by answering questions. External agents define problems an information gathering process, and so control analysis. Such a consultative process does not concede any share in decision making, and professional under no obligation to take on board people's views.
4. Participation for material incentives	People participate by contributing resources, for example, labor, in return for food, cash or other material incentives. Farmers may provide the fields and labor, but are involved in neither experimentation nor the process of learning. It is very common to see this called participation, yet people have no stake in prolonging technologies or practices when the incentives end.
5. Functional participation	Participation seen by external agencies as a means to achieve project goals, especially reduce costs. People may participate by farming groups to meet predetermined objectives related to the project. Such involvement may be interactive and involve shared decision making, but leans to arise only after major decisions have already been made by external agents. At worst, local people may still only be coopted to serve external goals.
6. Interactive participation	People participate in join analysis, development of action plans and formation or strengthening of local institutions. Participation is seen as right, not just the means to achieve project goals. The process involves interdisciplinary methodologies that seek multiple perspectives and make use of systemic and structured learning process. As groups take control over local decisions and determine how available resources are used, so they have a stake in maintaining structure of practices.
7. Self-mobilization	People participate by taking initiatives independently of external institutions to change systems. They develop contacts with external institutions for resources and technical advice they need, but retain control over how resources are used. Self-mobilization can spread if governments and NGOs provide an enabling frame work of support. Such self-initiated mobilization may or may not challenge existing distribution of wealth and power.

Source: Adapted from Pretty (1994), Satterthwaite (1995), Adnan, Alam and Brustnow (1992), and Hart (1992).

However, rural development programs keep on justifying subsidies and incentives because they are faster, because more people can win, or because they provide a mechanism for distributing food to poor people. When little effort is made to create local skills, interests and capacity, local people have

no responsibility to sustain structures or practices after the incentives' end. According to participation's issue types, development organizations are ranged from manipulative and passive participation; to self-mobilization in which people are engaged in initiatives independently of external institutions, where people can fulfil their members' roles (Table 1). This typology suggests that the term "participation" should not be accepted without an appropriate explanation.

Regarding the benefits and costs of participation, the World Bank's "Learning Group on Participatory Development" distinguishes different types of participation: many Bank's activities called "participants" are not in line with because it is only through development that passive recipients informers or workers "(World Bank, 1994, p.6 in Pretty,1995). The participation's success will not have a positive effect on human lives(ibid) such, participation can be used without being confident the act can be used in action.

Therefore, the term participation should be thorough and careful in sustainable agriculture as it threatens to support the objectives, the participation must always be qualified by the initiative. Previously, the more common passives, counselling and incentive-focused participation are the better ways to set a better transition method to the end of the spectrum.

Firstly, the Department of Technical and Extension Services (AGRITEX) developed the participatory extension approach (PEA) in Zimbabwe. *'Participatory technology development stresses partnerships between farmers, researchers and extensionists develop adequate farm technologies for sustainable development*' (Chambers & Jiggins, 1987 in Engel 1995, p.146). According to Cornwall & Jewkes, (1995) participatory research has the assumption that working with the "community" and local communities exist for separate entities: limited, small, homogeneous and integrated. These values, needs, emotions, and ideologies are shared. It has been discovered that a " community " is a very heterogeneous group with a large number of interrelated axes, including wealth, age, gender, ethnicity, religion and indirectly power (in ibid). In Latin America, "community involvement contributed to the cultural deprivation of the poor and contributed to political violence and also the destruction of grass-rooted organizations", that the poor produced additional exploitation by free labour.

The agriculture extension's aims have included the farmer's productivity and is based on 'technology transfer' approach. This approach for example has been implemented in Turkey, from Ministry of Agriculture and Rural Affairs on 'general agricultural extension approach' which was used until the 90s and the T&V approach is dominated after the 1984s until now. Technology transfer involves a top-down approach to generating innovations that scientists believe will be useful to farmers, setting research priorities, and providing results to extension agents (Chambers et al.,1989).

In addition, other agriculture extensions approaches are Farming System Research(FSR), the Participatory rural appraisal also called participatory learning and action approaches, and the Participatory group-based learning approach namely called the Farmer's Field School (FFS) (Chambers et al. 2004).

3. Agricultural Extension Systems Factors

According to Rivera et al. (2001; in Aker, 2011) many agricultural extension systems related to the following these factors:

1- Limited scale and sustainability: Small-scale farmers, extension clients usually live in geographically spread over a wide area. This means that in high cost, unsustainable services and restricted geographical coverage (ibid).

2- Policy environments that decrease to the value of information supplied through extension services are due to trade habits, primarily based on agriculture, inadequate infrastructure, and poor input sources.

3- Poor connections between universities, research centres, and agricultural extension systems. Extension services in the United States and Europe are often linked to the university system, while in developing countries can be the different system. As a result, the incentives of these institutions are not in line with the agricultural priorities in the country (ibid) and the technologies are not always adapted locally.

4- Low motivation and accountability of extension staff. It is difficult to monitor the existence and motivation of the extension staff as it is for all civil servants, which is particularly problematic when agriculture is based on field agents working in different geographical regions and whose

performance indicators are difficult to verify (i.e., number of training, number of participants). Failure to track can result in poor or poor quality field personnel and further reduce the use of agricultural publishing services.

5- Little evidence of the prosperity effects of such an extension. Inadequate credible evidence of the effects of agricultural extension has strengthened violence with respect to funding, motivation and the availability of appropriate technologies. It is also not known whether or not agricultural extension systems are functioning in this environment, but it is not only unclear, but it is also unknown whether or not they come from the top of information irregularity for small ones related to system models.

6- Gender continues to be the main concern of participatory development projects. Gender plays a major role in determining the achievement of participation goals. It shapes the procedures and practices adopted for the implementation of participatory initiatives. Some cultures where women take sides with men are vulnerable by the social norms of a society or a society. For example, men and women have a division of labour that determines their role in development work. Women will be allowed only to undertake tasks specific to women, and men will enter tasks that are considered men's tasks. Participation of women's groups can also be restricted to other issues such as patriarchal society, discrimination of male personnel, traditions of male domination, and the tendency of men and women on their tasks (Kabeer, 2005). It should also be noted that being a heterogeneous group has different interests depending on the women's status, race, class, religion, ethnicity and other factors (Kehler, 2001).

Because of all these complexities, it is difficult for women to participate in a development project; because it does not mean that the problems of being are represented or accepted. Therefore, appropriate tools and methods are needed to work with women to achieve their participation goals.

4. Conclusion

As a result, gender discrimination, poverty, education, and sustainability are more significant because women have a significant role in all societies. Indeed, the lack of gender-inclusive participation has resulted in less effective solutions; poverty and lack of education results in low capacity and resources of farmers.

Gender gap should be reduced to reach success and it can reduce poverty and it sustain development. In addition, education has the significant role of the extension and participation and can be sources of innovative and open-minded.

In developing countries, participatory approaches' implementation has been limited and focused more on a local scale. Many studies suggest that participatory approach can be practiced on rural farmers cooperatives, unions of farming communities, non-governmental organizations and also in universities researches (Ozcatalbas et.al,2011). Rural areas are encouraged by initiatives by enlargement organizations in developing countries, and it is useful to implement participatory approaches to think about their own problems and suggest solutions(ibid).

References

Aker, J. C. (2011). Dial "A" for agriculture: a review of information and communication technologies for agricultural extension in developing countries.*Agricultural Economics*, *42*(6), 631-647.

Chambers R, Pacey A, Thrupp LA (1989). Farmer first: Farmer innovation and agricultural research. Intermediate Technology Publications, London/UK.

Chambers R, Kenton N, Ashley H (2004). Participatory Learning and Action 50: Critical reflections, future directions IIED, October 2004.

Chowa, C., Garforth, C., & Cardey, S. (2013). Farmer experience of pluralistic agricultural extension, Malawi. *The Journal of Agricultural Education and Extension*, *19*(2), 147-166.

Cornwall, A., & Jewkes, R. (1995). What is participatory research? *Social science & medicine*, *41*(12), 1667-1676.

Diop, J. M., de Jong, M., Laban, P., & de Zeeuw, H. (2001). *Building capacity in participatory approaches*. PROLINNOVA Working Paper 4. Leusden: PROLINNOVA International Secretariat c/o ETC EcoCulture.

Engel, P. G. (1995). *Facilitating innovation: an action-oriented approach and participatory methodology to improve innovative social practice in agriculture*. Engel.

Garforth, C. (2005). The challenges of agricultural extension. *Starter packs: a strategy to fight hunger in developing countries? Lessons from the Malawi experience 1998-2003*, 175-191.

Kabeer, N. (2005). Gender equality and women's empowerment: A critical analysis of the third millennium development goal 1. *Gender & Development*,*13*(1), 13-24.

Kehler, J. (2001). Women and poverty: The South African experience. *Journal of international women's studies*, *3*(1), 41-53.

Ozcatalbas, O., Boz, I., Demiryurek, K., Budak, D. B., & Karaturhan, B. (2011). Developing participatory extension applications in Turkey. *African Journal of Agricultural Research*, *6*(2), 407-415.

Pretty, J. N. (1995). Participatory learning for sustainable agriculture. *World development*, *23*(8), 1247-1263.

AGRICULTURAL POLICIES IN RURAL DEVELOPMENT TWO RISING POWER - AGRICULTURAL POLICIES IN BRAZIL AND INDIA

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Abstract

Rural development is the process of improving economic recovery in rural areas. The process usually includes problem analysis, determining appropriate resources, and providing sustainable solutions to these problems by evaluating resources efficiently. The goal of rural development initiatives is to reshape the rural sector and provide a better, safer and more sustainable way of life to rural communities. Families who live in rural areas face many problems such as inadequate health care, education and food. These problems are the main areas of struggle for coping with rural development. Although rural development in developed countries can be used in different meanings, the background is always seen to include improving economic conditions of people. Rural development strategies aim to improve the social and economic situation of people in rural areas and intend to create a more developed community with the help of high level methods of production and socio-economic justice. The evaluation of agricultural policies for this rural development planning is also a priority element in the development of the mentioned rural area because agriculture is the main means of livelihood for the rural people to lead their lives. Accurate investments in agriculture can increase productivity of agricultural laborers and soil, and thereby income of farmers that improve the life standards of rural poor communities can increase. This research has focused on the importance of right agricultural policies in rural development, accordingly. In this sense, agricultural policies of some developing countries such as Brazil and India, will be examined from and the effects of different strategies applied will be tried to be revealed.
Keywords: Agricultural policy, rural development, developing country.

1. Introduction

In this research, agriculture policies that are important elements in rural development, are planned to be examined on two developing countries. The improvements and developments that Brazil and India chosen, have made in the field of agriculture can be an example to other countries. Rural development is intertwined with agricultural policies and the countries that implement the right agricultural practices ensure the balance more quickly and accurately between rural and urban life.

The concept of development can be defined as the increase in the level of social welfare as a result of the improvement of the life of the people in the material and spiritual context with the social, political and economic structure of the changingsociety. The concept of development does not only refer to an economic development or an activity, it is a dynamic concept that suggests to a change from the present or the previous situation (Oakley and Garforth, 1985: 450).

The concept of rural development is a concept identified as the development of the underdeveloped segment of generally rural society by the United Nations (McCalla and Ayres, 1997: 1). If the definition of rural development is made from a broader perspective, individuals and societies living in the rural area who provide their livelihoods from the agricultural sector or similar rural professions, are required first to create a sense of need for them in order to increase their living conditions to decent level and then to develop them democratically by making all their financial and moral aids

(Shehrin, 2005: 19). However, it is necessary to distinguish between agricultural development and rural development. In this context, in addition to raising the life standards and level of welfare of the people living in rural areas without deteriorating the natural structure within the scope of the definition of rural development, agricultural development such as elimination of local and regional developmental differences, improvement of agricultural structure constituting primary economic activities, development of agriculture-based industry, increase in employment, rural infrastructure, agricultural infrastructure, education, health, social security, organization and elimination of many other social, cultural and economic deficiencies and improvement of conditions are also included (Social Progress Through Community Development, 1955).

The starting point in terms of economic and social role and development potential of rural development must be agriculture. Secondary targets for development should be the agricultural-based industry in rural areas and the agricultural resource producing industry. The development process should predict income growth and welfare. All processes should be executed by the democratic participation and coexistence of the rural community. Since development is a political process for economic, social and cultural reasons, the importance of political preferences should be taken into account in the selection of policies and instruments for the design and implementation of such a process (Gulcubuk, 2001: 4).

First, geographical planning should be done for achievement of rural development.In this manner, it can be ensured to protect the land in the countryside, to regulate income distribution, to use natural resources and to sustain social life in a certain order. On account of these plans, agriculture, tourism, lodgement, industrialization places of the country can be determined in advance and national and rural development can be realized within the framework of these plans (http://www.dap.gov.tr).

Countries utilize various of means to ensure that these plans are implemented correctly. These means consist of activities that are carried out directly by the states within the frame of their own projects and plans, and that are indirectly carried out various backstoppings, subsidies and similar actions for the implementation of the plans (http://www.dap.gov.tr).

All of the countries in the world support the agricultural sector and indirectly the countryside in various forms. Although the forms and methods of these subsidies vary from country to country, it is aimed essentially to ensure the continuity of agricultural production that is the main economic activity of rural areas, to ensure food safety, to raise the living standards of agricultural producers and consumers, to ensure the contribution of agricultural production to national economy and to acquire competitive advantage in foreign trade.

Each state forms support policies by setting new objectives in accordance with their social economic situation in the direction of these main goals and carrying out these policies by developing various implements. These implemented supportive policies are influential on capital (public) budget, producer and consumer welfare and the use of resources (http://www.dap.gov.tr).

2. Data and Methods

In this research, agricultural applications are analyzed through two selected countries. These countries are India and Brazil.It is anticipated that economies of these countries will become important world powers in the scope of next 50 years, and even India will be the third largest economy in the world (Goldman Sachs, http://avikdgreat.tripod.com/InterestingReads/BRIC_GoldmanSachs.pdf). The selection of these countries is due to the significant similarities of the two countries in the agricultural sector.The data about the two countries were accessed through their own reports and World Bank data.

2.1 Agriculture Sector and Politics of India

The agricultural sector carries an important role in the Indian economy. India has a population of 1.3 billion, approximately (World Bank Report, 2015: 29). Nearly quarters of this population live at hunger limit and 60 percent live in rural areas.

70% of the families in rural areas are dependent on agriculture, either directly or indirectly. The sector provides 17% of the total GDP and it is 52% of the employment opportunities of India (Kekane, 2013: 23). The fact that 60% of Indian people work in the agriculture sector also makes this sector important in the Indian economy.

The Department of Agriculture and Cooperative under the Ministry of Agriculture is responsible for the agricultural sector in India. The Ministry is also responsible for observing the National Dairy Development Board (NDDB) and take care of other agricultural sub-sectors.

According to the KPMG report published in 2017, the most important products of agricultural exports of India are cotton, meat, oil, rice, pepper and sugar (KPMG, 2014: 30). The report also concludes that exports, which were 9.1% of GDP in 2008-2009, increased to 14.1% in 2016-2017.

India is the largest producer with an annual production of 130 metric tons of milk and 14% of total sugar production of the world. India is the 6th largest exporter of sugar with 2.76% of world total exports (IBEFT, 2015: 46).

Moreover, the Government of India has supported agriculture with budgets of 2015-2016 by making certain laws in the name of sustainable agriculture. These laws, namely "Pradhanmantri Gram SinchaiYojana" contain an incitement to increase irrigation access. The law called "Per Drop More Crop" is one that uses water efficiently. Another law is the "Mahatma Gandhi Rural Job Guarantee Movement", which is a step for farmers to increase their combined national agriculture and farmer incomes (IBEF,http://www.ibef.org/industry/agriculture-india.aspx#sthash.8sGC80dQ.dpuf).

In 2007, the Indian government issued a national policy for farmers (India National Policy for Farmers, 2007). The reason for that is the substantial contribution of the agricultural sector to the Indian economy. The agricultural sector includes 60 per cent of employees. Policy aims to ensure that farmers are strengthened in matters such as agricultural researches, publishing services and education. Furthermore, it provides seeds and fertilizers on time and in sufficient quantities and it specifies the conditions in some topics such as the supply of electricity for the farmer.

The important goals of this policy are given in the table below.

Table 1. Agricultural Policy in India

Purpose of Politics	**Technological Opportunities**	**Environmental Conditions**
- Increasing income of farmers by making agriculture a high and strong commercial power	-Comprehension Abilities -Innovative Competencies	-Financial -Support
- To develop farmer support services, including the opportunities such as provision of seeds, irrigation, energy, fertilizer, machinery and bank loans	-Innovative Opportunities -Access to Complementary Instruments	-Legal -Education -Financial
- To introduce and develop social security system for farmers	-Comprehension Abilities	-Education -Finance
- To transform India an internationally exogenous center that provides the necessary resources for sustainable agriculture, to develop products and processes with biotechnology and to improve Information and Communication Technologies (ICT)	-Accession to Complementary Instruments -Innovative Competencies	-Legal -Financial
- To ensure gender equality in all agricultural policies and programs	-Comprehension Abilities	-Legal -Education

Source: India's Agricultural Policy, 2007.

Policy documents also attach importance to asset reforms that will provide access to sources such as land and livestock that will increase the income of families. Hindu success law was held in 2005 and gave women the right to own land.

This law underlines the importance of science and technology in agricultural systems. The National Agricultural Research System (NARS) is working under the Indian Agricultural Research Council (ICAR). These institutions are responsible for agricultural researches, improved seeds and agricultural technologies and for supporting farmers. The policy also protects copyrights by licensing research done by farmers and farmers, with proper regulation. Agricultural enlargement, education and information transfer services are also provided at a sufficient level in the policy framework.

One of the goals of development programs is to clarify "how to know" and "how to do". Krishi Vigan Kendras (KVKs) are obligated to provide training, to make presentations in the region about post-harvest technology, to provide agricultural operations and to provide competitive advantage to the farmers in rural areas. By the virtue of this policy, small farmers can take steps in the topics of promoting the use of common resources such as irrigation and ventilation services and cooperation in order to increase their efficiency and they recognize the processes in this regard. This policy also provided opportunities such as providing technical assistance to the farmer with agriculture clinics and agriculture-business centers.

Within this policy program, agricultural prices and fair trade policies have also been emphasized.Farmer organizations are supported during the trade periods in product export.This includes a variety of support mechanisms such as a minimum support price program, market intervention schemes and a single national market.

Some initiatives by the Indian government and actors have begun to works to improve the technological possibilities of small farmers and the high level of competition in the agricultural value chain by improving their information transfer systems. The Department of Agriculture under the Ministry of Agriculture and the Cooperation have signed an agreement that produces capacity for farmers by the cooperation of 63 countries that conducted research. According to the statistics of the Department of Industrial Policy and Promotion (DIPP), the value of FDI is announced as 2.18 billion dollars in 2017 (IBEF, 2017: 31). These investments have provided Indian farmers with the feedback of huge information transfer.

The government also allowed the projects on February 2015 to support the national agricultural market by means of the Alternative Investment Funds (AIF).The main goal of these projects is to have the right to comment on technology purchase and sale, to increase transparency, to increase market access and to increase the participation of both purchasers and sellers. This structure looks for solutions oriented to provide market integration with technology (The Government of India, 2015a).

The Ministry of Agriculture develops information and skills of farmers by giving organic farming training with the organic farming department. This division has created a low cost certification system ("Participation Guaranteed System") to promote organic agriculture. This system makes it possible for the products of farmers to reach the markets easily (The Government of India, 2015b: 57).

2.2 Agricultural Policies in Brazil

The Brazilian agricultural sector is under two ministries. The Ministry of Agriculture, Livestock and Supply (MAPA) is involved in the operation of agriculture. The ministry is responsible for agricultural research activities and coffee funding with a "guaranteed minimum price" (The Ministry of Agriculture, http://www.agricultura.gov.br). The other ministry, called the Ministry of Agricultural Development, is responsible for supporting agricultural reforms and family farming. Family farming is 38% of total production in Brazil. The target of family agriculture programs is small farmers. It is aimed to provide credit facilities for them and to promote agricultural products by creating market opportunities (European Parliament, 2016, http://www.europarl.europa.eu/committees/en/supporting-analyses-search.html). Table 2 indicates a broad overview of agricultural policies, product and environmental conditions of technological opportunities.

Over the past few decades, Brazil has shown itself as an agricultural power of the world. In Brazil, a considerable number of support programs have revolutionized agriculture, making it more competitive on a global scale. Some programs have focused on the topics of creation of technological capabilities, quick access to markets and easy financial support.

Researches conducted by the Brazilian Agricultural Research Institute (EMBRAPA) have been a pioneer in Brazilian agriculture. EMBRAPA is an institution under the Ministry of Agriculture and Food. This institution also includes researches on selective breeding in biotechnology as compared to others (Matthey, 1994: 67). In the researches conducted with central system, EMBRAPA aims to make hybrid seeds resistant to drought with biotechnology, thus avoiding diseases and insects.

Table 2. A Brief Summary of Agricultural Policies, Product and Environmental Conditions of Technological Opportunities

	Agricultural Policy	Technological Opportunities	Environmental Conditions
The National Rural Credit System (SNCR)	-It was published in 1965 to support marketing of agricultural products and increased production costs. The system also aims to improve the economic situation of small farmers and capital formation. By 1965 the law of 4829 have come into force.	-Comprehension Abilities	-Financial
-Agricultural publication and technical support	-The program worked from 1960 to 1980. It aimed to capacity increase of small farmer. It aims to keep farmers pace with the technology in agricultural practices. In addition, the program aims to create the best agricultural practice with technical support and recommendations. Throughout this process, the number of support offices increased from 35 in 1954 to 2371 in 1981.The number of employees of these offices increased from 127 to 526 in the same years.	-Comprehension Abilities -Innovative Opportunities	- Financial - Education
-Multi-year plan from 2008 to 2011 of MAPA	-This plan was initiated by the Ministry of Agriculture to increase competition in the agricultural sector. This plan is integrated with the goal of developing agricultural-business potentials of small farmers.	-Innovative Opportunities -Comprehension Abilities	- Education - Financial
-Guaranteed Minimum Price Policy (PGPM)	-This policy is to protect farmers from sudden price changes in agricultural products. The state is the price determiner. During these periods prices appear at the lowest and they aim to buy sector investments and offer better prices to farmers.	-Comprehension Abilities	-Support - Financial
-Harvest Plan in Family Farming 2002/2003	-The Rural Development Ministry supports the use of innovation and technology by small farmers in farming practices.	-Accession to Complementary Instruments -Innovative Opportunities -Comprehension Abilities	-Education - Financial -Legal

Source: Brazilian Association of Credit and Rural Assistance; Brazilian Enterprise of Technical Assistance and Rural Extension, 2016, pp. 56-90.

Brazil has also implemented agricultural risk management programs targeting small farmers. The Agricultural Implementation Assurance Program (PROAGRO) protects farmers who suffer from loss of their crops or animals by natural disasters such as pest (FAO, 2014, 68). According to this program,

farmers can overcome financial obligations under the rural lending program. In 2005, the product(crop) insurance support program was constituted to support the rural insurance process. Soybeans, corn, cotton are protected by government in the assurance of this program (ICTSD, 2013, https://www.ictsd.org/downloads/2013/09/session-ii-izaias.pdf). This program encourages the use of modern technology in agriculture and ensures equal distribution agricultural incomes.

In 2010, the Rural Demolition Fund aimed to protect farmers who suffered from extreme climatic conditions with advanced insurance and reinsurance companies (FAO, 2014: 43). Risks arising from uncertain weather are often frightened to small entrepreneurs investing in agriculture, since the agricultural sector is affected very quickly by the climatic conditions. In 2016, the number of letter of exchange of rural agricultural insurance has increased from 63.328 that was in the previous years to 101.850. In the same year, MAPA increased its share of insurance premiums for corn and other products by 60 percent. Similarly, Brazil has become as a net exporter of agricultural products thanks to the export-supporting policies. These policies enabled the country to take part in the global marketplace. MERCOSUR is an agreement providing free trade between Brazil, Argentina, Uruguay, Paraguay and similar contracting partners (FAO, 2014: 102). Small firms had an access to major markets and this was supported by PROEX (Export Financing Program) established in 2009 to support exporting entrepreneurs. Other agreements have also been signed with countries such as India (2009), Israel (2011), South Africa Joint Association (2008), Egypt (2010) and Palestine (2011) in order to increase the agricultural product market (WTO, 2013).

3. Results and Discussion

The agricultural sector and policies are a very effective subject in rural development. The agricultural sectors in India and Brazil, which are examined at this point, are at an important point both as a business opportunity and as a director of the economy. In addition, the vast majority of people in rural areas carry interest (drive a profit) directly or indirectly from agriculture. Both countries are leading exporters of agricultural products; India is the leader country in exports of milk, whereas Brazil is the leader country in exports of soybeans and coffee. In both countries, agriculture is managed by the Ministry of Agriculture and the ministry carries an important role in monitoring agricultural practices and in decision making process. Agriculture in India and Brazil has improved due to productivity growth as a result of farmers using technological opportunities and their agricultural resources effectively. By the virtue of Indian agricultural policy, small farmers have improved their ability to comprehend as a result of increased training and transfer of information in the field of agriculture. Agricultural clinics and centers are defined as technology and information distribution centers, and they tested the innovations and transferred to farmers. Harvesting technologies and information programs and land management informations were also presented from these centers in order to strengthen the innovation capabilities of the farmers through KVKs.

To reduce the gap between men and women in rural areas, India's agricultural policy have taken huge steps in complementary land-access issues such as land and capital in order for women to take more role in agriculture. Adequate environmental conditions such as protection of intellectual property rights for women, legal regulations and good research initiatives have guided the rapid development and expansion of the agricultural sector in India.

Brazil, on the other hand, is increasing its technological capabilities constantly through the support of family farming. Technical support and trainings given to farmers by EMBRAPA have led them to increase their comprehension abilities. Additionally, farmers are provided with 30 days of training per year. During this period, farmers were ensured that they apply what they learned about technology on their own lands. Brazilian state with the various resource support has helped farmers to increase agricultural productivity by accessing complementary equipments such as land, capital, technical information and publishing services. Huge investments in R&D projects in Brazil, protection of copyrights of small farmers, and risk management programs like PROAGRO have been provided supportive conditions for agricultural success.

In India, where approoximately 60% of the population lives in rural areas, the transformation of agriculture policies has strengthened the agricultural livelihoods of rural families and almost 70% of the families living in rural areas have started to earn their living with agriculture. In the current situation, the agricultural sector is able to provide about 20% of its domestic revenue in India and

nearly half of all job opportunities in the country are in the agricultural sector. As a result of agricultural policies in India, more than half of the population is in the situation of being employed in the agricultural sector. Based upon the year 2017, it can be found that the exports of agricultural products since 2007 increased from 9% to 15% within 10 years. With the usage of agricultural policies, small farmers have been able to take steps on the use of common resources such as irrigation and ventilation services and the promotion of cooperations in order to increase their productivity. The support of the usage of technological infrastructures particularly in agriculture has become the most important supporter of the mentioned agricultural product exports and agriculture based employment.

When Brazil is examined, it is clearly seen that as a result of agricultural policies, the country has become an important exporter of agricultural products. In the agricultural sector that about 24% of the population is employed in Brazil, around 40% of the population living in the rural areas seems to be able to earn their keep in the agricultural sector according to data of 2017. Especially in the last decade Brazil has emerged as the agricultural power of the world. In Brazil, a considerable number of support policies have revolutionized agriculture and making it more competitive on a global scale. Some policies have focused on the creation of technological capabilities, the topics of quick access to markets and easy financial support.

This research has once again indicated that, rural development and agriculture policies which are intertwined with one another are very important in terms of ensuring the earning keep of the rural sector, increasing social prosperity, regulating the gross domestic product of the countries and income justice. The countries that execute the right agricultural practices find the balance between rural and urban life more quickly and accurately.

References

Brazilian Association of Credit and Rural Assistance. (2016). Brazilian Enterprise of Technical Assistance and Rural Extension, pp. 56-90

FAO. (2014). Food and Agriculture Organization. “Brazil Country Fact Sheet on food and Agriculture Policy Trends” Country Fact sheet on Food and Agriculture Policy Trends.

Goldman Sachs, http://avikdgreat.tripod.com/InterestingReads/BRIC_GoldmanSachs.pdf

Gulcubuk, B., (2001). Kırsal Kalkınma Stratejileri, Kırsal Kalkınmaya Yonelik Calışmalar ve HavzaYonetimi, Ankara.

IBEF, (2017). An Overview of Indian Agriculture Industry, 2015, http://www.ibef.org/industry/agriculture-india.aspx

IBEFT, Indian Agriculture Industry: An Overview, (2015), s. 46.

ICTSD. (2013). International Center for Trade and Sustainable Development., Domestic Support of Agriculture in Brazil, https://www.ictsd.org/downloads/2013/09/session-ii-izaias.pdf

India National policy for farmers, (2007). India, http://agricoop.nic.in/sites/default/files/npff2007%20%281%29.pdf

KekaneMandia, (2013). Indian Agriculture-Status, Importance and Role in Indian Economy, India.

KPMG, (2014). Indian Economic Survey 2014-2015– ÖnemliNoktaları, (2015), s. 30.

Matthey, H. (1994). The Future of Modern Agriculture. ATRIC Briefing Paper 04-MBP 6, Midwest Agribusiness Trade Research and Information Center. Iowa State University.

McCalla, A. - Ayres, W., (1997) Rural Development: from Vision to Action, Washington: World Bank Publications

Oakley, P. - Garforth, C., (1985) Guide to Extension Training, Food and Agriculture Organization Training Series, No:11, Rome

Shehrin, P. K.,. (2005). “A Critical Evaluation of Governance in the Framework of Rural Development in Turkey’", YayımlanmamışDoktoraTezi, Ankara

Social Progress Through Community Development, (1955) United Nations Publication, New York

The Economic Survey 2014–15. Agricultural and Processed Food Products Export Development Authority (APEDA), Department of Commerce and Industry 2014–15, Union Budget 2015–16, Press Information Bureau, Ministry of Statistics and Programme Implementation, Press Releases, Media Reports http://www.ibef.org/industry/agriculture-india.aspx#sthash.8sGC80dQ.dpuf

The Government of India, (2015a). Promotion of National Agricultural Market through Agritech Infrastructure Fund (ATIF), 2015.

The Government of India, (2015b). National Centre of Organic Farming. Department of Agriculture and Cooperation. Ministry of Agriculture.
The Ministry of Ministry of Agriculture, Livestock Farming and Provisions, www.agricultura.gov.br
World Bank, (2015). Agriculture and Poverty Reduction, http://web.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTRESEARCH/EXTWDRS/0,,contentMDK:21501332~pagePK:478093~piPK:477627~theSitePK:477624,00.html
WTO. (2013). World Trade Organisation, World Trade Policy Review: Brazil, https://www.wto.org/english/tratop_e/tpr_e/s283_e.pdf
http://www.dap.gov.tr

THE DIMENSIONS OF VULNERABILITY TO RURAL FOOD INSECURITY: EMPIRICAL EVIDENCE FROM KWAZULU-NATAL (SOUTH AFRICA) AND IMPLICATIONS

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Abstract

Using a result household survey data from a rural area in South Africa, Umzimkhulu municipality, this study examines vulnerability to food insecurity (VFI) using the Vulnerability as Expected Poverty (VEP) model, Principal Components Analysis (PCA) and cluster analysis. The study identifies households vulnerable to food insecurity and profiles the socio-economic and demographic characteristics of the most vulnerable. The findings suggest that it is not mere access to resources but utilization (a function of positive psychological capital endowment) that matters most to address current food insecurity and vulnerability in the future. Social and human capital (especially the education level of breadwinners), gender and age-related deprivations and the resilience of households to shocks are the most important influencers. An increase in age is an asset until about 65 beyond which it starts to become a liability. Unlike many studies in the past which do not distinguish consumption and production credit, the results in this study show that easy consumption credit improves access to food in the short-term but depletes asset base in the long-term and exacerbates vulnerability to food insecurity. Credit and finance institutions operating in rural areas have to be better regulated so that they can focus on production not consumption credit. On equity grounds, decision-makers will have to target the vulnerable segment of the population, including those households that are currently food insecure but more likely to be secured (transient), food insecure and vulnerable, and currently food secure but vulnerable. The last group can easily remain food secure with marginal and less costly interventions.

Keywords: Vulnerability to food insecurity, consumption credit, dietary diversity, typology of vulnerability, KwaZulu-Natal.

THE CONTRIBUTION OF AQUACULTURE TO POVERTY ALLEVIATION/FOOD SECURITY AMONG THE RURAL POOR IN THE FEDERAL CAPITAL TERRITORY (FCT) ABUJA, NIGERIA

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Abstract

Nigeria has a huge potential for aquaculture development. The fisheries sector contributed 4.5 percent to Nigeria's agriculture Gross Domestic Product (GDP) in 2016 from a combination of capture and culture fisheries. The sector is vital to the national economy of Nigeria, providing employment for millions, and contributing almost 50 percent of the animal protein diet for the citizens**.**

The current domestic production of fish in Nigeria is 1.1 million metric tonnes with demand for fish consumption at 3.2 million metric tonnes per annum, creating a deficit of 2 million tonnes in supply of fish and fish products only being met by imports. The role of aquaculture in attaining household and national poverty alleviation, contribution to the conservation of natural resources and food security in Nigeria cannot be overstated. Aquaculture activities provides vital nutrition and a source of business that offers a profitable means of livelihood andpromotes rural development and employment for both the local and urban dwellers alike.

To address the above challenges, this study determined among other things, the contribution and impact if any, aquaculture has on rural farmers and how this can further be improved or augmented if the farmers are empowered. The investigation seeks to elaborate on the measures put in place by the government to support farmers to increase their well-being, and income, and improve and intensify their protein dietary intake. Furthermore, the study will also help in determining how the natural resources and other inputs could be used effectively through sustainable aquaculture integration.

From the study, it came to light that aquaculture integration into other farming methods play a major role in the fight against food insecurity and reduce poverty through the production of more freshwater species of fish.

Key words: Aquaculture, fish farming, poverty alleviation, food security, economic empowerment.

FINANCIAL INDEPENDENCE OF RURAL MUNICIPALITIES IN POLAND

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Abstract

The main role of the local government's activities is to ensure convenient conditions for the functioning and development of the local community by satisfying their needs. The implementation of this goal requires ensuring a constant inflow of financial resources. Therefore, the financial independence is one of the most important issues of interest to both theoreticians and practitioners involved in the activity of local governments. Financial independence of local government units can be considered in legal, political, economic, organizational and financial terms. Autonomy of local government considered in financial terms is related to the possibility of free decision-making by self-government bodies about obtaining income and revenues, sizes and directions of expenditures and expenses, as well as development and implementation of municipal budget.

Financial independence is an important factor for social development andeconomic growth, especially in rural areas. Rural municipalities, mainlylocated peripherally to larger urban centers, are characterized by a lower income potential. It also means a lower level of independenceof rural municipalities, which may be a barrierfor multifunctional rural development.

This paper addresses aspects of the rural municipalities financial independence in Poland within the years 2007-2016. Information and data were taken from the literature, current legal acts and from the reports of the Ministry of Finance: The implementation of state budgets and The indicators to assess the financial situation of a local government unit in 2007-2016. The comparative analysis was based on selected statistical measures of financial independence, fundamental to its level:

- the share of own revenues of the local government in its total income.
- the share of expenditures of the local government in the total public sector expenditure,
- the self-financing indicators,
- the level of total liabilities including debt for EU projects per 1 inhabitant,
- the percentage share of total liabilities in total income.

The research shows that in the period covered by the assessment an increase in the income of Polish communes, including rural municipalities was observed. In rural municipalities the increase amounted to 180.4%. Hence, in 2016, rural communes had income of over PLN 44.4 billion, which accounted for over 43% of total Polish municipalities income. Although in the years 2009-2015 clearly began to increase the share of own revenue in the total income of rural municipalities but the process was halted in 2016, and this share has fallen below the value of this indicator in 2007.The increase in own income of rural communes was mainly due to the increase in income from participation in personal income tax, real estate tax and other income; it is highly probable that this is a consequence of a specific exodus of city inhabitants to surrounding municipalities.

Duality of the observed trends, ie. the decrease in financial independence and the increase in the share of supplementary income, reflect two positions emphasized in the literature. First of all municipalities should base their financial management on own income, implementing the principle of decentralization and financial independence. Secondly they used mainly non-returnable transfers due to the specificity of services and public goods that they provide to local communities, in accordance with the principle of subsidiarity.

Also in rural municipalities growth in debt as a result of growing expenditures earmarked for supporting EU funds and the related need to obtain loans was observed. However, the rural municipalities show extreme caution in implementing investments and incurring liabilities for this

purpose. The research shows that these communities, despite the relatively low self-financing rate, have a significantly higher operating surplus in total revenues.
Key words: Municipality, financial independence, rural municipality.

References

Act of Law 13 November 2003 on the income of local governments (Journal of Laws 2003 no. 203, item 1966, as amended).
Act of Law of 8 March 1990 on Local Governments (Journal of Laws 2016 no. 142, item 446 as amended).)
Act of Law of 27 August 2009 on Public Finance (Journal of Laws 2009 no. 157, item 1240 as amended).).
Dylewski M., Filipiak B., Gorzałczyńska-Koczkodaj M., (2010), Metody analityczne w działalności jednostek podsektora samorządowego, Difin, Warszawa,
Dylewski M., Filipiak B., Gorzałczyńska-Koczkodaj M. (2011), Analiza finansowa budżetów jednostek samorządu terytorialnego, Municipium, Warszawa
Guziejewska B. (2008), Zewnętrzne źródła finansowania samorządu terytorialnego. In Teoria a praktyka, Wydawnictwo Uniwersytetu Łódzkiego, Łódź, p. 36-54.
Heller J., Farelnik E. (2013), Finanse i samodzielność ekonomiczna a ustrój samorządów terytorialnychw Polsce, „Studia Regionalne i Lokalne", nr 2(52), Warszawa.
Informacja o wykonaniu budżetów Jednostek Samorządu Terytorialnego Ministerstwo Finansów 2012-2016
Kornberger-Sokołowska E. (2015), Wskaźnik zadłużenia a uwarunkowania funkcjonowania jednostek samorządu terytorialnego w warunkach zmiennej koniunktury gospodarczej, Finanse Komunalne, Warszawa, number 1-2/2015.
Kotarba B., Kołomycew A., (2014), Financial independence of local government units in Poland, Journal of Universal Excellence, December 2014, year 3, number 4, pp. A18–A35
Local and Regional Governments in Europe Structures and Competences, CCRE, Local & Regional Europe, 2016;
Parlińska A., (2014), Wybrane aspekty zadłużania się samorządów gminnych w Polsce, Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu, 2014, Issue 330, s.284-292
Powierzchnia i ludność w przekroju terytorialnym w 2016 r., GUS 2016
Staszel A., (2016), Narzędzia analizy finansowej w jednostkach samorządu terytorialnego, Zeszyty Naukowe Uniwersytetu Ekonomicznego w Krakowie, nr 10/2016,
Swianiewicz P. (2005), Co to znaczy bezpieczne zadłużenie jednostki samorządowej?, ‚Finanse Komunalne, number 1–2/2005,
Wskaźniki do oceny sytuacji finansowej jednostki samorządu terytorialnego wlatach 2007-2016, *Ministers two Finansów* http://www.finanse.mf.gov.pl/de/budzet-panstwa/finanse samorzadow/ opracowania.

THE PSYCHOLOGICAL BENEFITS OF 'FOREST BATHING' IN A MIXED LOW-ALTITUDE MOUNTAIN FOREST IN THE EASTERN ALPS İN ITALY: AN ECOSYSTEM SERVICES APPROACH

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Abstract

In the last decade, the Ecosystem Services (ES) approach has recognized the importance of natural resources for the purposes of human health and wellness. In the psychological research field, other studies have identified direct relationships between the practice of walking in the forest and reductions in an individual's level of anxiety. However, despite these advances, ecosystem services and psychological studies have often been conducted according to a strictly mono-disciplinary logic. The main objective of this interdisciplinary study is twofold: (1) to analyse the influence of a forest environment in conducting a short-duration meditation session from a psychological point of view; and (2) to evaluate the implications of this in relation to ES innovation and to Payment for Ecosystem Services (PES).

Twelve subjects (eight women and four men, with an average age of 36.67 and a range of +/- 13 years) gave their informed consent to participate in two meditation sessions carried out on Saturday 21st and Sunday 22nd October 2017, in a forest and an indoor environment, respectively. These informed subjects underwent a preliminary medical examination to ascertain a good general state of health, which was identified as being a requirement for admission to the experiment. Individual anxiety levels were determined using two parameters: "State" Anxiety (SA), related to an individual's state at the time of an event, and "Trait" Anxiety (TA), related to their personal characteristics. All the subjects compiled the State Trait Anxiety Inventory test, form Y (STAI-Y), for the measurement of their state anxiety and trait anxiety (minimum anxiety=20, to maximum anxiety=80) both before and after each of the two sessions, for a total of four tests performed for each subject participant. The outdoor activity lasted for 1:40', and consisted of a walk through the mixed (*Fraxinus Excelsior*, *TiliaPlatyphyllos*, and *CarpinusBetulus*) forest path (with a length of 630 metres) in the locality of the Kot Waterfalls (at an altitude of 168 metres AMSL) in the Municipality of San Leonardo (UD), Region of Friuli Venezia Giulia, Italy. Indoor activities took place in the hall of a building specifically equipped for meditation activities in the city of Udine.

From a psychological point of view: State Anxiety Levels (SAL) decreased on average, both as a result of forest (*F*) meditation (SAL*F*=28.92), and after indoor (*I*) meditation (SAL*I*=31.08), compared to the average level of Trait Anxiety Level (TAL=45.92). Ten out of twelve subjects saw reductions in their state anxiety, both in the forest and the indoor environments. The SAL*I*-SAL*F* (*forest bathingbased incremental benefit*) score was positive (+2.17; +6.97%). Moreover, the reduction in state anxiety was greater than the average for six of twelve subjects in the indoor environment, and eight of ten subjects in the forest environment.

From a psychological research point of view, future investigations could examine the effects obtained following a longer period of meditation activities, and with a larger sized sample group.

From the point of view of the ecosystem service innovation, an hour of meditation in the forest produce a greater added value than an hour of meditation in an internal environment. This study provides useful insights for the establishment of forest-based Payments for Ecosystem Services agricultural subsidies. Future researches could quantify the total economic value of those services, as well as income opportunities for forest owners, agribusinesses, and rural communities.
Keywords: Agribusiness, agricultural subsidies, anxiety, forest therapy, health ecosystem services.

LINKAGES BETWEEN TIMBER PROCESSING COMPANIES AND LOCAL FOREST COMMUNITIES: A CASE STUDY IN VIETNAM

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Abstract

The timber processing industry is currently increasing in Vietnam to meet the demand of wood products. Besides the involvement of companies, many small-scale farms have evolved in industrial plantation of forest. There are many types of economic linkages have been establishedbetween the private forest sector and local forest planters. However, the implementation of these economic integrations has not been effective so far because the connection between the wood companies and famers has shown weaknesses and the legality of the contracts is not high. Thus, in recent time, many wood processing facilities lack raw timber materials while the planters have to sell their wood at low prices when the harvest season comes. The people whose livelihood depends on the forest are still poor, the household economy in forestry shows many limitations and much fragmentation, and the effectiveness of forest plantations, harvesting, wood processing and forestry production have not been commensurate with the potential. The purpose of this study is to examine models of agreements between wood processing enterprises and local forest communities; also initially discussing the hypothesisof the main factors that make the implementation of the timber trade contractsbecomming less effective. The papertry to find the policies recommendations and efficient solutions for developing the agreements between timber processing companies and local forest comunities. The study is a part of growing the body on the research on linkages in timber production and marketing. By finding the weeknesses of the timber trade agreements, this study will contribute to future researchs on relate topics.
Keywords: Linkages, timber processing company, local forest community, agreements.

1. Introduction

Economic linkages between timber processing enterprises and local forest communities have been increasingly established in Vietnam as an effective solution to some problems regarding to meet the material demand for wood industry, contribute to job creation and allevtation of poverty, improve livelihoods and protect the ecological environment. Although the agreements between the private forestry companies and local growers are becoming more common, they are not always tight andbefeficial for both parties. More recent researches has occurred in the field of successful relationship between forest sectors and local actors, however very little is shown the reasons that make implementation of the timber trade agreements become less effective.

According to the statistics of the General Department of Vietnam Customs, the woodworking industry has become one of the main export industries of Vietnam in recent years. By the end of December 2017, timber and wood products export turnover about US$ 8 billion, up 10% over the same time 2016 and it is expected to continuerising in the coming years. The strategy in forestry field of Vietnamese Government has been focussing on decreasing gradually the import of timber materials and increasing the domestic wood supply instead. Therefore, it is necessary to enhance and strengthen the relationship between the private forestry companies and local planter communities.

The objectives of this study is to (1) examine the typical models of agreements between wood processing businesses and local forest growers that have proven successful and having potential for replication and that have less effective; (2) initially discussing the hypothesis of the main factors that effected on the timber trade contract; (3) proposing the efficient solutions to improve the linkages between timber processing companies and local forest comunities.

2. Linkages between Timber Processing Companies and Local Forest Communities

2.1 Theories on Forest Company-Community Linkages

Before going further, it is necessary to provide meaning of some terms that we use in this paper: 'timber processing company', 'local forest community', 'linkage'.

Timber processing companies are enterprises established with the aim of making profit through producing products from timber. These type of companies include large-scale coporations to small-scale private enterprises (J.Mayers, 2000). In Vietnam curently, there are about 4,3 thousand of companies working in wood processing industry, of which approximately 95% belong to private businesses and 5% are from government; firms with FDI investment is 16%; and about 20% of the total number of enterprises participating in direct export, 80% remaining may undertake processing orders for direct exporting firms and domestic market oriented manufacturers (T.X.Phuc, 2017). In the limitation of this study, we focus on small to medium private firms.

Local forest communities refer to local people who grow and manage forest on their land and get a livelihood by selling timber.They include individual small-scale farmers and farmers' groups or cooperatives (J.Mayers, 2000). According to the forestry statistic from Vietnam Ministry of Agriculture & Rural Development (2017), the estimate of total forest landcovered in Vietnam curently is 14,4 million of hectares, in which the planted forest is 4,1 million (ha) and natural forest is 10,3 million (ha). Under the Vietnam's forest policy, timber are not allowed to exploit from natural forest, replacing this all materials would be used from planted forest and import. Thus, grower shemes play an important role not only for significant contribution to the rural community's income but also being one of the main supply chains of materials for wood industry. This study, we concentrate on small-scale timber grwowers and farmers' groups because they own up to 70 percent of hectares of planting forest land (T.X.Phuc, 2017).

*Linkage*refer to the range of relationships and interactions between two or more parties that actively link together by economic legal contracts, formal or informal agreements on the expectation of mutual benefit (Curtis and Race, 1998). This paper uses the term linkage to describe the connection between wood processing enterprises and local grower communities formalized by contactual out-grower schemes, joint ventures or legality contracts with the intent to produce commercial forest crop. Their combination bases on the trust and voluntary agreements. Accordingly, the growers provide forest land and trees management while the companies provide initial finance, management and market opportunities. We primarily pay attention to the processing and growing related to timber trade. Non-timber forest products and forest services of partnerships are not mentioned in this report.

Vertical linkages is the trend of some timber processors because it typically benefits wood firms by providing potential to increase resource security for long-term through diversity of resources supply; efficiency and profits by controlling all the stages of timber production; reducing financial risks of landholding and timber growing, labour and management costs (J.Mayer et at, 2000). The forest communities get the attraction to the partnerships by expectation on chances to obtain the reliable cash flow, in terms of increasing income and spread the market risks through ensure sales; silvicultural physical support and advice with skills in treecrop management and establishment (Curtis and Race, 1998).

2.2 Typology of Forest Company-Community Linkages

J. Mayers and S.Vermeulen (2002:viii) state that there is no perfect, efficient and sustainable combination that has been bringing benefits to partnerships in a long-term basis. However, if the connection work reasonably well, it can bring the concrete economic pay-offs not only for both parties but also broader benefits to local comunities especially in rural areas.

Depending on the difference of each area's characteristic such as economic development, the parties involved, resource based, there are many various of arrangements collaborative linkages that can be established between companies and communities in different ways (World bank, 2008).After comprehending some researches with regard to these fields, we summarize the common currently commercial forest ventures as bellow:

- *Lease joint venture*: In this connection the landholders and the industry together make a lease contract, in which the landholders will contribute their forest land and will be responsible for maintaining the site such as fire breaks and weeds. The company will establish and manage timber production. Regular payments are given to the landholders over an agreed period. The implementation of the joint venture has achieved good result. Lease payments satisfy a range of socio-economic interests of farmers because they find that returns are considerably higher than their neighbouring grazing enterprises and the type of this venture is the most popular in Australia.It has established up to 82,900 ha, comprising 8% of Australia's plantation estate since the mid-1980s (Curtis and Race, 1998).

- *Cropshare joint venture*: With this link, the grower and the company share proportionally inputs such as seedling, planting, and these cost are all recorded. Farmers can join in the forest establishment and management or they may contribute the land only. When harvesting, profit returns will be divided proportionally for both parties base on their contribution. J. Mayers et al. (2002) found that the cropshare deals have been drawn farmers who own underutilized agricultural land with poor access and low productivity.

- *Out-grower scheme:* Company will provide landholder with physical inputs such as seedlings, silvicultural training for forest establishment and maintenance, amount of loan following the purchasing agreements in the contract. The farmer growand maintain trees on their land under the controlling of the company over wood production. When the trees are reached to standard quantity and quality harvesting, the company pays for timber at current market prices. The out-grower integration is attractive growers by some advance payments for their works and guaranteed market when harvesting. The company find the benefit through saving investment in developing their own forest assets and avoiding the potential of expensive liabilities. This scheme has been popular in South Africa (J.Mayer 1998)

- *Marketing join venture*:The company might provide growers free genetically-selected seedling and silvicultural advice, also assurance of a sale according to the market price at the time of harvest. In exchange, the growers isrequired to offer their company partner the first option of purchase, however if a better price can be found, the grower may sell to another purchaser.

2.3 Important Factors for an Effective Forest Company-Community Linkage

The impacts for a successful linkage differs depending on each type of arrangements. The main possible factors for a better forestry linkage has been derived from previous researches and lessons learned about failure and success in forest company-community relationship:

Firstly the arrangement must be *legally valid and fully bargained* by parties. It is necessary for a commercial timber contract to follow local law because this would increase and emphasize the responsibility of partnerships in the implementation agreements or just in case, if there is any disagreement happening between partners, third party will play the role to arbitrate. Furthermore, if the issues and interests in each issues are identified clearly by both sides, it will lead partners to have common expectations in their connection and to find effectively the best opportunities for prospective collaboration. As Curtis and Race (1998) pointed that "the value of joint ventures will be limited when either the grower or industry is restricted in their ability to negotiate linkage arrangements".

Secondly, the parties must have *mutual respect* on each partner's legitimate airms and *trust*one another when create a relationship. N.V.Quang et al., (2017) considered that the core values for the

succesful linkage is the trust and fair sharing system among participants. The company and growers take part in joint venture voluntarily to find from each other mutual benefit so that belief is one of the necessary important requirements to maintain and develop the reality integration for long-term. Without trust and respect, uncertainties will run high and finnally negate positive elements of both sides. Small problems may become large problems.

Thirdly, benefit and risks must be *shared equitably* base on the contribution of each sides. For every economic linkagesespecialy in forestry area, only after the benefit can be increased and the risks in production, market, social and environmental terms can be reduced, it would be secure for a subtainable development.

3. Linkages between Timber Processing Companies and Local Forest Communities in Vietnam

3.1 Characteristic of Wood Processing Companies

As a research on Vietnam wood industry of Trang et al. (2014) considered that there have been three types of wood company established as follow: 1) timber and non-timber forest product processing enterprises: they are mainstream businesses in the wood industry; 2) wood processing firms operating and locating in the craft villages: these firms are established in the form of households and they both follow general law applied for business activities and policies related to craft villages; 3) commercial timber processing households: they are mostly small scale private manufactures and they might not located in craft villages. However, the number of private timber processing familly firmsare not much so there are not any statistic dataon these businesses.

In general, the scale of most wooden enterprises in Vietnam is medium and small and their locational distribution is uneven and not close to the forest material areas. The majority of firms (80%) located in the south and the south central coast of the country (Vietnam Ministry of Agriculture and Rural Development, 2017).

Small-scale wooden enterprises might easily get big adversely affected by uncertainly input supplies and unexpectedly changing purchase orders because they lack of capital in stock raw materials for processing over a certain period of time in order to adjust to fluctuations. Futher to this point, T.X. Phuc (2017) considered that the ability of small-scale wooden enterprises in obtaining loans is not high and meet many difficulties, especially with enterprises which not produce products for export. In fact they are not allowed to take foreign currency loans but at the same time they have to use foreign currency to import input materials for processing. This is one of the main factors that limits the development of small-scale businesses. Besides, having a low level of capital might put firms in disadvantaged conditions to meet the changing or increasingly stringent requirements of export markets (N.V.Quang et al 2017).

3.2 Characteristic of Forest Growing Communities

In Vietnam, almost all timber growers are households or cooperatives. However, according to the statistic of General Statistics Office of Vietnam in 2016, there are about 44 cooperatives working in forestry field and the problem with regard to breaking contract between companies and coperatives is not high in fact so we focus on individual timber growing households in this study.

Most growers live in countryside and grow trees in the mountainous region. With many farmers, their livelihoods not onlydepends on agricultural production but also base on tree planting and timber producing is an economically driven activities, providing a source of income.

Because of living in countryside areas with inadequate information concerning timber demand and price, growers do not have much knowledge of market specifications and little linkages with market agents. They get used to with traditional ways to grow trees, lacking the up-to-date silvicultural knowledge, planning capacity, and skills required to maximize productivity.

Table 1. The Characteristic of Timber Growing Communities

Characteristic	**Households**	**Cooperatives**
Land for growing trees	Small farm size and scattered woodlots. Approximate 1 – 3 ha per household.	Large woodlots and concentrated.More than 100 ha
Harvest and marketing	Sell standing trees for brokers, companies Pay high cost for harvest and transportation	Self-exploiting trees and transfer to the company
Vertical linkages	Mainly intermediary agents such as: timber buyers, wooden exploiters, transpoters	Wood processing companies
Mode of transaction	Formal – informal agreements	Legal contract
Profit	Small	Stable

Consequently, they have difficulties in assessing the value of their trees and how and where to market them, even if they know they still have to pay much for high transportation cost to transfer timber from the their land to the company.That is why they easily decide to sell their trees when they meet good price from timber brokers who come to villages in search of trees to fell.

3.3 Typical Models of Forest Company-Community Linkage

- *Model 1: Company-community linkagein improving timber plantation with forest certification*: This model has been established to meet the requirements about the timber materials which have FSC certificate(Forest Stewardship Council, a certification for timber) for the inputs of the company's production. In this model, the company does not make the commercial contract with individual households, they work with farmers' groups only. The growers who want to join this linkage, they must be gatherred into a group and one person in charge on be half of those will sign in the contract with the company.

The farmers contribute their own forest land when join in the relationship. *Out-grower scheme contract* is used in this model.

Table 2. The Form and Structure of the Linkage

Obligations & Interests	**Company**	**Group of Growers**
Obligations	- Supporting expenditure for group's activities regarding to improve the forest. - Providing loans for growers to last the growth cycle of timber. - Training growers in developing and managing the forest following the requirement of FSC. - Supporting growersexpenses to obtain FSC certificate. - Undertaking to buy all timber with higher cost (10-18% at least) than market price when harvest.	- Following tightly all planting requirements of the company. - Lasting the cycle of growing timber to obtain maximum size. - Undertaking to sell timber to the company when harvest.
Interests	- Having the secure material inputs - Initiative management in material sources, reduce the imported inputs	- Oportunities to approach loans with less or free interest rates. - Improve the knowledge in technology, silvicultural training for forest establishment and maintenance. - Safety output market and increasing income

The disadvantages of this model is the company only accept woods which reached standard quality requirements and farmers have to find other markets for their remaining woods whichdo not fulfil company'sexpectations. This became a reason that make farmers break the contract because they can easily compare the final profit they might get after harvesting.

- *Model 2: Company-community linkage in improving timber plantation without forest certification*: The company and the community make a joint venture by a *lease contract.* Following this model, the farmers grow trees as their traditional ways, not any timber certifications are required from the company. There are two circumstances are applied for this type of connection:

1) The forest lands belong to the company: In this case, the lands and capital and all needed supports in terms of planting, improving and maintain the plantation will be provided to household or cooperative to producetimber material. When harvested, a quantity of trees must be returned to the company as agreed in the contract and the farmer can earn profits from the number of extra timbers during their production which are not mentioned in the lease agreements.

With this model, if the companies actively manage the plantation, they can reduce the risks as well as ensure the quality and quantity of the timber materials. However, it is difficult for the company to expand the model because of their limited forest lands.

2)The forest lands belong to the community: The company will give growers a loan through an economic contract to grow trees. Besides, company will provide farmers all needed helps during growing trees such as instruction and science in planting forest. Farmers have to sell trees to the company when harvesting. Requirements about the number of timbers that must be sold to the company are not mentioned in this case.

The advantages of this model is the company can expand the forest plantation, even with some enterprises which do not have any their own forest lands they are still able to join this venture. However, the number of growers who broke the contract in this model is high and firms meet many difficulties in recovering their capital.

3.4 Factors That Influence the Implementation of Timber Trade Agreements

The culture in timber production of growers: We have experienced that most factors was found effecting on the implemention of agreements come from the growers because they are always the side that give the final decision about choosing which company to sell trees for. Instead of working with aims tending to social development, they think for themselves and give priority to their own benefit than other things. However, the question is given here for the next studies that what the contents of 'culture' is? Is this the core of the reason? Although the farmers have a good comprehension in trees management and opportunities in establising forest stands and they understand clearly about the good benefit potential they might have with the long cycle of forest, they still sell timber before it achives the optimum size for sale because of some reasons as follow:

-According to the statistic from Vietnam Ministry of Agriculture & Rural Development (2017) about forestry, most growers (70%) live in moutainous areas where people are still poor and their livelihoods base on agricultural production activities. Because of inadequate market information and facilities, it not easy for farmers to get the information about the timber purchase price from the company. Thus, there are many members in each family so they need money fast for some urgent needs such as: money for their children to go to school, for some treatments in the hospital. As a result, they can not wait till the harvest time as expectation because they do not have many cash-flow supplies. This problem happened with all models of forest company-community linkages.

- With the model 2, in the case of forest lands belong to farmers, in fact the initial supported loans from the company are not enough to maintain the forest in at least 7-8 years as require of timber production, normally growers have to borrow money at the year of 2 or 3 of the tree and they have to return it within 3 years later. Accordingly, growers sell their trees mostly in the year of five of the tree. On the other hand, as growing timber in the moutain with difficulties in transportation and they do not have any helps from the company when fell and move the trees , growers always have the trend to harvest at the same time with neighbour lands to save transfer cost.

The competition in raw material inputsbetween woodchip industry and wood processing enterprises: As the woodchip market has expanded remarkably in recent years, there are many new

woodchip processing firms established with competitive price for buying input materials. A cycle of good timber production till harvested is quite long, normally 7-8 years and it can be lasted 12 – 14 years following each company's requirements. However, woodchip firms can accept timber even they reach 4-5 years. Thus, the landholders have many choices to sell their timber when harvesting.If this factor have a part in impacting on the farmers's decisions when harvest season comes, what is the best solution to improve effectively both industries? In addition, the government does not have control over the timber harvested from household growing farm, so many people fell trees and sell them following their own thinking to solve the problem of capital and forest plantation cost.

The role of local authorities: It is difficult for companies to deal the problem if a large number of households breaking the contract as the situation at the model 1, because they can not suggest legal proceedings with community groups so in this case the role of local authorities is very necessary. However, a little research shown the role of third party when risks happened.

4. Conclusion and Recommendations

The linkage between forest companies and communities plays an important role in the development of wood industry. We found out that two typical models applying for forest company-community relationships in Vietnam: lease joint venture in improving timber plantation with forest certificate, cropshare contract in plantation without forestry certificate. Three impact factors on less effective model of linkages in Vietnam wood industry was found: the farmer's culture in timber production, the active development of woodchip processing and the limited role of local authorities, however they are only hypothesis under the limited of this paper. To promote this relationship, some recommendations for better linkages are proposed:

- The State institution should promote innovation and have in place a comprehensive set of policies: accessing to credit especially for growers to keep timber in the final cycle years, providing favourable loans terms for business and timber production, providing available forest lands which ineffective using from forest enterprises to communities

- Strengthen the role of local authorities not only for creating a favourable conditions to promote the linkages and bring trust to companies, but also having stronger sanctions to deal the unexpected problems regarding risks, breaking contracts from the communities.

- Improve communities' silvicultural skills by facilitate training for growers in collective action and developing business links with timber industries; enhancing farmers' knowledge of timber markets, the timber quality required by industries and the prices for timber of varying quality.

In the context of Vietnam, the culture, society and economic environment are not the same as those of the developed countries where most of concepts and theoretical frameworks of linkages in forest company-community came from. Research on the relationship between forest companies and timber growers communities may provide different results compared with other studies in developed countries.

References

Mayers, J. & S. Vermeulen, S. (2002). Company–Community Forestry Partnerships. From Raw Deals to Mutual Gains? *An International Review with Proposals for Improving Forests, Enterprises and Livelihoods*. International Institute for Environment and Development, Russell Press, Nottingham, London.

J. Mayers. (2000). *Company–community forestry partnerships: a growing phenomenon*. Unasylva 200. Vol.51 33-41, FAO, Rome.

Mayers, J. 1998). Forestry partnerships between companies and communities: some best bets and dilemmas. *In Proceedings of a consultative meeting on principles for forestry development on community-owned land*. Pretoria, South Africa, Department of Water Affairs and Forestry.

Curtis, A. & Race, D. (1998). *Links between farm forestry growers and the wood processing industry: lessons from the Green triangle, Tasmania and Western Australia*. Report for Rural Industries Research and Development Corporation, RIRDC Publication No. 98/41: Canberra, Australia.

Thu Trang, N. T. & P. M. Thuy, P. M. (2014). *Support business associations to prepare studies on development strategy for two selected industries.* Report wood processing industry. Activity code:NSO-5. WTO center.

Nguyen Vinh Quang et al. (2017). *Linkages between wood processing company and forest growing households: enhance the wood value chain.* Retrieved from:http://goviet.org.vn/upload/aceweb/content/Bao%20cao%20lien%20ket%20IKEA%20-%20cong%20ty%20-%20ho.pdf accessed on 13.2.2018.

To Xuan Phuc. (2017). *Linkages in wood industry: Incresing opportunities, reducing risks for the sustainable development.*Retrieved from: http://goviet.org.vn/upload/aceweb/content/Lien%20ket%20trong%20nganh%20che%20bien%20go,%20tang%20o%20hoi%20giam%20rui%20rol..pdf accessed on 13.2.2018

World Bank. (2008). Forests Sourcebook. *Practical Guidance for Sustaining Forests in Development Cooperation*. Report No.51575-CLB, The World Bank, Washington DC, Agriculture and Rural Development Department.

DRY MATTER CONTENT AND ORGANIC ACIDS IN TOMATOES, GREENHOUSE GROWN UNDER DIFFERENT MANURING AND IRRIGATION MODES

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Abstract

The experimental work was carried out during the period 2016-2017 in Bulgaria. Subject of research are tomato Vitelio cultivar, greenhouse grown at three levels of manuring and different irrigation regimes. The purpose of this study is to research the effect of applying three manuring schemes on irrigation with an optimal irrigation regime (M) and a controlled water deficit, with 75% and 50% of the irrigation rate being applied to dry matter and organic acids. From the presented distributions of the tested quality parameters of greenhouse tomatoes, it can be seen that the dry matter and titrimetric organic acids ratios are close to normal, and for the ascorbic acid indicator there are larger variations in the base values. The data is eligible for the sampling representatively requirements. Significant levels of $p < 0.05$ were obtained for the three researched indicators, i. E. the results of multi-variate dispersion analysis could be used in order to develop strategies for irrigation and manuring of tomatoes to reduce environmental risk. Considering the quality indicator: ascorbic acid a decrease in the quantities has been registered with an increase in the manuring norms. The analysis of the results found that when increasing fertilizer levels, the content of ascorbic acid decreased, i.e., there is an increase in the cost of tomato production and a decrease in the quality of tomatoes.
Key words: Tomatoes, irrigation, fertilization, dry matter, organic acids, ascorbic acid.

1. Introduction

In recent years, tomatoes have been the vegetable crop that holds one of the first places in production. The quality of tomatoes is a determinative factor in production. The environmental risk of the manuring factor and the role of irrigated water as an environmental factor are at the base of the current ecological study.

The content of dry matter and organic acids in tomatoes can have a beneficial effect both on the taste qualities of the produce and on the productive potential of the crop. The quantities of dry matter

and the ratio of its individual components are essential for the quality of the fruit. A great number of the organic acid representatives are antioxidants that inhibit oxidative processes in animal and human consumption. These compounds not only inhibit the formation of free radicals containing oxygen, but can also be donors of hydrogen needed to increase levels of usable energy in organisms (ATPs).

A team of researchers (Bénard et al., 2009) prove that lower nitrogen levels reduce plant growth and increase the dry matter content in fruits, thus improving the fruit quality.

Potassium is considered to be one of the major biogenic elements due to its vital role in the formation of metabolites and the activation of enzymes that ultimately improve the chemical and sensory properties of tomato fruits.The present study of the effect of different levels of potassium fertilizer on the chemical and sensory properties of tomatoes indicates that the increase in the K-concentration leads to an improvement in the quality parameters of the tomato fruits (Javaria et al. 2012a; Constán-Aguilar et al. 2015).

A linear positive correlation was reported between taste and sugar, total solids, titratable acidity; surface redness with lycopene and hardness with the total amount of solids while the taste pH ratio is negative.

Regression relationships between manuringand macroelements nitrogen, phosphorus and potassium on the growth and reproduction of tomato seedlings have been determined, with a high degree of nitrogen influence on the leaf area index. Excessive use of N leads to a decrease of the tomato quality. of tomatoes (Liu et al. 2009, Patanè C. and SL Cosentino, 2010).

In the research of the effect of various mineral nutrient solutions, it has been found that the source of nutrients plays a major role in determining the levels of titratable acid and antioxidant components in tomatoes (Toor et al., 2006).

More attention is now focused on promoting the health benefits of the regular consumption of fruits and vegetables because fruits contain a wide assortment of antioxidant molecules (carotenoids, phenolics compounds, and ascorbate) that contribute to fruit nutritional quality.

The correlation between quality parameters and dietary regimes in tomatoes is the subject of many authors' research. There are numerous results on the influence of manuring with macroelements and types of nutrient solutions on the levels of chemical indicators and antioxidant properties of tomatoes (Oke et al., 2005, Bernard et al, 2009, Javaria et al. 2012b;, Vassileva et al., 2016).

It is only possible to obtain a good effect of irrigation and the most productive use of irrigated water by applying an optimal irrigation regime that is consistent with crop requirements. A number of authors have found the high degree of influence of the water deficit on the quantity and quality of tomato yields (Zugui L. et al., 2003, Favati F. 2009, Ozbahce et al. 2010, Patanè C. et al., Pevicharova et al. 2013, Kuşçu, 2014).

The purpose of this study is to research the effect of applying three manuring schemes on irrigation with an optimal irrigation regime (M) and a controlled water deficit, with 75% and 50% of the irrigation rate being applied to dry matter and organic acids.

2. Material and Method

2.1. Experimental Data

The experimental work was carried out during the period 2016-2017 in an unheated polyethylene greenhouse in Institute of Vegetable Crops “Maritsa”, Bulgaria. Subject of research are tomato Vitelio cultivar, greenhouse grown at three levels of manuring and different irrigation regimes.

The experience is based on the block method on a flat surface according to scheme 110 + 50 + 35 with the plot size of 10 m^2. To study the impact of different levels of manuring and irrigation with different irrigation regimes on fruit quality, twenty manuring and irrigation options have been set.

The scheme includes three levels of manuring: optimal manuring, 1/2 of manuring norms; 1/3 of the manuring standards. The effect of the basemanuring carried out with P_{23} (in the form of P_2O_5 and K_{25} (as K_2SO_4) and nutrition during vegetation with N_{50} (in the form of NH_4NO_3) and K_{66} (in the form of KNO_3) was studied. Irrigation includes optimal irrigation mode and disrupted irrigation regime with 75% and 50% of the irrigation rate.

Tomatoes are grown in accordance with standard practices in greenhouse production. Irrigation was carried out with a drip irrigation installation with built-in drip irrigation mechanism.

Experimental Variations: 1) disrupted irrigation regime (50% of the irrigation norm) without manuring; 2) disrupted irrigation regime (75% of the irrigation norm) without manuring; 3) optimum irrigation regime (100%) without manuring; 4) disrupted irrigation regime (50% of the irrigation norm) and 50% manuring; 5) disrupted irrigation regime (75% of the irrigation norm) and 50% manuring; 6) optimum irrigation regime (100%) and 50% manuring; 7) disrupted irrigation regime (50% of the irrigation norm) and 75% manuring; 8) disrupted irrigation regime (75% of the irrigation norm) and 75% manuring; 9) optimum irrigation regime (100%) and 75% manuring; 10) disrupted irrigation regime (50% of the irrigation norm) and 100% manuring; 11) disrupted irrigation regime (75% of the irrigation norm) and 100% manuring; 12) optimum irrigation regime (100%) and 100% manuring.

2.2. Biochemical Analysis

The content of basic chemical components in tomato fruit is determined as a result of the biochemical analysis. The dry matter content is determined on average samples of 20 fruit in process maturity of each variant refractometrically (%). The titrable organic acid levels are determined by direct titration of juice with 0.1 n NaOH (%). Ascorbic acid was detected by the Tilman reaction using 2,6-dichlorophenol-indophenol as an indicator (Genadiev et al., 1969).

2.3. Statistical Processing

Statistical data processing involves obtaining the main statistical indicators for all tested features, verifying the distribution normality data, and multivariate dispersion analysis with a LSD (Least Significant Difference) test to determine the impact of different manuring and watering schemes on the dry matter content, ascorbic acid and titratable organic acids in greenhouse-grown tomatoes. For data processing, the IBM SPSS Statistics 17.0 statistical package was used.

3. Results and Discussion

3.1. Analysis of Dry Matter

Table 1 shows the impact of the manuring and irrigation scheme on dry matter, ascorbic acid and titratable organic acid levels for 2016 and 2017. As a result of the multispectral LSD analysis of all manuring and irrigation variants for both years observed p-value = 0.000 <0.05 has been found, proving that the impact of the various manuring and watering variants on the tested features (dry matter, ascorbic acid and titratable organic acids) is statistically significant.

The dry matter in the fruit is one of the most important and easily determinable components of the produce quality. Its normal content in tomato fruit varies between 5 and 7.5% (Heuvelink, E. 2005). Considering the dry matter content, for the optimal irrigation options and different manuring levels, the average values range from 4.2 to 5.1 mg%. When 100% manuring is applied, dry matter ranges from 4.6 to 5.6 mg%.

In the first year of the manuring variants with a 100% manuring rate, an increase in the dry matter content was registered by 9.5% compared to the not menured, and in the second year of the survey the increase was by 14.4%. These results are confirmed by a study by Xiukang Wang et al. (2017), according to which the dissolvable solids (TSS) content increases with increasing manuring levels.

According to Bénard et al. (2009), however, lowering the supply of nitrogen has had a low impact on fruit commercial yield (-7.5%), but has reduced plant vegetative growth and increased dry matter content in fruit. Tringovska (2015) also found that in the excessive manuring the biochemical indicators of the quality of the fruits are of lower values.

Table 1. Influence of Manuring and Irrigation Scheme on Dry Matter Content and Titratable Organic Acid Levels

Variant	$\bar{x} \pm SD$					
	Dry matter [a]		**Ascorbic acid [b]**		**Titratable organic acids [c]**	
	2016	**2017**	**2016**	**2017**	**2016**	**2017**
1	4.21±0.023*	4.31±0.025*	37.93±0.030*	34.07±0.016*	0.29±0.021*	0.33±0.017*
2	4.21±0.020*	4.52±0.035*	34.06±0.024	34.07±0.022*	0.30±0.019*	0.34±0.020*
3	4.29±0.030	4.50±0.029	34.12±0.037	38.45±0.033	0.31±0.017	0.31±0.017
4	4.31±0.025*	4.50±0.029	27.95±0.039*	32.61±0.021*	0.32±0.018	0.39±0.020*
5	4.10±0.019*	4.60±0.037*	30.57±0.039*	33.58±0.032*	0.30±0.019*	0.41±0.026*
6	4.21±0.022*	4.41±0.037*	32.31±0.020*	30.16±0.023*	0.32±0.018	0.32±0.018
7	4.10±0.018*	4.60±0.037*	27.07±0.035*	30.17±0.025*	0.34±0.020*	0.39±0.020*
8	3.91±0.061*	4.60±0.037*	27.95±0.039*	28.24±0.023*	0.31±0.017	0.37±0.027*
9	4.90±0.035*	5.10±0.021*	24.45±0.033*	30.17±0.025*	0.32±0.018	0.36±0.027*
10	4.60±0.037*	5.60±0.037*	26.64±0.031*	32.61±0.022*	0.32±0.018	0.33±0.017*
11	4.70±0.035*	5.00±0.053*	25.33±0.029*	28.23±0.022*	0.33±0.017*	0.32±0.018
12	4.61±0.032*	4.60±0.037*	21.83±0.036*	30.66±0.026*	0.33±0.017*	0.35±0.027*

Based on observed means.
The error term is Mean Square (Error) = 0.000
a. R^2 = 0.987(Adjusted R^2 = 0.987) for 2016; R^2 = 0.990 (Adjusted R^2 = 0.990) for 2017
b. R^2 = 1.000 (Adjusted R^2 = 1.000) for 2016; R^2 = 1.000 (Adjusted R^2 = 1.000)for 2017
c. R^2 = 0.414 (Adjusted R^2 = 0.405) for 2016; R^2 = 0.669 (Adjusted R^2 = 0.663) for 2017
*test: LSD significant mean differences between variant 3 (accepted as Control) and all other variants of tomato fruit treatment at the p <0.05 level

As can be seen from Table 1,statistically significant differences in average dry matter between optimum irrigation and not menured variants (Variant 3) and variants of manuring and irrigation in tomatoes for 2016 exist. The credibility of the difference in the average values of dry matter are proven with the results obtained for 2017with the exception of variants3 and 4, where no statistically significant differences were observed. These results are presented graphically in Fig. 1a and 1b. The figure clearly shows the average values and standard deviations of the dry matter indicator for the various tomato processing options, greenhouse production, and the credible differences between them.

The frequency distribution of the average dry matter content of tomato fruits into the two years of the experiment is shown at Fig. 2a and 2d. As can be seen from the figure, the values of the dry matter have a distribution/diffusion close to the normal value.During the second year, higher values of the indicator were recorded. The upward trend in dry matter volumes in 2016 for 100% manuring variants was also observed in 2017.

3.2. Analysis of Ascorbic Acid

Ascorbic acid (vitamin C) is one of the main quality indicators measured in tomatoes. It is one of the most important organic acids in fruits and vegetables in terms of their nutritional value (Melèndez et al., 2004) The histogram, concerning concentrations of ascorbic acid in 2016 (Fig.2b) reflects the irregular distribution/order of these values in different manuring and irrigation options.

A decrease in the content of ascorbic acid at 100% manuring rate has been registered for various tomatoes with regular irrigation scheme. Limits were set at 21.83-26.64 in the first year and 28.23-32.61 in the second year. Opposed to the background full of different irrigation regimes but without application of manuring the results are the following 34.06-37.93 and 34.07-38.45 (see Table 1). Experimental data show a decrease in the amount of ascorbic acid at higher manuring rates.

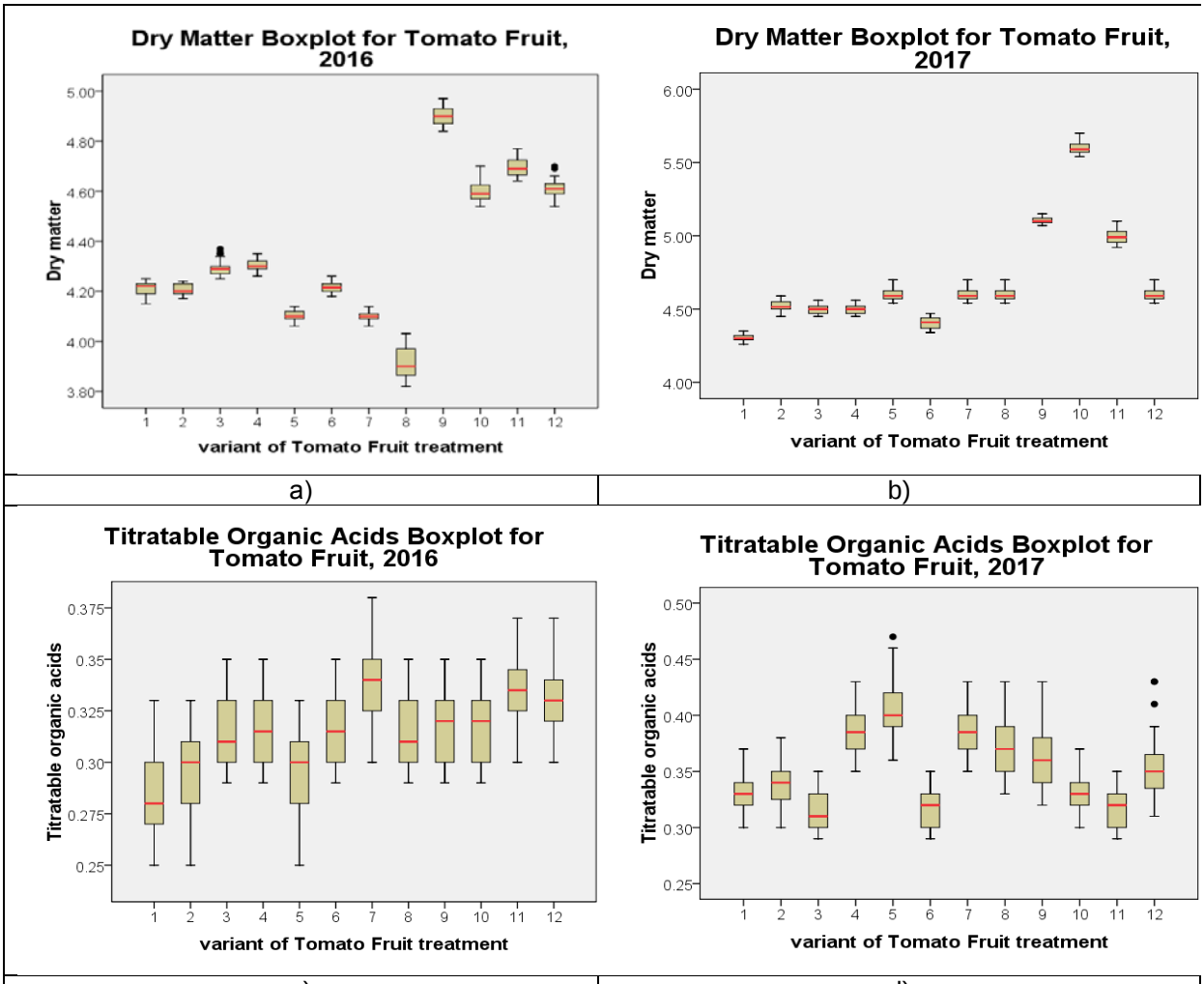
As a result of their own study, Stevens and Rick (1986) study it wide ranges of vitamin C content in tomato fruits (8-119 mg. 100g) was also found. Vasileva et al. (2016) found that fractional (three or

two times) potassium manuring leads to an increase in the dry matter content, total sugars and vitamin C while researching the fruits of the two varieties of tomatoes ("Atak" and "Nicolina F1").

According to a Pevicharova et al. (2013) survey the influence of the irrigation regime on the synthesis of ascorbic acid in tomatoes is relatively low. The content ranges from 19.48 to 60.49 mg per 100 g for irrigated plants and from 12.52 to 85.64 mg per 100 g for not irrigated plants.

The results obtained in this study confirm the insignificant effect of irrigation on the content of ascorbic acid in tomatoes grown under different irrigation regimens. The causing of periodic water deficiency leads to insignificant disturbances in the synthesis of vitamin C.

The multivariate analysis of the results of the chemical component: ascorbic acid proves significant differences between manuring and irrigation variants. Except variant 2 for 2016, reliable differences between the averages of the researched index between option 3 (optimal irrigation regime) and all other variants of treatment are reported for both 2016 and 2017.



Legend1) disrupted irrigation regime (50% of the irrigation norm) without manuring; 2) disrupted irrigation regime (75% of the irrigation norm) without manuring; 3) optimum irrigation regime (100%) without manuring; 4) disrupted irrigation regime (50% of the irrigation norm) and 50% manuring; 5) disrupted irrigation regime (75% of the irrigation norm) and 50% manuring; 6) optimum irrigation regime (100%) and 50% manuring; 7) disrupted irrigation regime (50% of the irrigation norm) and 75% manuring; 8) disrupted irrigation regime (75% of the irrigation norm) and 75% manuring; 9) optimum irrigation regime (100%) and 75% manuring; 10) disrupted irrigation regime (50% of the irrigation norm) and 100% manuring; 11) disrupted irrigation regime (75% of the irrigation norm) and 100% manuring; 12) optimum irrigation regime (100%) and 100% manuring.

Fig. 1. Boxplot of Significant Differences between all Variants of Tomato Fruit Treatment

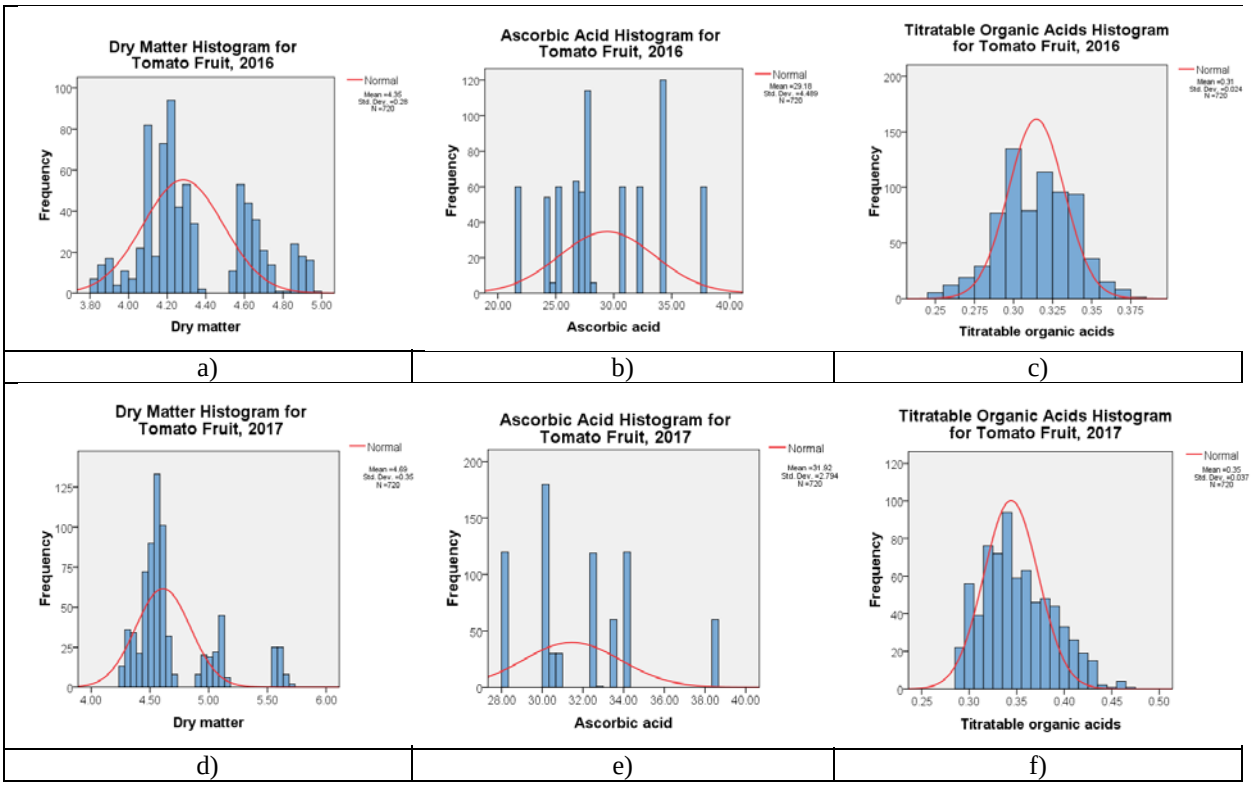


Fig. 2. Histogram of Data Distribution for Dry Matter, Ascorbic Acid and Titratable Organic Acids for 2016 and 2017

3.3. Analysis of Titratable Organic Acids

An important element of plant nutrition is the formation and accumulation of titratable organic acids in tomato fruits. According to Adams et al. (1978), the content of total acidity in tomato fruit has a greater impact on their taste qualities than sugars. Data concerning the total quantity of organic acids (ascorbic, citric, fumaric and malic acids) in tomatoesare presented in this paper.

In Table 1 what makes an impression is that at an optimal manuring rate, the organic acid content ranges within very narrow limits over both years. The highest levels of organic acids are recorded at manuring rates of 50 and 75%. Significant differences were found under the influence of irrigation regimes.With the highest levels of titratable organic acids, variants with impaired/disrupted irrigation regime and reduced manuring levels are distinguished on average. It has been found that when reducing the irrigation rate of 50 and 75% and manuring by 50 and 75%, the parameters for this component range from 0.32 to 0.4 in both years.

Considering the chemical component: Titratable acids (Table 1) statistically significant differences for the year 2016 are recorded between the optimal scheme of watering and manuring (variant 3) and 1, 2, 5, 7, 11 and 12 schemes of irrigation and manuring, and in 2017 the differences between the optimal variant and all other variants except the 6 and 11 are credible.These results are depicted in Fig. 1c and 1d.

As can be seen from Fig. 1c in 2016, the average values of the titratable acid indicator for most treatment regimens are very close or equal, so only some of them have statistically significant differences. In 2017 (Figure 1d) a significant variation in the average values variants for processing options was indicated, with the exception of the options 6 and 11, which justifies the statistical reliability of the differences.

The histogram of the average values for titratable organic acids for 2016 is depicted in Fig. 2c and Fig. 2f for 2017 and indicates that the data has a normal frequency distribution.

3.4. Analysis of the Coefficients of Determinacy for all the Qualitative Indicators Examined

Table 1 shows the coefficients of determinacyof the three quality parameters observed as a result of the analysis. As can be seen from the table, 98.7% (2016) and 99.0% (2017) of variations in the factor: dry matter are due to the impact of different watering/irrigating and manuring options.

Considering ascorbic acid, 100% of variations in both observed years are due to the impact of watering and manuring schemes. Consideringtitratable organic acids, 41.4% for 2016 and 66.9% for 2017 variations are explained by the impact of different manuring levels and different irrigation regimes.

A similar trend is registered by Javaria, et al. (2012) when analyzing the total content of solids, sugars and titratable acidity in samples with different potassium levels. Likewise, lycopene, vitamin C, and total quantity ofdissolvable solids increased significantly with K_2O was increased up to 375 kg but then decreased when K_2O was applied to 450 kg K_2O ha-1.

The results obtained by comparing the impact of different irrigation regimes identify the possibilities for increasing the nutritional qualities of tomatoes by reducing irrigation norms. In support of this, Favatia et al. 2009 reported that the data obtained by regulating irrigation regimes by a reduction of the irrigation rate and an extension of the irrigation interval.

The presented frequency distributions (Figure 2) of the reaearched dry matter qualities and titratable organic acids have a near-normal distribution, and for the ascorbic acid indicator there are larger variations in the base values. Since the data comly with the sample representativeness requirements, and as a result of the analysis, significance levels p-value = 0.000 <0.05 were obtained for the three researched indicators, respectively for both observed years, it can be assumed that the results of the applied multivariate dispersion analysis are common and applicable to the whole aggregation.

The performed multvariate analysis of the influence of the factors manuring and irrigation on the dry matter content and the levels of the organic acids may be used/serve as the basis for developing strategies for irrigation and manuring of tomatoes in order to reduce the environmental risks.

4. Conclusions

From the presented distributions of the tested quality parameters of greenhouse tomatoes, it can be seen that the dry matter and titrimetric organic acids ratios are close to normal, and for the ascorbic acid indicator there are larger variations in the base values.

The data is eligible for the sampling representativity requirements. Significant levels of p <0.05 were obtained for the three researched indicators, i. E. the results of multi-variate dispersion analysis could be used in order to develop strategies for irrigation and manuring of tomatoes to reduce environmental risk.

Significant differences have been found concerning the effects of manuring on the dry matter content of tomatoes, greenhouse production.

Considering the quality indicator: ascorbic acid a decrease in the quantities has been registered with an increase in the manuring norms.

Average variants with disrupted irrigation regime and reduced manuring levels With the highest levels of titratable organic acids are distinguished.

The analysis of the results found that when increasing fertilizer levels, the content of ascorbic acid decreased, i.e., there is an increase in the cost of tomato production and a decrease in the quality of tomatoes.

References

Adams, P., Davies J., Winsor G. (1978). Effects of nitrogen, potassium and magnesium on the quality and chemical composition of tomatoes grown in peat., J. Hort. Sci. 53, 115-122.

Bénard C., Gautier H., Bourgaud F., Grasselly D., Navez B., Caris-Veyrat C., Weiss M., Génard M. (2009). Effects of Low Nitrogen Supply on Tomato (Solanum lycopersicum) Fruit Yield and Quality with Special Emphasis on Sugars, Acids, Ascorbate, Carotenoids, and Phenolic Compounds. J. Agric. Food Chem., 57 (10), pp 4112–4123

Caretto S., Parente A. Serio F., Santamaria P. (2008). Influence of Potassium and Genotype on Vitamin E Content and Reducing Sugar of Tomato Fruits. HORTSCIENCE 43(7):2048–2051. 2008.

Constán-Aguilar C., Leyva R., Romero L, Soriano T., Blasco B., Ruiz J. M.. (2015). The Effect of Potassium Biofortification Over Yield and Nutritional Quality of Cherry Tomato Fruits. American Journal of Advanced Food Science and Technology, Vol. 3 No. 2 pp. 67-93. doi:10.7726/ajafst.2015.1006

Favati F., Lovelli S., Galgano F., Miccolis V., Tommaso T. D., Candido V. (2009). Processing tomato quality as affected by irrigation scheduling. Scientia Horticulturae. Volume 122, Issue 4, Pages 562-571

Genadiev A., Kalcheva D., Nenchev N., Tevecheliev N., Chavdarova H. (1969). Annanization of Food Products. Technika, Sofia, 695 p.

Heuvelink, E. (2005). Tomatoes, Wageningen University, The Netherlands, CABI Publishing

Javaria S, Khan M. Q., Rahman H. U., Bakhsh I. (2012a). Response of tomato yield and post harvest life to potash levels. Sarhad J. Agric. Vol.28, No.2, 227-235.

Javaria S., Khan M. Q. Bakhsh I. (2012b). Effect of potassium on chemical and sensory attributes of tomato fruit. The Journal of Animal & Plant Sciences, 22(4): 2012, Page: 1081-1085

Liu K., Zhang T. Q.,. Tan C. S., Astatkie T. (2011). Responses of Fruit Yield and Quality of Processing Tomato to Drip-Irrigation and Fertilizers Phosphorus and Potassium. Agronomy Journal Abstract - Soil Fertility & Crop Nutrition, Vol. 103 No. 5, p. 1339-1345.

Liu J., Qi S., Wei X.,Wang C., Shi W. (2009). The Effects of Different Concentrations of N,P,K Mixed on the Growth and Reproduction of Processing Tomato Seedling. http://en.cnki.com.cn/Article_en/CJFDTotal-BFYY200907004.htm.

Melèndez, J. A. Bejines, E., Vicario M. I., Heredia J. F. (2004). Vitamin C in orange juices. Ital. J. Food Sci. n. 1, vol. 16.Oke M., Ahn T., Schofield A., Paliyath G. (2005). Effects of Phosphorus Fertilizer Supplementation on Processing Quality and Functional Food Ingredients in Tomato. J. Agric. Food Chem., 2005, 53 (5), pp 1531–1538.

Ozbahce A., Tari. A. F. (2010). Effects of different emitter space and water stress on yield and quality of processing tomato under semi-arid climate conditions. Agricultural Water Management. Volume 97, Issue 9, Pages 1405-1410.

Patanè C., Cosentino S.L. (2010). Effects of soil water deficit on yield and quality of processing tomato under a Mediterranean climate. Agricultural Water Management. Volume 97, Issue 1, January 2010, Pages 131-138.

Pevicharova G., Ganeva D., Zamir D. (2013). Influence of irrigation on the content of ascorbic acid in a collection of soybean Solanum cheesmaniae. Plant Breeding Sciences, 50, 70-74.

Stevens M. A., Rick C. M. (1986). Genetics and breeding. The Tomato Crop pp 35-109.

Tringovska I. (2015). Optimization of Fertilization Schedule in Greenhouse Grown Tomatoes. Plant science, № 2, 101-105.

Toor R.K., Savage G. P., Heeb A. (2006). Influence of different types of fertilisers on the major antioxidant components of tomatoes. Journal of Food Composition and Analysis Volume 19, Issue 1, Pages 20-27.

Vasileva V., Dinev N., Mitova I. (2016). Effect of different potassium fertilization treatments on some biochemical parameters, related to tomato fruit quality. ttp://hst.bg/bulgarian/conference.htm

Xiukang Wang, Yingying Xing . 2017. Evaluation of the effects of irrigation and fertilization on tomato fruit yield and quality: a principal component analysis. 1Scientific RepoRts | 7: 350 | DOI:10.1038/s41598-017-00373-8.

Zugui L., Aiwang D., Haiqing W., Jiyang Z., Guangxing W. (2003). Impacts of Water-and-Fertilizer Allocation on Tomato Yield and Water Use Efficiency in Drip Irrigation Greenhouse. China Rural Water and Hydropower, 2003-01, http://en.cnki.com.cn/Article_en/CJFDTOTAL-ZNSD200301004.htm

Zhang H., Xiong Y., Huang G., Xu Xu, Huang Q. (2017). Effects of water stress on processing tomatoes yield, quality and water use efficiency with plastic mulched drip irrigation in sandy soil of the Hetao Irrigation District. Agricultural Water Management. Volume 179, 1 January 2017, Pages 205-214

Kuşçu H., Turhan A., Demir A.O. (2014). The response of processing tomato to deficit irrigation at various phenological stages in a sub-humid environment. Agricultural Water Management. Volume 133, February 2014, Pages 92-103.

ASSESSMENT OF VALUE-ADDED TAX EFFECTIVENESS

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Abstract

Assessment of value-added tax (VAT) effectiveness is not a new phenomenon in scientific research domain (De Oliveira, Costa, 2015; Hybka, 2009; Matthew, 2003; Schaffer, 2000). Nonetheless, it could be noted that assessment of effectiveness of this tax is usually treated from a narrow perspective, i.e. in terms of collection of the maximum tax revenue at the minimum administrative costs. The concept of effectiveness, however, covers a lot more tax components, and its assessment cannot be limited to one or two aspects only, meaning that only a comprehensive analysis may help identify the disadvantages and advantages of the tax (Mansor, 2005; Ufier, 2014 et al.). The object of this research is therefore combined assessment of VAT effectiveness. Research aim – to design the methodology for assessment of VAT effectiveness enabling comprehensive assessment of VAT effectiveness.

In the course of the research work, it has been found that there is no uniform comprehensive methodology for objective assessment and comparison of VAT effectiveness in individual countries. The most common are the most informative quantitative methods for assessment of VAT effectiveness related to analysis of the tax revenue structure, assessment of the general tax burden and VAT burden, analysis of changes in tax revenues generated by VAT and tax rates based on the Laffer Curve model. There is shortage of methods that would enable inclusion of qualitative indicators into assessment of VAT effectiveness.

Selection of quantitative and qualitative indicators defining VAT effectiveness and integration of the selected indicators under the multi-criteria SAW method underlies the methodology for assessment of VAT effectiveness designed during the research (Chen, 2015; Ufier, 2014). The methodology covers the criteria of tax revenue collection and tax administration complexity. The indicators which represent different components of the analysed phenomenon have been selected for the quantitative research, as they provide the required information and are not time-intensive in terms of processing (Emmanuel, 2013; Olatunji, 2009; Poddar, 2009; Vlassenko, 2011). Expert method has been applied to assessment of the qualitative indicators, experts' opinions are in line with each other.

The model designed on the basis of the multi-criteria method covers the VAT revenue collection and tax administration components in view of the findings by other researchers that these two factors have the major effect on effective tax functioning. The multi-criteria assessment of VAT effectiveness enables combining the indicators, which have been subject to quantitative and qualitative assessment, into a single quantitative estimate that is comparable to other estimates of effectiveness calculated under the same method (see Fig.).

Empirical research of three EU countries (Lithuania, the Czech Republic, and Latvia) has been conducted for verification of reliability and applicability of the methodology. The results generated has enabled the authors to identify the differences in VAT effectiveness in individual countries and the causes for lower or higher effectiveness.

Keywords: Value-added tax, value-added tax effectiveness, SAW metod.

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RESPONSE OF COTTON TO FERTILIZING LEVELS IN THE CONDITIONS OF SOUTHERN BULGARIA

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Abstract

The aim of this study was to evaluate the effects of different application rates of nitrogen and phosphorus on seed-cotton yield and total biomass of cotton (*G. hirsutum* L.), grown during the period 2012-2014 in Chirpan, Bulgaria, in crop-rotation with durum wheat under non-irrigated conditions. The soil type was Leached vertisols. The experimental design was a randomized complete block with four replications. Single and combined nitrogen as NH_4NO_3 in rates 0; 80; 120 and 160 kg.ha^{-1} and phosphorus in rates 0; 80 and 120 kg.ha^{-1} were tested. The year conditions had greatest share in the total variation of the factors – 67.4 %. The N influence on seed-cotton yield was 13.0 % and of phosphorus - 0.45 % of total variation. No significant differences in the total seed-cotton yield occurred as a function of the NP interaction. The nitrogen and phosphorus fertilizers used in cotton production remain important, as N has a decisive influence, while phosphorus has less effect. Under the influence of N fertilization, the total seed-cotton yield significantly increased by 26.6-32.9 % compared to the check (1.32 t.ha^{-1}), and under fertilization P_{120}– by 2.9 %. An alone phosphorous fertilization was not cost-effective agronomic activity. Application of increasing NP rates in different rates showed good economic results regarding the yield. The maximum effective yield and net return from cotton cultiar Darmi can be secured by application of $N_{120\text{-}160}P_{80\text{-}120}$ to cotton crop at Central South Bulgaria - 26.6-37.8 % more than the unfertilized. Total average dry biomass at maturity was 5.51 t.ha^{-1}. The total dry matter was more than the unfertilized by 24.0; 40.8 and 62.8 % at N_{80}, N_{120} and N_{160} respectively. The phosphorous fertilization increased the yield of biomass by 7.6 % at P_{80} and by 3.4 % at P_{120}. The year conditions had strong effect on seed-cotton yield and total biomass. The main reason for the high yields in 2014 for all tested rates, as well as the control, was the very good combination of temperature and rainfall during the vegetation period.
Keywords: Cotton, fertilization, nitrogen, phosphorus, seed-cotton yield, dry matter.

1. Introduction

Recommendations for cotton fertilization range from relatively low to very high rates (Clawson et al., 2008; McConell et al., 1993) but all authors agree that the maximum potential of yield cannot be attained without sufficient amount of nutrients at each developmental stage (Kirchmann & Thorvaldsson, 2000). The nitrogen level is one of the determinants of cotton productivity. In case of nitrogen deficit the cotton plants develop with suppressed vegetative and reproductive growth, have

early maturity and low yield (Stewart et al., 2010). In contrast, excessive N can have negative impact on yield and can result in economic loss.

According to Clawson et al. (2006), Munir et al. (2015) and other authors N increased lint yield, plant height, main stem nodes, and both whole-plant and subset individual boll weight, but lint percentage was not affected by nitrogen. Pettigrew and Adamczyk (2006) reported that N treatments had no effect on lint yield or any dry matter partitioning components. According to Girma et al. (2007) the nitrogen, phosphorus and potassium fertilizers used in cotton production remain important, as N has a decisive influence, while phosphorus has less effect.

Sawan et al. (2008) and other authors reported that P fertilizer was generally not effective, and significant differences were not observed for cotton yield. Saleem et al. (2010) reported that phosphorus levels significantly affected almost all the characters related to earliness and yield. According to Cahill et al. (2008) phosphorus deficiency violates the nitrogen nutrition.

The critical level of phosphorus is a function of actual concentration of the labile pool that in turn determines the available P during the growth of cotton (Crozier et al., 2004). The nitrogen uptake is reduced in plants with phosphorus deficiency (Breitenbeck and Boquet, 1993). According to Gill et al. (2000) there are cases where cotton response to phosphorus has been positive and economical. Application of NPK nutrients had some effect on lint yield, although most of the response was attributed to N and to some extent P (Girma et al., 2007).

Weather conditions and fertilizers have a great effect on cotton yield. Cotton yield under different conditions is a desirable characteristic because Bulgaria is located on the northern cotton-cultivating boundary. In Bulgaria there are suitable soil and climatic conditions, tradition, experience and advanced research for cotton growing. The foreign cultivars in Bulgaria have late maturity and fail to manifest their yield and quality potential. The nutrient requirements of the new varieties are often questioned by producers. Optimizing fertilization for cotton cultivars is one possible way of tailoring production practices to achieve optimal economic returns.

The aim of this study was to evaluate the effects of different application rates of nitrogen and phosphorus on growth, yield, earliness and quality of cotton (*Gossypium hirsutum* L.) cultivar Darmi, grown in the region of Central South Bulgaria.

2. Material and Methods

The experiment was carried out on the field of the Field Crops Institute, Chirpan, situated in a major cotton-growing region of Bulgaria during the period 2012-2014. The cotton (*G. hirsutum* L.) cultivar Darmi was grown in double crop-rotation with durum wheat under non-irrigated conditions. The experimental design was a randomized complete block with four replications. Individual plots consisted of six 2.40-m rows spaced 0.60 m apart with a net plot size of 10 m^2. Single and combined N and P_2O_5 fertilizers were tested. The rates of nitrogen were 0; 80; 120 and 160 $kg.ha^{-1}$ and of phosphorus – 0; 80 and 120 $kg.ha^{-1}$. The source of N was ammonium nitrate, of P_2O_5 – triple superphosphate. The applied agrotechnical practices were complied with the technology established for the region. Cotton seeds were sown by 20-30 April. The plant population reached as much as 160 000 $plants.ha^{-1}$, approximately. Weeds were controlled by preplant and preemergence herbicides, inter-row cultivation and hand chipping. Defoliants were not applied. The crops were harvested by hand. Cultivar Darmi was established in Bulgaria in 2007 with improved quality of the fibre. It was created by crossing breeding line N 268 (with geneplasm from species *G. barbadense* L.) x C-9070 (Uzbek variety). The total seed-cotton yield ($t.ha^{-1}$) and yield of the total biomass ($t.ha^{-1}$) were determined. Analysis of variance (ANOVA) was performed to evaluate differences and interaction among the nitrogen rates, phosphorus rates and years.

The studied years had different meteorological conditions during the vegetation period (May-October) (**Figures 1 and 2**). Regarding temperature and rainfall during cotton vegetation, the studied years were characterized as follows: 2012 was very warm and dry, with insufficient precipitation during the critical stages of cotton development – flowering and bolls formation; 2013 was characterized as moderately warm and moderately dry; and 2014 was moderately warm and very wet.

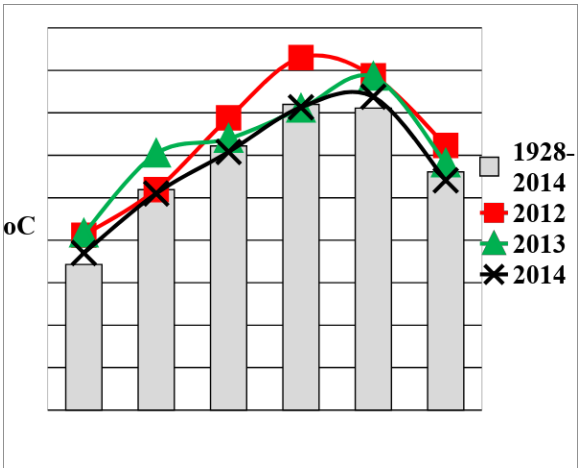

Figure 1. Temperature Sum, (^{o} C) During Cotton Vegetation Period (IV–IX), 2012-2014

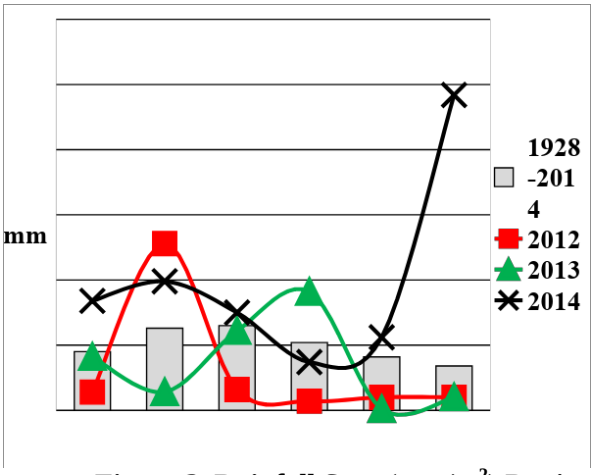

Figure 2. Rainfall Sum (mm/m^2) During Cotton Vegetation Period (IV–IX), 2012-2014

The soil type at the region was Pellic Vertisols (FAO), defined by its sandy-clay composition, with high humidity capacity and small water-permeability. The soil in the field had neutral soil reaction in the 0-60 cm soil layer, medium supplied with organic matter, moderately N provided, with low content of mobile P_2O_5 and well supplied with available K_2O (**Table 1**).

Table 1. Agrochemical Properties of the Soil, Chirpan

Parameters	Depth, cm	
	0 - 30	30 - 60
pH_{KCl}	6.7	6.2
Humus, %	2.80	2.55
Total N, %	0.100	0.090
Total Nmin, kg.ha^{-1}	97	83
Mobile P_2O_5, mg.kg^{-1}	51	39
Available K_2O, mg.kg^{-1}	230	160

3. Results and Discussion

Cotton productivity widely varied depending on the environmental conditions and agrotechnical activities, including applied fertilization and type of crop rotation (Coker et al., 2009). The effect of meteorological conditions on cotton yield was of great significance as Bulgaria is located on the northern border of the crop distribution.

The obtained results showed that fertilization had a good effect on seed-cotton yield with an average yield of 1.62 t.ha^{-1} (**Table 2**). The average formed seed-cotton yield without fertilization was 1.32 t.ha^{-1}. The shortage of nutrients held back the development of cotton plants and reduced cotton yield. There were significant differences in the yields of the tested N levels over the period. The studied single N fertilization showed an increase in the seed-cotton yield up to N_{120} – an average 1.76 t.ha^{-1}, which was 32.9 % above the unfertilized control. The high rate N_{160} decreased the yield by 2.4 % compared to the yield obtained from the moderate level of N_{120}.

According to Munir et al. (2015) the highest seed-cotton yield is obtained after application of 180 kg N.ha^{-1}, which, however, was not statistically proven for 120 kg N.ha^{-1}, and the authors drew the conclusion that cotton should be cultivated with fertilization of 120 kg N.ha^{-1}. These results also correspond to the realized yield in this study. A very good average yield was reported at low rates of nitrogen fertilization N_{80} – 1.67 t.ha^{-1}, and at this fertilization rate in 2014 cultivar Darmi had a very good yield - 2.46 t.ha^{-1}.

Table 2. Effect of Fertilization on the Total Seed-Cotton Yield, t.ha^{-1}

Treatment	Year			Average	
	2012	2013	2014	t.ha^{-1}	%
$N_0P_0K_0$	1.13	1.10	1.74	1.32	100
N_{80}	1.36	1.20	2.46	1.67	126.6
N_{120}	1.46	1.41	2.41	1.76	132.9
N_{160}	1.42	1.44	2.32	1.73	130.5
P_{80}	1.20	1.17	1.71	1.36	102.9
$N_{80}P_{80}$	1.38	1.32	2.45	1.72	129.9
$N_{120}P_{80}$	1.45	1.57	2.44	1.82	137.7
$N_{160}P_{80}$	1.48	1.38	2.36	1.74	131.6
P_{120}	1.22	1.11	1.6	1.32	99.9
$N_{80}P_{120}$	1.38	1.36	1.99	1.58	119.3
$N_{120}P_{120}$	1.48	1.54	2.23	1.75	132.3
$N_{160}P_{120}$	1.46	1.34	2.23	1.68	126.6
Average	**1.37**	**1.33**	**2.16**	**1.62**	
GD $_{5\ \%;\ 1\ \%;\ 0,1\%}$ = 0.28; 0.36; 0.47.					

Saleem et al. (2010) reported that phosphorus fertilization at different rates had a significant effect on almost all the traits related to cotton growth and yield. In this study, the effect of single phosphorus fertilization was low (**Table 2**). Average for the period, after fertilization at a moderate rate of 120 kg P_2O_5.ha^{-1} the yield equaled the unfertilized variant, and varied significantly over the three years – an increase of yield in 2012 by 7.6 %, decrease by 5.9 % in 2014, and in 2013 it was close to the control. At a lower rate of P_{80} the average yield had an insignificant increase by 2.9 %. Cahill et al. (2008), Sawan et al. (2008) and other authors reported that single phosphorus fertilization as a whole was not effective and no significant differences were observed in cotton yields. Application of increasing NP rates in different ratios showed very good economic results regarding the yield. At combined $N_{120}P_{80}$ fertilization led to the highest average yield - 1.82 t.ha^{-1}. The low fertilization rate $N_{80}P_{80}$ had very good effectiveness when compared to the unfertilized, the yield was 29.9% more, and in 2014 the yield of seed cotton was 2.45 t.ha^{-1}. Fertilization at a moderate rate of $N_{120}P_{120}$ average for the period was 1.75 t.ha^{-1}, by 32.36 % more than the control. Compared to the unfertilized variant, the increase of yield at $N_{120}P_{120}$ in 2014 was 28.0 % above the control and a yield of 2.23 t.ha^{-1}was obtained.

The yield of seed cotton in 2014 was an average of 2.16 t.ha^{-1}, which was significantly higher than the ones obtained in 2012 (1.37 t.ha^{-1}) and 2013 (1.33 t.ha^{-1}). The highest result in 2014 was realized at fertilization with N_{80} – 2.46 t.ha^{-1}. One of the main reasons for the high yields in 2014 for all tested variants, including the control, was the very good combination of temperature and rainfall during the vegetation period. The rainfall in May and the summer months of 2014 contributed to emergence within the optimal terms, for the good density of the crops, stimulated the formation, holding and growth of a good number of bolls. In 2012 and 2013 the low yields were due to the higher temperatures during the vegetation period – 383 and 259° C more than the average values, respectively, as well as due to the long spring-summer drought, which led to shedding of buds and blossoms and impeded the proper nourishment of the bolls.

The results from the analysis of variance for total seed-cotton yield as affected by the N rates, phosphorus rates and years factors are shown in **Table 3**.

When the independent effect of the factors was reported, it was found that the year conditions were the strongest source of variation on cotton yield (67.37 % of the total effect), significant at P δ 0.001. The rate of N fertilization also had a strong impact (13.04 %). The effect of phosphorus rates at various rates - 0.45 % was low and not proven. The interaction N x P was insignificant, i.e. the applied phosphorus rates had one-way effect on nitrogen. The interaction N x Year was proven at P δ 0.01, whereas P x Year was significant to a low extent.

Table 3. Analysis of Variance for Cotton Yield with Fertilization, 2012-2014

Source of variation	Degree of freedom	Sum of squares	Sum of squares, %	Dispersion	F
Total	143	318628.5	100.00		
Blocks	3	3434.2	1.08*	1145	2.96
Variants	35	274627.8	86.19***	7846	20.31
A - N rate	3	41556.5	13.04***	13852	35.85
B - P rate	2	1425.5	0.45	713	1.84
C - Year	2	214654.5	67.37***	107327	277.8
A x B	6	516,8	0.16	86.12	0.22
A x C	6	9072	2.85**	1512	3.91
B x C	4	4174.8	1.31*	1044	2.70
A x B x C	12	3227.8	1.01	269	0.70
Error	105	40566.5	12.73	386	-

Regarding the independent effect of N, the analysis of variance showed that average for the study the tested rate of N_{120} led to forming the highest yield – 1.78 t.ha^{-1}, followed by the high rate of N_{160} – 1.66 t.ha^{-1} (**Fig. 3**). Regarding the main effect of phosphorus, rate P_{80} had a greater effect on yield, but the differences with the effect of the other two tested phosphorus rates were insignificant (**Fig. 4**).

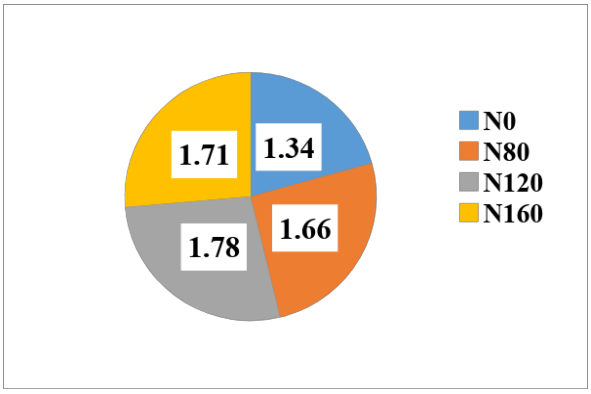

Figure 3. Main Effect of Nitrogen on the Total Seed-Cotton Yield, t.ha^{-1}

GD $_{5\ \%;\ 1\ \%;\ 0{,}1\%}$ = 0.92; 1.21; 1.57

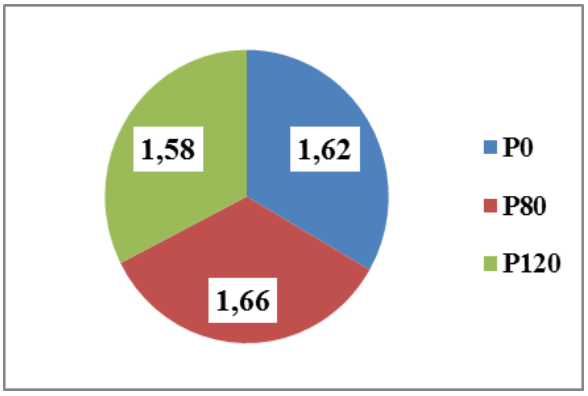

Figure 4. Main Effect of Phosphorus on the Total Seed-Cotton Yield, t.ha^{-1}

GD $_{5\ \%;\ 1\ \%;\ 0{,}1\%}$ = 0.79; 1.05; 1.39

The amount of dry matter including fiber and seed yield – i.e. the total yield of raw cotton, as well as formed leaves, stems and bolls under different nutritional management is shown in **Table 4.**

The total dry biomass in maturity average for the experimental period was 5.51 t.ha^{-1}. Average for the 3-year period, unfertilized cotton plants formed 4.07 t.ha^{-1} of dry matter. At single fertilization with $N_{80}N_{120}$ and N_{160} the total average dry matter at the maturity stage exceeded the unfertilized by 24.0, 40.8 and 62.8 %, respectively. A number of authors analyzed the role of nitrogen in forming the total biomass. Surya et al. (2010) pointed out that nitrogen influenced both vegetative and reproductive growth as its deficiency decreased the yield of total biomass by accelerating the premature leaf senescence (Fageria and Baligar, 2005) and their early cut-out (Read et al., 2006), while nitrogen in excess can delay crop maturity and promote boll shedding, diseases and insect damages (Howard et al., 2001).

Single phosphorus fertilization contributed to the increase of dry matter by 7.62 % at P_{80} and by 3.36 % at P_{120}. The results showed differences by years and greater biomass in 2014 stood out – 4.95 and 4.45 t.ha^{-1} at P_{80} and P_{120}, respectively, whereas the quantity in 2012 and 2013 for the two high rates ranged from 3.90 to 4.26 t.ha^{-1}. According to some researchers (Dorahy et al., 2008) the application of phosphorus fertilizers has no effect on the quantity of biomass and fiber yield, whereas

others (Bassett et al., 1970; Leffler, 1986) reported that phosphorus fertilization increased dry matter and assimilation of nutrients.

Table 4. Effect of Fertilization on the Total Dry Biomass of Cotton in Maturity, t.ha^{-1}

Treatment	Year			Average	
	2012	2013	2014	t.ha^{-1}	%
$N_0P_0K_0$	3.80	3.65	4.75	4.07	100.0
N_{80}	4.74	4.50	5.85	5.03*	123.7
N_{120}	5.12	4.96	7.10	5.73***	140.8
N_{160}	5.76	6.20	7.90	6.62***	162.8
P_{80}	4.20	3.96	4.95	4.38	107.5
$N_{80}P_{80}$	5.06	4.58	5.95	5.20**	127.8
$N_{120}P_{80}$	5.48	5.20	7.25	5.98***	147.0
$N_{160}P_{80}$	6.04	5.90	8.05	6.66***	163.8
P_{120}	3.90	4.26	4.45	4.20	103.4
$N_{80}P_{120}$	4.72	4.96	5.75	5.14**	126.5
$N_{120}P_{120}$	5.48	5.48	7.60	6.19***	152.1
$N_{160}P_{120}$	6.18	6.35	8.14	6.89***	169.4
Average	**5.04**	**5.00**	**6.48**	**5.51**	**-**
GD $_{5\ \%;\ 1\ \%;\ 0{,}1\%}$= 0.63; 0.86; 1.16					

Combined NP fertilization had a proven effect on dry matter yield. After fertilization with $N_{80}P_{80}$ the total dry biomass increased and it was 5.197 t.ha^{-1} average for the period, which was by 27.8% above the unfertilized. Increasing the combined fertilization rates also led to an increase of cotton dry matter. $N_{160}P_{80}$ formed 6.66 t.ha^{-1} biomass, 63.85% more than the control. Average for the period, the highest result was reported for high combined fertilization at rate $N_{160}P_{120}$ – 69.4% above the unfertilized.

Table 5. Correlation of Fertilization and Cotton Productivity

Correlations	2012	2013	2014	2012-2014
Only N rates - Total cotton yield	0.923*	0.953*	0.776	0.921*
Only N rates - Total dry biomass	0.997**	0.960**	0.986*	0.988*
N rates combined with P - Total cotton yield	0.935**	0.652	0.712	0.805*
N rates combined with P - Total dry biomass	0.991*	0.973**	0.968**	0.989**
Only P rates - Total cotton yield	0.945	0.981	0.518	0.774
Only P rates - Total dry biomass	0.827	0.999*	0.882*	0.928*
P rates combined with N - Total cotton yield	0.836*	0.678	0.460	0.659
P rates combined with N - Total dry biomass	0.673	0.761*	0.622	0.685

The effect of fertilization on total biomass was strong – 61.58 % of the total effect of tested factors, and year conditions also had significant effect – 32.5 %. In 2014, the biomass yield was significantly higher compared to the other two years and at rate N_{160} biomass was 7.90 t.ha^{-1} - 66.3 % more than the control, whereas at $N_{160}P_{120}$ dry biomass exceeded the unfertilized by 71.4 %. The average amount of biomass in 2014 was 6.48 t.ha^{-1}, and in 2012 and 2013 – 5.04 and 5.00 t.ha^{-1}, respectively. The increased biomass at different fertilization rates was mainly from vegetative mass – leaves, stems and bolls.

For the studied period the share of seed cotton compared to the total above ground mass was an average of 29.4 %, and when grown without fertilization it was 32.5 %, 33.2 % at N_{80} and it decreased to 26.1% at N_{160} and up to 24.3 % at $N_{160}P_{120}$ (**Tables 2 and 4**). The differences can be explained with the role of nitrogen to stimulate growth of over ground plant parts, with the growing conditions and technology, with the difference in formed yields of cotton and vegetative mass. The variations by years under the influence of fertilization were better expressed regarding the vegetative mass compared to the fiber and seed yield.

Over the three years, the correlation between alone and combined nitrogen fertilization with biomass was better expressed (**Table 5**), while the phosphorous fertilization was significantly correlated only to total dry biomass.

4. Conclusions

On the basis of three years field experimentation, we can conclude that the nitrogen and phosphorus fertilizers used in cotton production remain important, as N has a decisive influence, while phosphorus has less effect.

Application of increasing NP rates in different rates showed good economic results regarding the yield. The maximum effective yield and net return from cotton cultiar Darmi can be secured by application of $N_{120}P_{80}$ per hectare to cotton crop at Central South Bulgaria in Leached vertisols soil type. At this combined fertilization the average seed cotton yield was 1.82 $t.ha^{-1}$, by 37.8 % above the unfertilized. Under the effect of nitrogen fertilization, yield increased by 26.6 (N_{80}) to 32.9 % (N_{120}) compared to the unfertilized (1.32 $t.ha^{-1}$), and phosphorus fertilization – up to 2.9 % at P_{80}. An alone phosphorous fertilization was not an efficient agronomic activity.

The total dry biomass in maturity was an average 5.51 $t.ha^{-1}$. Unfertilized cotton plants formed 4.07 $t.ha^{-1}$ of biomass. At single fertilization with N_{80}, N_{120} and N_{160}, the total dry matter in the maturity stage was more than the unfertilized by 24.0, 40.8 and 62.8 %, respectively. Single phosphorus fertilization increased the biomass yield by 7.6 % at P_{80} and by 3.4 % at P_{120}. The biomass was highest at combined fertilization $N_{160}P_{120}$ – 69.4 % above the unfertilized.

The share of seed cotton compared to the total above ground biomass was an average of 29.4 %, and when grown unfertilized it was 32.5 %, it was 33.2 % at N_{80} and decreased to 26.1 % at N_{160} and to 24.3 % at $N_{160}P_{120}$.

The year conditions had strong effect on seed-cotton yield and total biomass. The main reason for the high yields in 2014 for all tested rates, as well as the control, was the very good combination of temperature and rainfall during the vegetation period.

References

Bassett, D., Anderson, W. & Werkoven, C. (1970). Dry matter production and nutrient uptake in irrigated cotton (*Gossypium hirsutum*). Agron. J., 62: 299-303.

Breitenbeck, G. & Boquet, D. (1993). Effect of N fertilization on nutrient uptake by cotton. Proceedings of the Beltwide Cotton Conferences, Jan. 10-14 1993, New Orleans, LA.: 1298-1300.

Cahill, Sh., Johnson, A., Osmond, D.L. & Hardy, D.H. (2008). Response of Corn and Cotton to Starter Phosphorus on Soils Testing Very High in Phosphorus. Agronomy Journal, 100 (3): 537-542.

Clawson, E.L., Cothren, J.T. & Blouin, D.C. (2006). Nitrogen fertilization and yield of cotton in ultra-narrow and conventional row spacings. Agron. Journal, 98: 72-79.

Clawson, E., Cothren, J.T., Blouin, D.C. & Satterwhite, J.L. (2008). Timing of Maturity in Ultra-Narrow and Conventional Row Cotton as Affected by Nitrogen Fertilizer Rate. Agronomy Journal, 100 (2): 421–431.

Coker, D., Oosterhuis, D. & Brown, R. (2009). Cotton Yield Response to Soil- and Foliar-Applied Potassium as Influenced by Irrigation. The Journal of Cotton Science, 13: 1-10.

Crozier, C., Walls, B., Hardy, D. & Barnes, J. (2004). Response of Cotton to P and K Soil Fertility Gradients in North Carolina. J. Cotton. Sci., 8: 130-141.

Dorahy, Ch., Rochester, I., Blair, Gr. & Till, A. (2008). Phosphorus Use-Efficiency by Cotton Grown in an Alkaline Soil as Determined Using ^{32}Phosphorus and ^{33}Phosphorus Radio-Isotopes. J. of Plant Nutrition, 31 (11): 1877-1888.

Fageria, N.K. & Baligar, V.C. (2005). Enhancing nitrogen use efficiency in crop plants. Adv. Agron. 88: 97-185.

Gill, K., Sherazi, S., Iqbal, J., Ramzan, M., Shaheen M. & Ali, Z. (2000). Soil Fertility Investigations on Farmers Fields in Punjab. Soil Fertility Research Institute, Department of Agriculture, Govt. of Punjab, Lahore, Pakistan: 133-135.

Girma, K, Teal, R., Freeman, K., Boman, R. & Raun, W. (2007). Cotton Lint Yield and Quality as Affected by Cultivar and Long-Term Applications of N, P, and K Fertilizers. 15th annual 2017 NUE Conference, Baton Rouge, LA: 12-19.

Howard, D.D., Gwathmey, C.O., Essington, M.E., Roberts, R.K., & Mullen, M.D. (2001). Nitrogen fertilization of no-till cotton on loess- derived soils. Agron. Journal, 93: 157-163.

Kirchmann, H. & Thorvaldsson, G. (2000). Challenging targets for future agriculture, European Journal of Agronomy, 12 (3-4): 145-161.

Leffler, H. (1986). Mineral compartmentation within the boll. Chapter 21: 301-309. *In* J.R. Mauney and J. McD. Stewart (Eds.), Cotton Physiology. The Cotton Foundation. Memphis, TN.

McConnell, J.S., Baker, W., Miller, D., Frizzell, B.S. & Varvil, J.J. (1993). Nitrogen Fertilization of Cotton Cultivars of Differing Maturity. Agronomy Journal, 85(6): 1151-1156.

Munir, M., Tahir, M., Saleem, M. & Yaseen, M. (2015). Growth, yield and earliness response of cotton to row spacing and N management. The J. of Animal & Plant Sciences, 25(3): 729-738.

Pettigrew, W.T. & Adamczyk, J.J. (2006). Nitrogen Fertility and Planting Date Effects on Lint Yield and Cry1Ac (Bt) Endotoxin Production. Agron J., 98: 691-697.

Read, J.J., Reddy, K.R. & Jenkins, J.N. (2006). Yield and fiber quality of Upland cotton as influenced by nitrogen and potassium nutrition. Europ. J. Agron., 24: 282-290.

Saleem, M., Shakeel, A., Bilal, M., Shahid, M. & Anjum, S. (2010). Effect of different phosphorus levels on earliness and yield of cotton cultivars. Soil & Environ., 29 (2): 128-135.

Sawan, Z., Mahmoud, M. & El-Guibali, A. (2008). Influence of K fertilization and foliar application of zinc and P on growth, yield and fiber properties of Egyptian cotton. J. Plant Ecol., 1: 259-270.

Stewart, J., Oosterhuis, D., Heitholt, J., & Mauney, J. Editors. (2010). Cotton Physiology, Springer Publishing Co., New York.

Surya, K., Bi, Y. & Rothstein, S. (2010). Understanding plant response to nitrogen limitation for the improvement of crop nitrogen use efficiency. J. Exp. Bot., 62, (4): 1499-1509.

ECONOMIC PERSPECTIVES FOR SEEDER SZ – 3, 6 COMBINED WITH DEEP PLACEMENT FERTILIZER TECHNOLOGY

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Abstract

Agriculture is one of the most important sectors of the food production in the world. This makes agriculture one of the largest and most significant industries. Agricultural productivity is the main factor not only for a country's balance of trade but also for the health and food security. In recent times, the agricultural sector has become more flexible and changeable in order to supply sufficient food for the continuously growing population of the world. Meanwhile, scientists and farmers in a number of developing countries are looking for new technologies and methods to increase crop yields and revenues, reduce the volume of fertilizer used and mitigate environmental impacts to the atmosphere and water. These matters play a key role in the sustainable development of modern agriculture. This study presents the results of research based on modernization of the seeder SZ – 3, 6 made by a Russian manufacturer and equipped with deep placement fertilizer technology. The seeder SZ – 3, 6 is designed by a Russian manufacturer for drill seeding of cereals (wheat, rye, barley, oats), legumes (peas, beans, soybeans, lentils, pea, chickpea) with simultaneous application of fertilizers. The basic version of the seeder applies fertilizers at depth about 4 – 8 cm, but after modernization, by an installation of additional equipment on the seeder, the placement depth of fertilizers will be extended up to 10 – 25 cm. The depth of fertilizerplacement below 10 cm allows plants to grow throughout the growing season. Deep placement fertilizer technology is an innovative and a profitable practice, which serves not only reduction of waste and excessive use of fertilizer but also mitigates negative impacts induced by fertilizer application on the environment. It has been proven by experts that fertilizer application technology achieves average yield increase. The economic perspectives of modification of seeder SZ – 3, 6 is to achieve a cheaper model, which could be equivalent to more expensive competitors. More specifically, by using the modified seeder we are able to increase the average crop yield with better quality, and minimize use of fertilizers. The construction of the modified seeder and use of deep placement fertilizer technology in modern agriculture are described. The results indicated a theoretical scheme for the seeder equipped with deep placement fertilizer technology as well as describing the working principle of the seeder during the application of this technology.

Keywords: Agricultural economics, mechanization of agriculture, agricultural machinery, deep placement fertilizer technology, seeder.

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EFFECT OF FERTILIZATION ON PHOSPHORUS UPTAKE IN COTTON

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Abstract

The aim of this research was to studythe effects of nitrogen and phosphorus fertilization on concentration and uptake of phosphorus in cotton (*G. hirsutum* L.), grown during 2012-2014 on *Pellic Vertisols* soil type in Chirpan, Bulgaria in crop-rotation with durum wheat under non-irrigated conditions. The experimental design was a randomized complete block with four replications. Single and combined nitrogen as NH_4NO_3 in rates 0; 80; 120 and 160 kg.ha^{-1} and phosphorus in rates 0; 80 and 120 kg.ha^{-1} were tested. It was established that fertilization with $N_{120}P_{80}$led to the highest economic effective yield – 1.82 t.ha^{-1}, by 37.8% above the unfertilized. An alone phosphorous fertilization was not an efficient agronomic activity. Fertilization with P_{80} and P_{120} increases the phosphorus concentration in cotton plants. In bud formation an extremely high phosphorus content of 1.06% is reported at moderate levels $N_{120}P_{120}$ and the average phosphorus content is 0.82%. The P concentration in flowering stage is in the range of 0.67 (unfertilized) to 0.87% (P_{120} and $N_{80}P_{120}$). The phosphorus concentration decreases in maturity - average 0.53%. The phosphorus uptake depends on both the dry matter accumulation and the P concentration. The uptake of phosphorus averaged from 18.3 kg.ha^{-1} ($N_0P_0K_0$) to 35.9-40.0 kg.ha^{-1} at high values of NP fertilization. The uptake was 24.5-25.6 kg.ha^{-1} at alone P rates. Nitrogen has a stimulating influence on the phosphorus utilization. At combined NP fertilization the P uptake increases significantly and at $N_{160}P_{120}$ reaches 40.0 kg.ha^{-1}. P concentration and uptake went up with the increase of the phosphorus rate.
Key words: Phosphorus, concentration, uptake, cotton, fertilization.

1. Introduction

Knowledge of phosphorus content in relation to plant development and yield is valuable and useful for various branches of the agricultural practice. For the producer it provides information for making management decisions relative to timing and rates of NPK application to avoid occurrence of deficiency. In research it is important to identify the development stage at sampling when evaluating experiments with data from tissue analysis, and also when comparing treatment effects, since changes in concentration of NPK occur as plants mature.

Variable responsiveness of cotton to phosphorus fertilization is established in different countries ofthe World.In the United States, P application produced significantly positive response to seed cotton yield on the sandy soils whereas little or no response was obtained on the fertile alluvium (Nelson, 1980). In Israel, sodium bicarbonate extractable phosphorus isrecommended as an index for fertilization of cotton crop and if more than 12 mg.kg^{-1}available P is present in the soil, no fertilizer is added (Halevy, 1976). Bronson et al., (2003) reported that phosphorus fertilizer did not affect lint yields at Lamesa.

More and Agale (1993) indicated that seed cotton and dry matter yield increased with increasing levels of P up to 50 kg P_2O_5 ha^{-1}. Uptake of P ranged from 27.2 to 32.9 kg ha^{-1}. There was gradual increase in P uptake with increasing levels of P up to 75 kg P_2O_5 ha^{-1}. The P balance at 25 kg P_2O_5 ha^{-1} rate was negative.

The nitrogen utilization is closely related to the phosphor nutrition. P significantly enhanced cropgrowth, N and K uptake, total chlorophyll concentration and dry matter yield of cotton plant (Sawan et al., 2008). Deshpande and Lakhdive (1994) found that Papplication (19-22 kg ha^{-1}) increased P uptake and content in leaf, stemand reproductive part like seed. Acording to Leffler (1986) and Bassett et al. (1970) the phosphorus fertilization increased dry matter production and nutrient uptake.

According to some authors the cotton varieties manifest specific nutrient requirements (Karamanidis et al., 2004; Fritschi et al., 2003; Clement-Bailey and Gwathmey, 2008) while according to others (Kostadinova & Panayotova, 2003; Mullins and Burmester, 1990; Panayotova et al., 2007) the differences in the level of mineral nutritionof genotypes with close origin are insignificant. The variety specificity to uptake of nutrition elements in the cotton organs was established by Meredith & Wells (1989) and Makhdum et al. (2001), but Mullins & Burmester (1990) report that the concentrationanduptakeof macroelements are not significantly influenced by the variety.

The aim of this research was to study the effects of nitrogen and phosphorus fertilization on concentration and uptake of phosphorus in cotton (*G. hirsutum* L.), grown during 2012-2014 in crop-rotation with durum wheat under non-irrigated conditions in theregionofCentral South Bulgaria.

2. Material and Methods

The experiment was carried out on the field of the Field Crops Institute, Chirpan, situated in a major cotton-growing region of Bulgaria during 2012-2014. The cotton (*G. hirsutum* L.) cultivar Darmi was grown in double crop-rotation with durum wheat under non-irrigated conditions. The experimental design was a randomized complete block with four replications. Individual plots consisted of six 2.40-m rows spaced 0.60 m apart with a net plot size of 10 m^2. Single and combination of N and P_2O_5 fertilizers were tested. The nitrogen rates were 0; 80; 120 and 160 kg.ha^{-1} and of phosphorus – 0; 80 and 120 kg.ha^{-1}. The source of the N was ammonium nitrate, of P_2O_5 – triple superphosphate. Cotton seeds were sown within 20-30 April. The plant population reached as much as 160 000 plants ha^{-1}, approximately. Defoliants were not applied. The harvest was made by hand.

The total seed-cotton yield (t.ha^{-1}) and yield of the total biomass (t.ha^{-1}) were determined. Plant material was dried at 60°C, weighted and sieved. The P_2O_5 content in plant parts (% of dry matter) was analyzed colorimetrically. P_2O_5 uptake (kg.ha^{-1}) was the product of dry matter yield (kg.ha^{-1}) and concentration (%). Analysis of variance (ANOVA) was performed to evaluate differences and interaction among the nitrogen rates, phosphorus rates and years.

The studied years were with different meteorological conditions during the vegetation period (May-October). Regarding temperature and rainfall during cotton vegetation, the studied years were characterized as follows: 2012 was very warm and dry, with insufficient precipitation during the critical stages of cotton development flowering and bolls formation; 2013 was characterized as moderately warm and moderately dry; and 2014 was moderately warm and very wet.

The soil type at the region was *Pellic Vertisols* (FAO), defined by the sandy-clay composition, with high humidity capacity and small water-permeability. The soil in the field was with neutral soil reaction in the 0-60 cm soil layer, medium supplied with organic matter, moderately N provided, with low content of mobile P_2O_5 and well supplied with available K_2O (**Table 1**).

Table 1. Agrochemical Properties of the Soil, Chirpan

Parameters	**Depth, cm**	
	0-30	**30-60**
pH_{KCl}	6.7	6.2
Humus, %	2.80	2.55
Total N, %	0.100	0.090
Total Nmin, kg.ha^{-1}	97	83
Available P_2O_5, mg.kg^{-1}	51	39
Exchangeable K_2O, mg.kg^{-1}	230	160

3. Results and Discussion

The results showed that fertilization had a good effect on seed-cottonyieldwith an average yield of 1.62 t.ha^{-1} (**Figure 1**).Without fertilization the average seed-cotton yield was 1.32 t.ha^{-1}.The studied alone N fertilization showedsignificant increase in the seed-cotton yield up to N_{120} – an average of 1.76 t.ha^{-1}, by 32.9 % above the unfertilized control.The high rate of N_{160} decreased the yield by 2.4 % compared to the yield obtained from the moderate level of N_{120}. Average good yield was reported at N_{80} – 1.67 t.ha^{-1}, and at this low rate in2014 cultivar Darmi had a very good yield - 2.46 t.ha^{-1}. The seed-cotton yield increased most under combined fertilization $N_{120\text{-}160}P_{80\text{-}120}$ - 26.6-37.8 % more than the unfertilized. In 2012 and 2013 the low yields were due to the higher temperatures during the vegetation period– 383 and 259°C more than the average values, respectively, as well as due to the long spring-summer drought, which led to shedding of budsand blossoms and impeded the proper nourishment of the bolls.

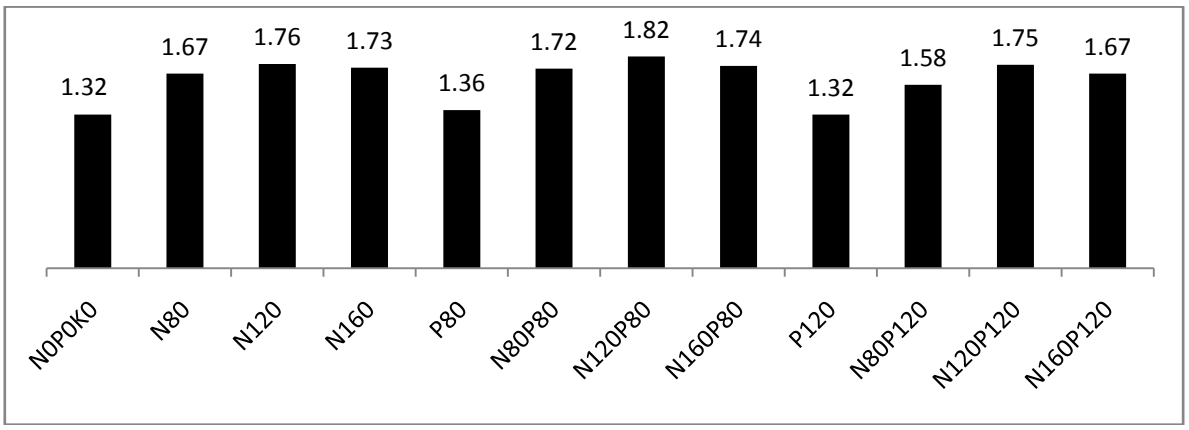
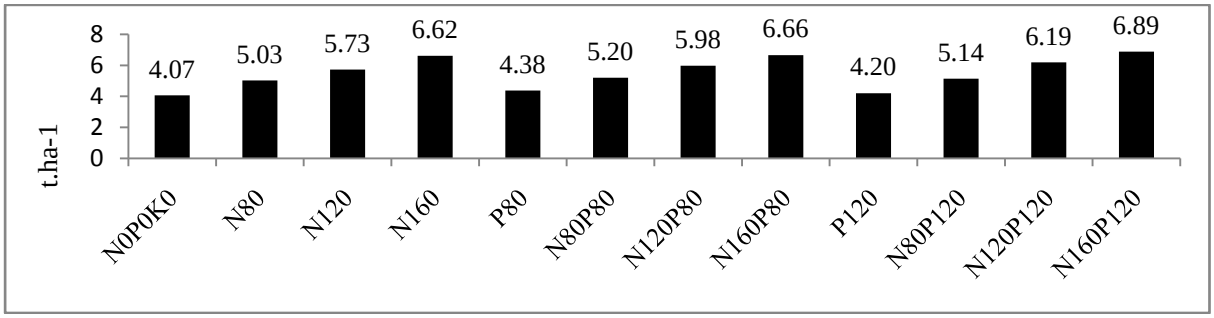


Figure1. Mean Effect of Fertilization on Total Seed-Cotton Yield, t.ha^{-1}
GD 5 %; 1 %; 0.1%= 0.28; 0.36; 0.47

The amount of dry matter including seed cotton yield, formed leaves, stems and bolls in maturity average for the period was 5.51t.ha^{-1}.Unfertilized plants formed 4.07 t.ha^{-1}of dry matter. At fertilization with$N_{80}N_{120}$ and N_{160} the total dry matter at the maturity exceeded the unfertilized by 24;41and 63%, respectively. Single phosphorus fertilization contributed to the increase of dry matter by 7.6% at P_{80} and by 3.4% at P_{120}. Combined NP fertilization had a proven effect on dry matter yield. After fertilization with $N_{80}P_{80}$the total dry biomass increased and it was 5.2t.ha^{-1} average for the period, by 27.8% above the unfertilized. Increasing the combined fertilization rates also led to an increase of cotton dry matter. $N_{160}P_{80}$formed 6.66 t.ha^{-1}biomass, 63.8% more than the control. Average for the period the highest result was reported for high combined fertilization at rate $N_{160}P_{120}$ –69.4% over the unfertilized(**Figure 2**).



GD 5 %; 1 %; 0.1%=0.63; 0.86; 1.16

Figure 2. Effect of Fertilization on the Total Dry Biomass of Cotton in Maturity, t.ha^{-1}

It has been established from previous studies that the fiber contains minimal amounts of phosphorus and the values in the vegetative mass are generally low (0.14-0.28%) (Panayotova, 1999). Seeds are relatively well-supplied with phosphorus (1.1-1.40%). Singh et al. (2006) reported that leaf fresh mass and leaf area per plant were positively related to the leaf P %, which increased with increasing P supply.

During the three years of the cotton growing stages, fertilization with P_{80} and P_{120} increases the phosphorus content in the plants (**Figure 3)**. The phosphorus concentration went up with the increase of the phosphorus rate.

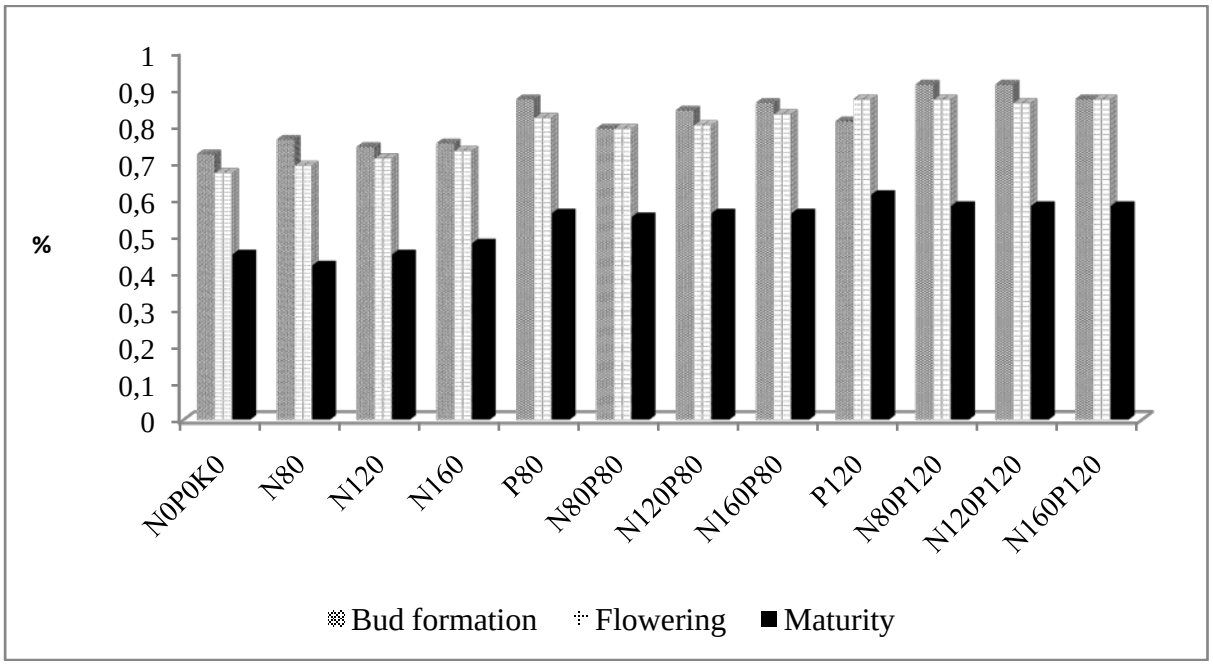


Figure 3. Phosphorus Concentration in Cotton Plants by Development Phases, %

Inbud formation stage independent phosphorus fertilization results in 20.8-25.0% higher phosphorus concentration in plants.At N fertilization there is a tendency to increase phosphorus amounts to 5.6 % according to unfertilized, probably related to better growth and development of plants and root system and the ability to better utilization of available soil phosphorus. At combined NP fertilization the phosphorus content depends on the phosphorus rate and reaches 0.91% at P_{120}.An extremely high phosphorus content of 1.06% in bud formation is reported at moderate levels of combined fertilization $N_{120}P_{120}$. At this stage the average phosphorus content for the period is 0.82%, and in 2012 the concentrationis the highest - 0.90%, mainly due to the higher temperatures in May and June. The average phosphorus values decrease at all N levels and at P_{80} rateduring the later stages of the vegetation. In the flowering stageonly at $P_{120}$the phosphorus content is higher than the bud formation. The average phosphorus content is in the range of 0.67 (unfertilized) to 0.87% (P_{120} and $N_{80}P_{120}$). The influence of yearsis strong - the concentration is from 0.68% in 2012 to 0.99% in 2013 with better water permeability.

Dorahy et al. (2008) indicated that phosphorus fertilizer application only increased P concentration in the plants during leaf expansion, but had no effect on biomass production, P uptake at later growth stages sampled, or lint yield. This is confirmed in our study.The phosphorus concentration decreases in maturity and the plants contain average 0.53% phosphorus, in the range of 0.42 (N_{80}) to 0.61% (P_{120}).The maximum values in maturityare in 2012 - an average of 0.68%, nearly twice higheraccording to average concentration in 2013. Only differences in bud formating are prove.

The phosphorus uptakein maturity depends on both the dry matter accumulation and the P concentration. The uptake of phosphorus in the study averaged from 18.3 $kg.ha^{-1}$ ($N_0P_0K_0$) to 35.9-40.0 $kg.ha^{-1}$ at high values of NP fertilization. P uptake went up with the increase of the phosphorus rate (**Figure 4)**. The lower biomass values conditioned the smaller amounts of P uptake and henceforth

the higher residual amounts of available P in soil. Not always the P uptake corresponded to the obtained cotton yield. Phosphorus uptake continued to plant maturity, with more being allocated to seed at the expense of burs and leaves. Phosphorus levels should be high enough and plants should be vigorous enough to support P uptake and translocation from vegetative organs to fruiting structures as cotton bolls mature.

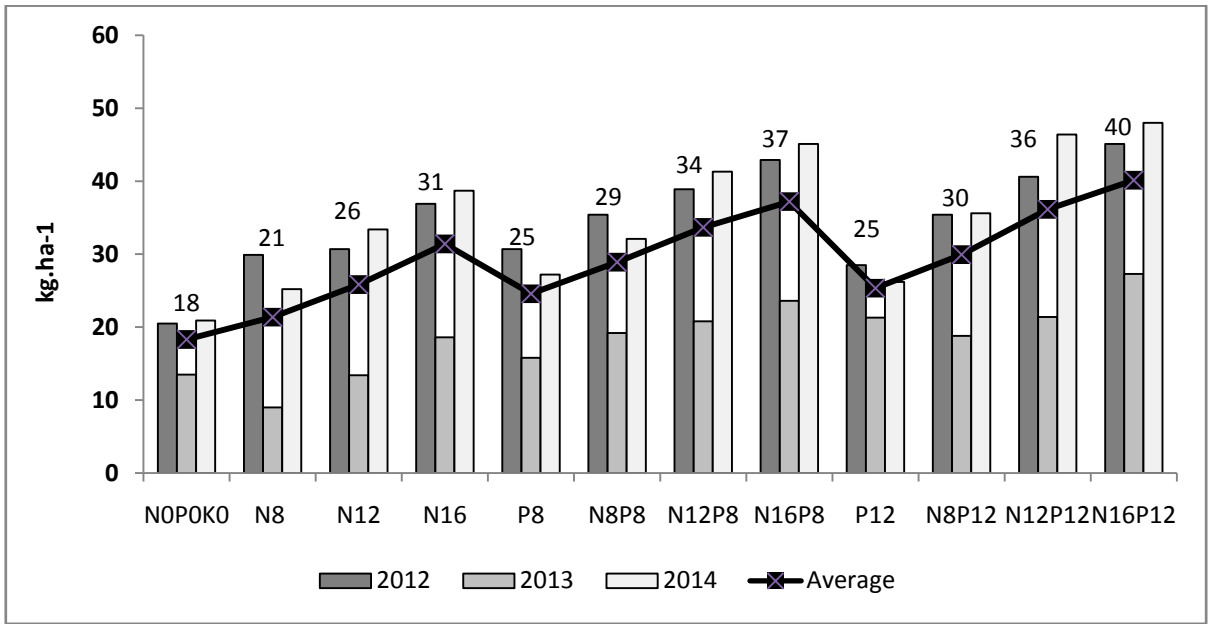


Figure 4. Phosphorus uptake by Cotton Plants, kg.ha^{-1}

At two alone phosphorous rates the annual average uptake was 24.5 and 25.6 kg.ha^{-1}, rising by 33.9 and 39.9% respectively to the control. In 2012 the plants absorb larger amounts of phosphorus – 30.7 and 28.5 kg.ha^{-1}, respectively at these fertilizer rates.The higher value at the lower rate P_{80} is associated with higher total biomass yield and good soil supply with mobile phosphates. Bassett et al. (1970), Deshpande and Lakhdive (1994), Leffler (1986) and others also indicate that phosphorous fertilization increases the uptake of phosphorus and its content in the vegetative and reproductive parts of the plant.

Nitrogen has a stimulating influence on the phosphorus utilization from cotton plants. At alone Nfertilization the absorbed phosphorus is from 21.2 kg.ha^{-1}(N_{80}) to 31.8 kg.ha^{-1} at N_{160}. At combined NP fertilization phosphorus uptake increasessignificantlyand at $N_{160}P_{120}$ reaches 40.0 kg.ha^{-1}.

The uptake of phosphorus average for the period was 29.2 kg.ha^{-1}. In 2014 it is higher- 35.0 kg.ha^{-1}, which we would explain with the good weather conditions during the year and the higher above ground biomass (6.5 t.ha^{-1}). During this year the highest phosphorus uptake - 48.0 kg.ha^{-1}was reportedat the highest combined fertilization $N_{120}P_{120}$.

4. Conclusions

The results showed that phosphorus fertilization exerts a favourable influence on cotton plants. The phosphorous application to the Bulgarian cotton cultivarDarmi increased seed-cotton yield, concentration and P uptake.

Under the influence of N fertilization the total seed-cotton yieldincreasedby 26.6 (N_{80}) to 32.9% (N_{120}) compared to the unfertilized (1.32t.ha^{-1}),and at P fertilization – up to 2.9% at P_{80}. Fertilization with $N_{120}P_{80}$led to the highest economic effectiveyield –37.8% above the unfertilized.An alone phosphorous fertilization was not an efficient agronomic activity.

The total dry biomass yield in maturity stage was an average 5.51 t.ha^{-1}. At single fertilization with N_{80}, N_{120} and $N_{160}$the total dry matter in the maturity was more than the unfertilized (4.07 t.ha^{-1})by

24.0, 40.8 and 62.8%, respectively. Single phosphorus fertilization increased the biomass by 7.6% at $P_{80}$and by 3.4% at P_{120}.Thebiomasswas highest at combined fertilization $N_{160}P_{120}$.

Fertilization with P_{80} and P_{120} increases the phosphorus concentrationin the plants.In bud formation an extremely high phosphorus content of 1.06% is reported at moderate levels $N_{120}P_{120}$ and the average phosphorus content is 0.82%.The phosphorus concentration in flowering stage is in the range of 0.67 (unfertilized) to 0.87% (P_{120} and $N_{80}P_{120}$). The phosphorus concentration decreases in maturity and the plants contain average 0.53% phosphorus.

The phosphorus uptake depends on both the dry matter accumulation and the P concentration. The uptake of phosphorus averaged from 18.3 kg.ha^{-1} ($N_0P_0K_0$) to 35.9-40.0 kg.ha^{-1} at high values of NP fertilization. Atalone P rates the uptake was 24.5-25.6 kg.ha^{-1}. At combined NP fertilization the P uptake increasessignificantlyand at $N_{160}P_{120}$ reaches 40.0 kg.ha^{-1}.

Such information would enhance nutrient management strategies and may be used for cotton development/yield models.

References

Bassett, D., Anderson, W. & Werkoven, C. (1970). Dry matter production and nutrient uptake in irrigated cotton (*Gossypiumhirsutum*).Agron. J., 62: 299-303.

Bronson, K., Keeling, J., Booker, J., Chua, T., Wheeler, T., Boman, R., &Lascano, R. (2003). Influence of landscape position, soil series and P fertilizer on cotton lint yield. Agron. Journal, 95: 949-957.

Clement-Bailey, J. & Gwathmey,C. (2008). Earliness, partitioning and yield responses to potassium in cotton cultivars. Paper 1302, 2008. World Cotton Res. Conf.-4, 10-14 Sep 2007, Lubbock TX. Omnipress [CD-ROM].

Deshpande, R. M., & Lakhdive, B. A. (1994). Effect of plant growth substances and phosphorus levels on yield and phosphorus uptake by cotton. PKV Research Journal, 18: 118–121.

Dorahy, Ch., Rochester, I., Blair, Gr. & Till, A. (2008).Phosphorus Use-Efficiency by Cotton Grown in an Alkaline Soil as Determined Using ^{32}Phosphorus and ^{33}Phosphorus Radio-Isotopes. J. of Plant Nutrition, 31 (11): 1877-1888.

Fritschi, F. B., Roberts, B.A., Travis, R.L., Rains, D.W.& Hutmacher R. B. (2003). Response of irrigated Acala and Pima cotton to nitrogen fertilization: Growth, dry matter partitioning, and yield. Agron. Journal, 95: 133-146.

Halevy, J.(1976).Growth rate and nutrient uptake of two cotton cultivars under irrigation. Agron. J., 68:701-705.

Karamanidis, G., Nechev, H. &S toilova A.(2004). Effect of fertilization and plant density on Bulgarian and Greece cotton cultivars growth in Orestiada district - Greece. Proc. Conference USB – St. Zagora, June 3-4 2004: 67-70.

Kostadinova, S. & PanayotovaG. (2003). Agronomic Efficiency of Nitrogen Fertilization at Bulgarian Cotton Cultivars. Ecology and Future, vol. I(1): 43-46.

Leffler, H.(1986). Mineral compartmentation within the boll. Chapter 21: 301-309. In J.R. Mauney and J. McD. Stewart (Eds.), Cotton Physiology. The Cotton Foundation. Memphis, TN.

Makhdum, M., Malik, M., Shabab-ud-Din & Chaudhry, F.(2001). Effect of phosphorus fertilizer on growth, yield and fibre quality of two cotton cultivars. Journal of Research (Science), Bahauddin Zakariya University, Multan, Pakistan, Vol. 12, no. 2: 140-146, ISSN 1021-1012.

Meredith, W & Wells, R.(1989). Potential for increasing cotton yield through enhanced partitioning to reproductive structures. Crop Sci., 29: 636-639.

More, S. D. &Agale, B. N. (1993). Phosphate balance studies in irrigated cotton. Journal of the Indian Society of Soil Science, 41, Issue 3:498-500.

Mullins, G. & Burtmester C. (1990). Dry matter, nitrogen, phosphorus, and potassium accumulation by four cotton varieties. Agronomy Journal, 82: 729-736.

Nelson, W. (1949). The effect of nitrogen, phosphorus, and potash on certain lintand seed properties of cotton. Agron. J.,41:289–293.

Panayotova, G. (1999). Nutrition of durum wheat (*Tr. Durum*Desf.) cultivated with cotton in crop rotation. PhD Thesis, Sofia.

Panayotova, G., Stoilova,A. & Valkova, N. (2007). Response of New Cotton Varieties to Fertilizing Levels at Stationary Trial Condition. Field Crops Studies, vol. IV – 2: 327-332.

Sawan, Z., Mahmoud, M. &El-Guibali, A. (2008). Influence of K fertilization and foliar application of zinc and P on growth, yield and fiber properties of Egyptian cotton. J. Plant Ecol., 1: 259-270.

Singh, V., Pallaghy, Ch.&Singh, D. (2006). Phosphorus nutrition and tolerance of cotton to water stress: I. Seed cotton yield and leaf morphology. Field Crops Research, 96 (2-3): 191-198.

EFFECT OF SOME HERBICIDES AND THEIR MIXTURES WITH GROWTH REGULATOR AND FOLIAR FERTILIZER ON FAT CONTENT IN COTTON (*GOSSYPIUM HIRSUTUM* L.) SEEDS

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Abstract

The research was conducted during 2013-2015 with two cotton cultivars - Helius and Darmy (*Gossypium hirsutum* L.). It was investigated five herbicides: Goal 2 E (oxyfluorfen) - 800 ml/ha; Linuron 45 SC (linuron) – 2 l/ha; Wing-P (pendimethalin + dimethenamid) – 4 l/ha; Merlin 750 WG (isoxaflutol) - 50 g/ha; Bazagran 480 SL (bentazone) – 1.5 l/ha. They were treated separated or combined with growth regulator Amalgerol 5 l/ha or foliar fertilizer Lactofol O – 8 l/ha in the budding stage of the cotton. It has been found that investigated herbicides and their combinations with growth regulator and foliar fertilizer do not have a phytotoxic effect on the fat content of the cotton seed cultivar Helius. These herbicides and tank mixtures reduce the fat content in the seeds of cultivar Darmy. The decrease is greatest in the Linuron 45 SC herbicide and its combination with Amalgerol. For the first time, it has been established that, from the point of view of the technology for cotton growing of cultivar Helius, technologically the most valuable are all herbicides and their combinations with growth regulator and foliar fertilizer. Technologically the most valuable in cotton cultivar Darmy are tank mixtures of herbicides Wing-P and Bazagran 480 SL with growth regulator Amalgerol. They combine high values and high stability of fat content in cotton seed during different years. The alone use of herbicide Linuron 45 CK and its combination with Amalgerol receives negative assessments and should be avoided. The most economically effective are tank mixtures of herbicides Wing-P and Bazagran 480 SL with growth regulator Amalgerol.
Keywords: Cotton, foliar-applied herbicides, growth regulator, foliar fertilizer, fat content.

1. Introduction

Cotton is a crop characterized by long vegetation period and a poor competitive ability to weeds. Because of this, it is highly sensitive to weed spread from the earliest stages of its development.

In cotton growing, weed control is critical to yield and production quality (Stoychev, 2010). Problems with primary weed spread in cotton are solved to a considerable extent (Chachalis and Galanis, 2007; Cardoso, 2011). The issue of secondary weed spread of annual and perennial graminaceous weeds during cotton vegetation is also solved to a great extent by using antigraminaceous herbicides (Gao, 2005).

A problem with modern cotton growing is the secondary wed infestation (Boz, 2000; Nikolova, 2001; Economou, 2005: Gozgu and Uludag, 2005). Data on herbicides for efficient control of secondary emerging annual and perennial broadleaf weeds in conventional cotton growing technology are rather scarce even on a global scale. Effective herbicides for their control in cotton are still being

sought. In the application of vegetative antibroadleaved herbicides in conventional technology, there are often manifestations of phytotoxicity (Barakova and Delchev, 2016; Barakova, 2017).

Information on glyphosate-tolerant and glufosinate-tolerant cotton cultivars is presented (Gaylon et al., 2015; Spielman et al., 2015). In them control of all weeds – graminaceous and broadleaf, annual and perennial is completely solved by the use of total herbicides based on glyphosate (Roundup Ready technology) or glufosinate (Liberty Link technology). These two technologies are widely used in major cotton-producing countries. However, these cultivars are GMOs and are banned within the territory of the European Union. This makes the present study particularly relevant for all cotton producing countries within the European Union.

Cotton is one of the most valuable oil crops in the world.The seeds of cotton are quite rich in fat - 17-23%. Cotton oil is one of the most important semi-dry oils in the world used for alimentary and technical purposes.Worldwide, there are many studies on the fat content in cotton seed, its quality and its purpose (Ataullaev et al., 1982; Constantin, 2007; Saldzhiev et al., 2008; Saldzhieva et al., 2009; Uzunova G., 2008). Scientific literature does not yet know whether treatment with herbicides during cotton growing affects the fat content of cotton seeds.

The purpose of this study is to investigate the effect of vegetative treatment with some herbicides and their mixtures with growth regulator and foliar fertilizer on the fat content of seeds of two Bulgarian cottoncultivars.

2. Materials and Methods

In the period 2013-2015 a field experiment was carried out in the experimental field of the Field Crops Institute, Chirpan, under non-irrigated conditions of a soil type leached vertisol with two Bulgarian cotton cultivars - Helius and Darmy (*Gossypium hirsutum* L.). The experiment is based on the block method in 4 replications with a plot size of 20 m^2.

Table 1. Investigated Herbicides and Herbicide Combinations

№	Variants	Active Substance	Doses
1	no treated control	-	-
2	economic control	-	-
3	Goal 2 E	oxifluorfen	800 ml/ha
4	Linuron 45 SC	linuron	2 l/ha
5	Wing-P	pendimethalin + dimethenamid	4 l/ha
6	Merlin 750 WG	izoxaflutole	50 g/ha
7	Basagran 480 SL	bentazone	1.5 l/ha
8	Amalgerol	growth regulator	5 l/ha
9	Goal 2 E + Amalgerol	oxifluorfen + growth regulator	800 ml/ha + 5 l/ha
10	Linuron 45 SC + Amalgerol	linuron + growth regulator	2 l/ha + 5 l/ha
11	Wing-P + Amalgerol	pendimethalin + dimethenamid + growth regulator	4 l/ha + 5 l/ha
12	Merlin 750 WG + Amalgerol	izoxaflutole + growth regulator	50 g/ha + 5 l/ha
13	Basagran 480 SL + Amalgerol	bentazone + growth regulator	1.5 l/ha + 5 l/ha
14	Lactofol O	foliar fertilizer	8 l/ha
15	Goal 2 E + Lactofol O	oxifluorfen + foliar fertilizer	800 ml/ha + 8 l/ha
16	Linuron 45 SC + Lactofol O	linuron + foliar fertilizer	2 l/ha + 8 l/ha
17	Wing-P + Lactofol O	pendimethalin + dimethenamid + foliar fertilizer	4 l/ha + 8 l/ha
18	Merlin 750 WG + Lactofol O	izoxaflutole + foliar fertilizer	50 g/ha + 8 l/ha
19	Basagran 480 SL + Lactofol O	bentazone + foliar fertilizer	1.5 l/ha + 8 l/ha

In both cultivars five herbicides were studied - Goal 2 E, Linuron 45 SC, Wing P, Merlin 750 WG and Basagran 480 SL They were applied both individually and in combinations of each of them with the growth regulator Amalgerol and the foliar fertilizer Lactofol O applied during bud formation phase of cotton. The active substances of the herbicides and the treatment dosages are given in Table 1.

The applied herbicides are applied against the background of the herbal combination Dual gold 960 EC 1.2 l/ha + Goal 2 E – 1.5 l/ha applied after sowing pre-emergence for control of primary weed spread in cotton. Spraying was done with hand back sprayer with working solution of 300 l/ha. Weeds in the economic control were removed by digging - 3 times during cotton vegetation.

Fat content in cotton seeds was determined by extraction - SR ISO 6492. The seeds were taken from cotton treated during vegetation with the relevant herbicides.

The math processing of the data was done according to the method of analyses of variance (Shanin 1977; Barov, 1982; Lidanski, 1988). The stability of herbicides and tank mixtures for fat content in cotton seeds with relation to years was estimated using the stability variances σ_i^2 and S_i^2 of Shukla (1972), the ecovalence W_i of Wricke (1962) and the stability criterion YS_i of Kang (1993).

3. Results and Discussion

None of herbicides has any phytotoxic effect on the fat content of cottonseed in cultivar Helius average for the period of study.They account for values around and above that of the commercial control where the fat content is measured - 29.8% (see Table 2). The highest is the fat content of the seeds in the herbicides Linuron 45 SC and Basagran 480 SL - 31.4 %.

In their combinations with growth regulator and foliar fertilizer, the same tendency is observed. All herbicidal mixtures show values exceeding those of the commercial control. The exception is the Merlin 750 WG + Lactofol O combination, which measures a value close to the control - 29.2 %.

In cultivar Darmy, all herbicides and herbicide combinations have a phytotoxic effect on the fat content of the seeds. The measured values are lower than those of the economic control - 30.7 %. The most phytotoxic effect on this indicator is the Linuron 45 CK - 22.5 % herbicide, and its combination with Amalgerol - 22.3 %. In alone use of herbicide Merlin 750 WG, it also accounts for a lower value than the economic control and another herbicides - 25.6 %. The highest fat content in the seeds is measured with the herbicide Goal 2 E - 29.1% and tank mixtures Wing-P + Amalgerol - 29.6 % and Basagran + Amalgerol - 29.3 %. This indicates that they have a poor phytotoxic effect on the indicator.

The growth regulator Amalgerol lowers the phytotoxicity of Merlin 750 WG compared with alone use in cultivar Darmy. In combination Merlin + Amalgerol account of fat content in seeds - 28.0 %. But Amalgerol does not reduce the phytotoxic effect of the Linuron 45 SC herbicide. Combination Linuron + Amalgerol has a strong phytotoxic effect on the fat content of the seeds.

The foliar fertilizer Lactofol O reduces the phytotoxic effect of herbicides Linuron 45 CK and Merlin 750 WG in cultivar Darmy compared to the alone use of these two herbicides. The values for Linuron + Lactofol O - 27.3 % and Merlin + Lactofol O - 27.2 % are reported, which are also the highest of all herbicide combinations with Lactofol O.

In cultivar Helius, the herbicides and herbicide combinations applied during its vegetation do not have a phytotoxic effect on the fat content of the seeds. In cultivar Darmy each of the herbicides and herbicidal mixtures act phytotoxically to a lesser or greater extent on this index. These results show cultivar's sensitivity. This is proved by the analyses of the variance for fat content.

The variance analysis with regard to fat content in cotton seeds (see Table 3) established that herbicides and herbicide combinations have the greatest impact on that indicator – 42.9 % of the total variation. The reason for this is the phytotoxic action of some of the herbicides on cotton plants during vegetation. Cultivars also have great influence – 27.6 %, which is due to the different genetic origin of the two cotton cultivars - Helius and Darmy. The power of effect of years is 1.0 %. The effect of years, cultivars and herbicides is very well demonstrated at $p \leq 0.1$. There is proven interaction of varieties with the conditions of years (AxB) – 2.6 % and of cultivars with preparations (BxC) – 20.6 %. They are very well proven at $p \leq 0.1$. The effect of years with herbicides (AxC) is 1.1 % and is not proven. There is an interaction among the three factors in the experiment (AxBxC) - 1.1 %. It is also not proven.

Table 2. Fat Content in Cotton Seeds of Vegetation Treatment with Herbicides, % (2013-2015)

Cultivars	Variants	2013	2014	2015	Mean
Helius	no treated control	27.3	26.3	27.3	26.9
	economic control	29.5	29.5	30.5	29.8
	Goal 2 E	29.4	29.4	30.4	29.7
	Linuron 45 SC	31.1	31.1	32.1	31.4
	Wing-P	30.3	30.4	31.4	30.7
	Merlin 750 WG	29.2	29.2	30.2	29.5
	Basagran 480 SL	31.1	31.2	32.1	31.4
	Amalgerol	30.5	30.5	31.5	30.8
	Goal 2 E + Amalgerol	30.8	30.8	31.8	31.2
	Linuron 45 SC + Amalgerol	31.7	31.7	32.7	32.0
	Wing-P + Amalgerol	31.4	31.5	32.4	31.8
	Merlin 750 WG + Amalgerol	31.7	31.7	32.7	32.0
	Basagran 480 SL + Amalgerol	31.0	31.0	32.0	31.3
	Lactofol O	31.6	31.6	32.6	31.9
	Goal 2 E + Lactofol O	31.1	31.2	32.1	31.5
	Linuron 45 SC + Lactofol O	29.9	29.9	30.8	30.2
	Wing-P + Lactofol O	30.8	30.8	31.8	31.1
	Merlin 750 WG + Lactofol O	29.2	29.2	29.2	29.2
	Basagran 480 SL + Lactofol O	30.6	30.7	31.6	31.0
Darmy	no treated control	23.9	22.9	22.8	23.2
	economic control	31.3	30.3	30.3	30.7
	Goal 2 E	29.4	29.0	28.9	29.1
	Linuron 45 SC	26.6	20.6	20.3	22.5
	Wing-P	28.2	27.5	27.2	27.6
	Merlin 750 WG	26.2	25.2	25.2	25.6
	Basagran 480 SL	29.3	28.3	28.3	28.6
	Amalgerol	29.9	29.0	28.9	29.3
	Goal 2 E + Amalgerol	29.4	28.4	28.4	28.7
	Linuron 45 SC + Amalgerol	23.0	22.0	22.0	22.3
	Wing-P + Amalgerol	30.3	29.3	29.3	29.6
	Merlin 750 WG + Amalgerol	28.6	27.6	27.6	28.0
	Basagran 480 SL + Amalgerol	30.0	29.0	29.0	29.3
	Lactofol O	29.6	28.6	28.6	28.9
	Goal 2 E + Lactofol O	26.5	25.5	25.5	25.8
	Linuron 45 SC + Lactofol O	27.9	26.9	26.9	27.3
	Wing-P + Lactofol O	26.5	25.5	25.5	25.8
	Merlin 750 WG + Lactofol O	27.8	26.9	26.8	27.2
	Basagran 480 SL + Lactofol O	26.8	25.8	25.8	26.1

LSD, %:

F.A	p≤5%=0.2	p≤1%=0.3	p≤0.1%=0.4
F.B	p≤5%=0.2	p≤1%=0.3	p≤0.1%=0.4
F.C	p≤5%=0.5	p≤1%=0.7	p≤0.1%=0.9
AxB	p≤5%=0.3	p≤1%=0.4	p≤0.1%=0.5
AxC	p≤5%=0.9	p≤1%=1.2	p≤0.1%=1.5
BxC	p≤5%=0.7	p≤1%=1.0	p≤0.1%=1.3
AxBxC	p≤5%=1.3	p≤1%=1.7	p≤0.1%=2.2

Based on the proven interactions cultivar x year and cultivar x herbicide, the stability of manifestations of each variant with respect to fat content in cotton seeds has been evaluated (see Table 4). Shukla's stability variances σ_i^2 and S_i^2, Wricke's ecovalence W_i and Kang's stability criterion YS_i have been calculated.

Table 3.Analyses of Variance for Fat Content

Source of variation	Degrees of freedom	Sum of squares	Influence of factor, %	Mean squares
Total	455	1695.0	100	-
Tract of land	3	1.0	0.1	1.0
Variants	113	1645.0	97.1	14.6***
Factor A - Years	2	16.4	1.0	8.2***
Factor B - Cultivars	1	730.4	42.9	730.4***
Factor C - Herbicides	18	467.3	27.6	26.0***
AxB	2	44.0	2.6	22.0***
AxC	36	17.9	1.1	0.5
BxC	18	351.8	20.8	19.5***
AxBxC	36	19.1	1.1	0.5
Pooled error	339	47.0	2.8	0.4

*p≤5% **p≤1% ***p≤0.1%

Shukla's stability variances (σ_i^2 and S_i^2), which take into account both linear and non-linear interactions, uniquely assess the stability of the variants. These variants, which show lower values, are considered to be more stable because they interact less with the environmental conditions. The negative values of the indicators σ_i^2 and S_i^2 are assumed to be 0. With reliably high values of either parameter - σ_i^2 or S_i^2, the variants are considered unstable. With Wricke's ecovalence W_i, the higher the values of the indicator, the more unstable the relevant variant.

By using these three stability parameters it has been established that in both cotton cultivars, all of the applied herbicides and herbicide combinations are stable, with the exception of Linuron 45 CK in cultivar Darmy. Herbicide Linuron in Darmy has high instability. In it the values of the Shukla σ_i^2 and S_i^2 stability variances and Wricke's ecovalence W_i are high and mathematically proven. Instability is mainly due to the significant differences in fat content in cotton seed in these variants throughout the years of the experiment, since this herbicide exhibits the most phytotoxic effect on cultivar Darmy. In some of the variants there is instability of linear and non-linear type - proven values of σ_i^2 and S_i^2. In another part, there is only linear type of instability - proven value of σ_i^2, whereas the S_i^2 values are unproven.

In order to make an overall assessment of the effectiveness of each herbicide and herbicide combination, both its effect on fat content and its stability - the reaction of the crop to it throughout the years has to be taken into account. Very valuable information about the technological value of the variants gives Kang's YS_i indicator for simultaneous evaluation of the fat content in seeds and stability based on the reliability of differences in fat content and the variance interaction with the environment. The value of this criterion is that by using non-parametric methods and statistical proof of differences, we obtain generalized assessment ranking the variants in descending order according to their economic value.

The summarizing Kang's stability criterion YS_i, taking into account both stability and fat value in cotton seeds, gives negative assessment of herbicide Linuron and herbicide combinations Linuron + Amalgerol in cultivar Darmy. They are characterized as the most unstable or the most sensitive to herbicides in terms of fat content in cotton seeds. In cultivar Helius, none of the herbicides and herbicide mixtures has negative assessment. According to that criterion, technologically the most valuable in cultivar Helius are all tank mixes except Merlin + Amalgerol.

Table 4. Stability Parameters for the Variants for Fat Content with Relation to Years

Cultivars	Variants	$\bar{x}$	σ_i^2	S_i^2	W_i	YS_i
Helius	no treated control	26.9	0.1	0.06	0.3	5
	economic control	29.8	0.7	1.3	1.4	25+
	Goal 2 E	29.7	0.7	1.3	1.4	24+
	Linuron 45 SC	31.4	0.7	1.3	1.4	35+
	Wing-P	30.7	0.7	1.3	1.4	29+
	Merlin 750 WG	29.5	0.7	1.3	1.4	21+
	Basagran 480 SL	31.4	0.7	1.3	1.4	35+
	Amalgerol	30.8	0.7	1.3	1.4	30+
	Goal 2 E + Amalgerol	31.2	0.7	1.3	1.4	32+
	Linuron 45 SC + Amalgerol	32.0	0.7	1.3	1.4	40+
	Wing-P + Amalgerol	31.8	0.7	1.3	1.4	38+
	Merlin 750 WG + Amalgerol	32.0	0.7	1.3	1.4	40+
	Basagran 480 SL + Amalgerol	31.3	0.7	1.3	1.4	34+
	Lactofol O	31.9	0.7	1.3	1.4	39+
	Goal 2 E + Lactofol O	31.5	0.7	1.3	1.4	37+
	Linuron 45 SC + Lactofol O	30.2	0.7	1.3	1.4	27+
	Wing-P + Lactofol O	31.1	0.7	1.3	1.4	32+
	Merlin 750 WG + Lactofol O	29.2	0.2	-0.04	0.4	18
	Basagran 480 SL + Lactofol O	31.0	0.8	1.5	1.6	31+
Darmy	no treated control	23.2	0.4	0.9	0.8	0
	economic control	30.7	0.3	0.6	0.8	28+
	Goal 2 E	29.1	0.1	0.2	0.3	17
	Linuron 45 SC	22.5	23.5**	27.9**	44.7	-9
	Wing-P	27.6	0.4	0.8	0.8	8
	Merlin 750 WG	25.6	0.3	0.6	0.7	1
	Basagran 480 SL	28.6	0.3	0.6	0.7	12
	Amalgerol	29.3	0.3	0.5	0.5	19
	Goal 2 E + Amalgerol	28.7	0.3	0.6	0.7	13
	Linuron 45 SC + Amalgerol	22.3	0.3	0.6	0.7	-2
	Wing-P + Amalgerol	29.6	0.3	0.6	0.7	23+
	Merlin 750 WG + Amalgerol	28.0	0.3	0.6	0.7	10
	Basagran 480 SL + Amalgerol	29.3	0.3	0.6	0.7	20+
	Lactofol O	28.9	0.3	0.6	0.7	16
	Goal 2 E + Lactofol O	25.8	0.3	0.6	0.7	2
	Linuron 45 SC + Lactofol O	27.3	0.3	0.6	0.7	7
	Wing-P + Lactofol O	25.8	0.3	0.7	0.7	2
	Merlin 750 WG + Lactofol O	27.2	0.3	0.6	0.7	6
	Basagran 480 SL + Lactofol O	26.1	0.3	0.6	0.7	4

Technologically valuable is the alone use of applied herbicides.In cultivar Darmy high obtained herbicide combinations Wing-P + Amalgerol and Bazagran + Amalgerol. They combine high values and high stability with regard to fat content in cotton seeds in different years.The alone use of herbicide Linuron and its combination with Amalgerol have low assessment and they should be avoided.

4. Conclusions

It has been found that investigated herbicides and their combinations with growth regulator and foliar fertilizer do not have a phytotoxic effect on the fat content of the cotton seed cultivar Helius.

These herbicides and tank mixtures reduce the fat content in the seeds of cultivar Darmy.The decrease is greatest in the Linuron 45 SC herbicide and its combination with Amalgerol.

For the first time, it has been established that, from the point of view of the technology for cotton growing of cultivar Helius, technologically the most valuable are all herbicides and their combinations with growth regulator and foliar fertilizer.

Technologically the most valuable in cotton cultivar Darmy are tank mixtures of herbicides Wing-P and Bazagran 480 SL with growth regulator Amalgerol. They combine high values and high stability of fat content in cotton seed during different years.

The alone use of herbicide Linuron 45 CK and its combination with Amalgerol receives negative assessments and should be avoided.

The most economically effective are tank mixtures of herbicides Wing-P and Bazagran 480 SL with growth regulator Amalgerol.

References

Ataullaev, A.; Sultanbekova, D.; Kim, M. (1982). Properties of promising cotton cultivars. Oil industry (Maslo-jirovaya promishlenost), 11: 19-21.

Barakova, T. (2017). Development of elements of integrated weed control in cotton vegetation and testing of cotton genotypes (*Gossypium hirsutum* L.) for resistance to herbicides, Doctoral dissertation. Chirpan, 164 pp.

Barakova, T.; Delchev, G. (2016). Selectivity and stability of vegetation-applied herbicides at cotton (*Gossypium hirsutum* L.). Agricultural Science and Technology, 8 (2): 121-126.

Barov, V. (1982). Analysis and schemes of field experience. NAPS, Sofia.

Boz, O. (2000). Determination of weed flora, distribution and density of weed species occurring in cotton growing in Aydin. Turkey Herbology dergisi, v.3: 10-16.

Cardoso, G.D.(2011). Critical periods of weed control in naturally green colored cotton BRS Verde. Industrial Crops and Products, v. 34: 1198-1202.

Chachalis, D.; Galanis, M.(2007). Weed control and cotton response to combinations of acetochlor with fluometuron. Journal of Food, Agriculture & Environment, 5 (3/4): 198-201.

Constantine, D.(2007). Biodiesel from cotton seed. International Journal of Vehicle Design, 45 (1-2): 200-221.

Economou, G.(2005). Weed flora distribution in Greek cotton fields and its possible influence by herbicides. Phytoparasitica v. 33: 406-419.

Gao, X(2005). The effect of different mixed herbicides in controlling weeds. China Cotton v. 32: 19-23.

Gaylon, D.; Morgan, P.; Baumann, A.; Dotray, P. (2015). Weed Management in Texas Cotton. Texas A&M Agrilife extension esc-008, 3/14.

Gozgu, D.; Uludag, A. (2005). Weeds and their importance in cotton fields in Kahramanmaras province of Turkey. Turkey herbology dergisi, v. 8: 7-15.

Kang, M.(1993). Simultaneous selection for yield and stability: Consequences for growers. Agronomy Journal, 85: 754-757.

Lidanski, T.(1988). Statistical methods in biology and agriculture, Sofia.

Nikolova, V.(2001). Influence of reduced doses of herbicide bentazone on *Xanthium strumarium* weed. Agricultural University - Plovdiv, Scientific papers, volume XLVI, v. 1: 273-277.

Saldzhiev, I.; Valkova, N.; Stoilova, A.; Panayotova, G.; Delchev, G.; Radevska, M.; Dechev, V. (2008). Cotton yield, biomass and oil content at Bulgarian cotton cultivars. National Conference – energy crops in Bulgaria.

Saldzhieva, A.; Valkova, N.; Saldzhiev, I.; Panayotova, G.(2009). Study on oil potential of Bulgarian cotton cultivars as an alternative source of biofuel. Journal of International Scientific Publication: Ecology and Safety, 3 (1): 354 – 361.

Shannin, Y.(1977). Methodology of field experience. BAS, Sofia.

Shukla, G.(1972). Some statistical aspects of partitioning genotype - environmental components of variability. Heredity, 29: 237-245.

Spielman, D.; Nazali, H.; Zambrano, X.; Zardi, P. (2015).Technological opportunity, regulatory uncertainty and Bt cotton in Pakistan. AgBioForum, 18 (1): 98-112.

Stoychev D.; Dimitrova, M.; Dimova, D. (2010). Harmful influence of *Xanthium strumarium* L. on the yield and quality of cotton fibre. Journal of Environmental Protection and Ecology 11 (3): 875-878.

Uzunova, G. (2008). Investigation on glyceride oil from seeds of new Bulgarian cotton cultivars and technological exploration about its derivation, shrewdness and utilization. Thesis for scientific and education degree “Doctor”.

Wricke, G. (1962). Über eine Methode zur Erfassung der ökologischen Strak Breiten Feldersuchen. Pflanzenzurecht, 47: 92-96.

INFLUENCE OF LATE TREATMENT WITH ANTIBROADLEAVED HERBICIDES DURING STEM ELONGATION STAGE OF DURUM WHEAT ON GRAIN QUALITY

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Abstract

The research was conducted during 2012 - 2014 on pellicvertisol soil type. Under investigation was Bulgarian durum wheat cultivar Victoria (*Triticum durum var. valenciae*). A total of 20 antibroadleaved herbicides were investigated: Granstar 75 DF, Granstar super 50 SG, Ally max SG, Arat, Biathlon 4 D, Derby super WG, Mustang 306.25 SC, Weedmaster 646 CL, Sunsac, Secator OD, Logran 60 WG, Lintur 70 WG, Akurat 60 WG, Akurat extra WG, Eagle 75 DF, Herbaflex, Starane 250 EK, Sanafen, Dicotex 400 and Herby 675. All herbicides were treated in 1-st, 2-nd and 3-rdstem node stages of durum wheat.During 1-st stem node stage of durum wheat can to be used the antibroadleaved herbicides Arat, Biathlon, Derby super, Mustang, Weedmaster, Secator, Lintur,Akurat,Akurat extra, Eagle,Starane,Sanafen,Dicotex and Herby.These herbicides do not have negative influence on grain yield. During 2-nd stem node stage of durum wheat can to be used the herbicides Arat, Biathlon, Derby super, Mustang, Secator, Lintur,Akurat,Akurat extra, Starane,Dicotex and Herby. During 3-rd stem node stage of durum wheat can to be used only the herbicides Arat, Biathlon, Derby super, Secator, Lintur,Akurat,Akurat extra and Starane. Herbicides Weedmaster, Mustang, Logran, Eagle, Dicotxs and Herby decrease of some physical or biochemical properties of grain and should not be used during stem elongation stage of durum wheat crop for commodity production. Herbicides Arat, Biathlon, Derby super, Secator, Lintur, Akurat, Akurat extra and Starane can be applied without the risk of reducing of durum wheat grain quality.These eight antibroadleaved herbicides are economically the most effective.
Keywords: Durum wheat, herbicides, late treatment, grain yield, grain quality.

1. Introduction

Increased application of herbicides in the agricultural practices raises many open questions about their effect on the quality of obtained products. It has been carried out a number of attempts to establish the efficacy of different herbicides for weed control in durum wheat fields (Alegri, 1998; Montemurro; 1998; Holm et al., 2000). It is still insufficient studies on the reaction of different cultivars to some herbicides (Rapparini et al., 1998; Rola et al., 1999).

At foliar application of herbicides weather conditions in the region are an important condition for the occurrence of the herbicidal effect and establish their influence on cultivated plants (Fetvadzhieva, 1973; Lyubenov, 1987; Kucharski and Sadowski, 2004). Studies show that the quantity and quality of the grain are in direct dependence on weather conditions during the treatment with herbicides and during the period following the treatment (Citron et al., 1998; Stashinskis, 2001; Cacak-Pietrzak et al., 2008; Delchev, 2018).

The purpose of this investigation was to establish the changes on grain yield, its structural elements and grain quality of durum wheat by the influence of 20 antibroadleaved herbicides, which are applied during 1-st, 2-nd and 3-rd stem node stages of durum wheat.

2. Materials and Methods

The research was conducted during 2012 - 2014 with Bulgarian durum wheat cultivar Victoria (*Triticum durum* Desf. *var. valenciae*). It was carried out a field experiment as a block method in 4 repetitions, on a 20 m^2 harvesting area, on pellicvertisol soil type, after sunflower predecessor.

For exploration the possibilities to fight with secondary weed infestation with broadleaved weeds in durum wheat fields for processing 20 antibroadleaved herbicides were investigated: Granstar 75 DF, Granstar super 50 SG, Ally max SG, Arat, Biathlon 4 D, Derby super WG, Mustang 306.25 SC, Weedmaster 646 CL, Sunsac, Secator OD, Logran 60 WG, Lintur 70 WG, Akurat 60 WG, Akurat extra WG, Eagle 75 DF, Herbaflex, Starane 250 EK, Sanafen, Dicotex 400 and Herby 675. The active substances and doses of the investigated herbicides are given in Table 1.

Table 1. Investigated Variants

№	Herbicide	Active substance	Doses
1	Check	-	-
2	Granstar 75 DF	tribenuron-methyl	25 g/ha
3	Granstar super 50 SG	tribenuron-methyl + tifensulfuron-methyl	40 g/ha
4	Ally max SG	metsulfuron-methyl + tribenuron-methyl	35 g/ha
5	Arat	tritosulfuron + dicamba	200 g/ha
6	Biathlon 4 D	tritosulfuron + florasulam	55 g/ha
7	Derby super WG	florasulam + aminopyralid	33 g/da
8	Mustang 306.25 SC	florasulam + 2.4-D	800 ml/ha
9	Weedmaster 646 CL	2.4-D + dicamba	1 l/ha
10	Sunsac	metosulam + 2.4-D	1 l/ha
11	Secator OD	iodosulfuron + amydosulfuron	100 ml/ha
12	Logran 60 WG	triasulfuron	37.5 g/ha
13	Lintur 70 WG	triasulfuron + dicamba	150 g/ha
14	Akurat 60 WG	metsulfuron-methyl	10 g/ha
15	Akurat extra WG	metsulfuron-methyl + tifensulfuron-methyl	50 g/ha
16	Eagle 75 DF	chlorsulfuron	15 g/ha
17	Herbaflex	beflubutamid + isoproturon	2 l/ha
18	Starane 250 EK	fluroxypyr	1 l/ha
19	Sanafen	2.4-D	2 l/ha
20	Dicotex 400	2M-4X	4 l/ha
21	Herby 675	2.4-D + 2M-4X	1.4 l/ha

The weak adhesion of herbicides Granstar, Granstar super and Ally max required their application with adjuvant Trend 90 - 0.1%. The weak adhesion of herbicides Arat and Biathlon required their application with adjuvant Dash HC - 500 ml/ha.

All herbicides were treated during 1^{-st}, 2^{-nd} and 3^{-rd} stem node stages of durum wheat. All variants are applied with working solution consumption 200 l/ha. To examine only the influence of herbicides and eliminate the negative influence of weeds they are removed by hand weeding during the growing period.

It was investigated the influence of the herbicides on durum wheat grain yield and yield components – spike length, spikelets per spike, grains per spike, grain weight per spike. It was investigated and changes who made of the tested factors in the physical properties - 1000 grain weight, test weight and vitreousness – and the biochemical properties – protein quantity, wet and dry gluten quantities. The mathematical processing is made with analysis of variance method.

3. Results and Discussion

Data about the influence of investigated antibroadleaved herbicides on grain yield are showed that herbicides Arat, Biathlon, Derby super, Mustang, Weedmaster, Sunsac, Secator, Lintur, Akurat, Akurat extra, Eagle, Starane, Dicotex and Herby, applied during 1^{-st} stem node stage of durum wheat have not proved decrease on grain yield (see Table 2).

Table 2. Grain Quality of Durum Wheat at Treatment during 1^{-st} Stem Node Stage (2012 - 2014)

Herbicides	Grain yield, kg/ha	1000 grain weight, g	Test weight, kg	Vitreousness, %	Protein, %	Gluten	
						Wet %	Dry %
Check	5227	48.8	82.3	95.0	18.13	39.6	14.9
Granstar	4906	48.0	82.7	94.8	18.31	39.2	14.7
Granstar super	4929	48.0	82.7	94.5	18.16	39.6	14.9
Ally max	4929	48.1	82.7	94.5	18.17	32.4	14.7
Arat	5070	48.7	82.6	94.6	18.20	39.5	14.5
Biathlon	5034	48.6	82.6	94.6	18.21	39.5	14.6
Derby super	5188	48.2	82.5	94.4	18.16	39.8	14.9
Mustang	5060	48.4	82.5	94.4	17.98	39.0	14.7
Weedmaster	5102	46.8	82.8	95.4	17.63	38.2	14.6
Sunsac	4979	48.0	82.3	93.4	17.37	39.8	14.6
Secator	5207	48.6	82.1	94.4	18.17	39.8	14.7
Logran	4605	47.4	82.0	93.8	18.13	39.6	14.9
Lintur	4978	48.2	82.2	94.4	18.12	39.2	15.2
Akurat	4976	48.4	82.0	94.5	19.00	40.6	15.2
Akurat extra	4976	48.7	81.9	94.5	18.98	40.4	15.2
Eagle	4984	47.8	82.3	95.2	18.56	39.2	15.2
Herbaflex	4832	47.6	82.2	94.2	17.71	37.6	14.1
Starane	5125	46.4	82.4	94.2	17.19	36.8	13.7
Sanafen	4932	48.2	82.1	93.8	18.14	36.8	13.8
Dicotex	5058	48.4	82.2	93.4	19.04	40.4	15.2
Herby	5125	48.2	82.0	94.6	18.48	41.6	15.6
LSD 5%	333	1.5	1.4	1.9	0.30	0.7	0.4
LSD 1%	430	2.4	2.0	2.4	0.37	1.9	1.0
LSD 0.1%	561	3.2	3.4	4.2	0.44	2.8	1.5

Herbicides Granstar, Granstar super, Ally max and Weedmaster cannot be used during stem elongation stage of durum wheat. During 2013 herbicides Granstar, Granstar super and Ally max has not proved decrease of grain yield. During 2013 herbicide Weedmaster leads to grain yield equal to this one from untreated check. This is due to different weather conditions in the particular years. Herbicides Logran, Herbaflex and Sanafen also cannot to be used during 1^{-st} stem node stage, because they have high phytotoxicity to durum wheat.

Herbicides Arat, Biathlon, Derby super, Mustang, Sunsac, Secator, Lintur, Akurat, Akurat extra, Starane, Dicotex and Herby, applied during 2^{-nd}stem node stage of durum wheat have not proved decrease on grain yield (see Table 3).

With the advancement of stem elongation stage (from 1-st to 2-ndstem node stage), herbicides Granstar, Granstar super, Ally max and Weedmaster have enhanced their phytotoxicity with regard to the durum wheat, which is especially strongly expressed at Weedmaster. It is establishes that the herbicide of base 2M-4X (Dicotex) has better expressed selective action on durum wheat in comparison with that one of base 2.4-D (Sanafen). Herbicide Herby due to its lower content of 2.4-D and lower dose per hectare also has better selectivity to durum wheat. From 2-ndstem node stage herbicide Eagle has high phytotoxicity during each year of investigation.

Table 3. Grain Quality of Durum Wheat at Treatment during 2-nd Stem Node Stage (2012 - 2014)

Herbicides	Grain yield, kg/ha	1000 grain weight, g	Test weight, kg	Vitreousness, %	Protein, %	Gluten	
						Wet %	Dry %
Check	5227	48.8	82.3	95.0	18.13	39.6	14.9
Granstar	4806	48.2	82.3	94.0	18.73	39.2	14.7
Granstar super	4835	48.3	82.3	94.0	18.70	39.1	14.6
Ally max	4830	48.5	82.2	94.0	18.69	39.0	14.6
Arat	5044	48.6	82.2	93.8	18.67	39.2	14.5
Biathlon	4997	48.6	82.2	93.8	18.67	39.2	14.4
Derby super	5069	48.4	82.2	93.8	18.80	39.9	14.9
Mustang	4966	48.7	82.3	93.7	17.88	39.4	14.8
Weedmaster	4750	46.4	82.6	94.4	16.86	37.6	14.6
Sunsac	4979	48.2	82.5	93.2	17.88	40.0	14.5
Secator	5025	48.6	82.2	93.6	18.71	39.9	14.8
Logran	4120	46.2	82.2	93.6	17.79	39.6	14.9
Lintur	4924	48.7	82.2	93.4	18.14	40.0	14.0
Akurat	4948	48.8	82.2	93.6	19.19	40.4	14.6
Akurat extra	4927	48.7	82.4	93.5	18.22	40.4	14.2
Eagle	4742	48.2	82.3	95.0	18.05	38.8	15.0
Herbaflex	4832	48.0	82.1	94.6	18.31	38.2	14.6
Starane	5038	47.2	82.3	94.6	17.79	38.0	14.2
Sanafen	4787	48.4	82.1	93.4	18.39	40.4	14.6
Dicotex	4929	48.8	82.4	93.6	18.14	38.8	14.6
Herby	4982	48.6	82.4	93.4	18.14	40.4	14.2
LSD 5%	320	2.0	1.6	2.1	0.28	1.0	0.5
LSD 1%	422	3.2	2.3	2.9	0.32	2.1	1.3
LSD 0.1%	551	4.4	3.6	4.5	0.40	3.3	2.4

Herbicides Arat, Biathlon, Derby super, Secator, Lintur, Akurat, Akurat extra and Starane, applied during 3-rd stem node stage of durum wheat have not proved decrease on grain yield (see Table 4).

The decrease of the grain yield by treatment with herbicides Granstar, Weedmaster and Sunsac during 3-rd stem node stage is proven during each year, regardless of weather conditions. At herbicides Granstar super, Ally max and Mustang decrease of the yield is reported only during certain years. Herbicides Sanafen, Dicotex, Herby, Logran, Eagle and Herbaflex also have phytotoxicity on the durum wheat. The biggest is the negative effect at the herbicide Logran where the decrease of grain yield in relative to the control is up to 1525 kg/ha or 29.2 %.

Durum wheat is the main raw material for the production of high quality pasta. To meet this requirement, it must be grown in suitable agrotechnology, providing a high-quality grain. From this perspective, the efficient and timely displayed weed control in durum wheat crops is important for

improving the quality of the durum wheat grain. The high selectivity of the herbicides used in the cultivation of durum wheat also has a positive impact on these indicators.

The lowest values of 1000 grain weight are accounted in use of herbicides Weedmaster, Logran, Herbaflex and Eagle when they applied during early stem elongation stage.The delay in treatment of herbicides - from 1-st to 3-rd stem nodes of durum wheat - leads to a small increase of 1000 grain weight at herbicides Granstar, Granstar super, Ally max, Eagle, Starane, Herbaflex, Dicotex and Herby.The reason for this increase is the smaller number of grains in the spike of main tiller. The indicator values are not changed by use of herbicides Arat, Biathlon, Derby super, Mustang, Sunsac, Secator, Akurat, Akurat extra, Lintur and Starane. Only herbicides Weedmaster and Logran by treatment in stem elongation stage of durum wheat always lead to mathematically proven decrease of 1000 grain weight.

Table 4. Grain Quality of Durum Wheat at Treatment during 3-rd Stem Node Stage (2012 - 2014)

Herbicides	Grain yield, kg/ha	1000 grain weight, g	Test weight, kg	Vitreousness, %	Protein, %	Gluten	
						Wet %	Dry %
Check	5227	48.8	82.3	95.0	18.13	39.6	14.9
Granstar	4635	48.6	82.0	93.4	19.76	46.0	16.1
Granstar super	4647	48.7	82.0	93.4	19.77	46.0	16.1
Ally max	4642	48.8	82.0	93.4	19.78	46.0	16.1
Arat	4987	48.6	82.2	93.3	18.55	39.8	15.0
Biathlon	4945	48.6	82.2	93.3	18.55	39.8	15.0
Derby super	5003	48.6	82.2	93.6	18.97	39.6	14.9
Mustang	4913	48.7	82.1	93.5	17.80	39.6	14.7
Weedmaster	4564	46.2	82.6	94.4	16.85	35.6	13.4
Sunsac	4630	48.2	82.0	93.0	18.05	41.2	15.5
Secator	4982	48.8	82.2	93.6	18.99	39.8	14.9
Logran	3702	48.8	82.3	95.0	18.13	39.6	14.9
Lintur	4929	46.0	82.4	93.2	17.36	39.6	14.9
Akurat	4913	48.8	82.0	93.2	17.80	38.8	14.6
Akurat extra	4903	49.0	82.3	94.4	19.42	43.6	15.3
Eagle	4687	49.0	82.3	93.4	17.82	38.8	14.1
Herbaflex	4578	48.8	82.3	95.0	17.62	38.8	14.6
Starane	4941	49.0	82.1	94.6	18.82	40.8	15.3
Sanafen	4798	48.0	82.0	94.8	18.13	40.8	14.8
Dicotex	4793	48.6	82.0	94.4	19.42	43.6	15.3
Herby	4817	49.0	82.3	93.2	17.80	38.8	14.6
LSD 5%	340	2.9	1.9	2.0	0.22	1.2	0.6
LSD 1%	434	3.8	3.1	2.8	0.31	2.4	1.5
LSD 0.1%	567	5.0	4.5	4.2	0.43	3.6	2.7

Test weight characterizes the density of the grain and is one of the important technological parameters. Usually with increasing nitrogen rate specific weight decreases. This is associated with the preparation of a more lax tissue cell at a high nitrogen fertilizer, especially under dry conditions. Uses of investigated antibroadleaved herbicides not adversely affect the test weight of the grain. It retains its high levels characteristic of durum wheat - all variants except weeded control have test weight over 82 kg.

The use of antibroadleaved herbicides does not lead to proven decreases virteousness of durum wheat grain, although this was some variation during years.

The keeping the physics properties of the grain (1000 grain weight, test weight and virteousness) high and stable guaranteed good mill qualities and high semolina output.

Other indexes included in the investigation characterized the biochemical properties of the grain from the different variants as raw material for the pasta production. The protein quantity and the wet and dry gluten quantities are one of the most important indexes, leading to pasta with a good culinary quality.

The protein quantity is definitely by cultivar, but it varies depending on weather conditions and the agrotechnology. In this sense it is necessary to note that later treatment -from 1^{-st} to 3^{-rd} stem nodes of durum wheat - with herbicides Granstar, Granstar super, Ally max, Sunsac, Derby super, Secator, Starane, Herbaflex and Sanafen leads to prove increase of protein quantity. At herbicides Granstar, Granstar super, Ally max, Sunsac, Herbaflex and Sanafen this increase can be explained by the significantly lower grain yields, which are obtained by these variants, as a result of the existing negative correlation between quantity and quality of yield. At herbicides Arat, Biathlon, Derby super, Secator, Akurat and Staraneprotein quantity has increased, although the yield of grain does not change proven by treatment with these herbicides duringstem elongation stage. Other herbicides included in investigation - Mustang, Weedmaster, Logran, Lintur, Akurat extra, Eagle, Decotexand Herby - decrease protein quantity.

Wet and dry gluten quantities are an important element of the quality characteristics of the grain. The obtained data show that late treatment with herbicides Sunsac, Starane, Herbaflex and Sanafen leads to increase of wet and dry gluten quantities. These quantities decreased by treatment with herbicides Weedmster, Mustang, Eagle, Dicotex and Herby. Herbicides Arat, Biathlon, Derby super, Secator and Logran do not change wet and dry gluten quantities. Herbicides Granstr, Granstar super, Ally max and Akuratdo not change wet and dry gluten quantities at treatment during 1^{-st} and 2^{-nd} stem node stages, but increase these quantities at treatment during 3^{-rd} stem node stage of durum wheat.All variants are over the standard requirements about the wet gluten quantity - more than 28 %. The ratio between wet and dry gluten (2.5 - 3 to 1) remains unchanged and favorable for producing high quality pasta.

The differences in the biochemical properties of the grain are due to the changes in the speed and nature of the physiological and biochemical processes in plants occurring under the influence of different herbicides.

4. Conclusions

During 1^{-st} stem node stage of durum wheat can to be used the antibroadleaved herbicides Arat, Biathlon, Derby super, Mustang, Weedmaster, Secator, Lintur, Akurat, Akurat extra, Eagle, Starane, Sanafen, Dicotex and Herby.These herbicides do not have negative influence on grain yield.

During 2^{-nd} stem node stage of durum wheat can to be used the herbicides Arat, Biathlon, Derby super, Mustang, Secator, Lintur, Akurat, Akurat extra, Starane, Dicotex and Herby.

During 3^{-rd} stem node stage of durum wheat can to be used only the herbicides Arat, Biathlon, Derby super, Secator, Lintur, Akurat, Akurat extra and Starane.

Herbicides Weedmaster, Mustang, Logran, Eagle, Dicotxs and Herby decrease of some physical or biochemical properties of grain and should not be used during stem elongation stage of durum wheat crop for commodity production.

Herbicides Arat, Biathlon, Derby super, Secator, Lintur, Akurat, Akurat extra and Starane can be applied without the risk of reducing of durum wheat grain quality.

These eight antibroadleaved herbicides are economically the most effective.

References

Alegri, A. (1998). The Italian ryegrass treatments the *Triticum durum*. Terra e vita, 39 (4): 57-59.

Cacak-Pietrzak, G.; Sulek, A.; Ceglinska, C. (2008). Influence of the active matter herbicide doses on the yield and grain quality of spring wheat. Fragmenta Agronomica, v. 25(97): 76-84.

Citron, G.; Orlando, D.; Viron, H. (1998). Efficacy of the new herbicides on cereals. Annales Association Nationale de Protection des Plantes (ANPP), v. 2: 603-616.

Delchev, Gr. (2018). Chemical control of weeds and self-sown plants in eight field crops. Monograph, ISBN: 978-613-7-43367-6, LAP LAMBERT Academic Publishing, Saarbrücken, Germany: 397 pp.

Fetvadzhieva, N. (1973). Weed control. Zemizdat, Sofia.

Holm, F.; Kirkland, K.; Stevenson, F. (2000). Defining optimum herbicide rates and timing for wild oat control in wheat. Weed Technology, 14 (1): 167-175.

Kucharski, M.; Sadowski, J. (2004). Residues of herbicide active ingredient in the grain of cereals. Pamietnik Pulawski, no. 135: 129-135.

Lyubenov, Y. (1987). Integrated weed control. vol. I and II, Zemizdat, Sofia.

Montemurro, P. (1998). Durum wheat – the management of weeds in Southern Italy. Terra e vita, 39 (2): 44-47.

Rapparini, G.; Bartolini, D.; Tallevi, G. (1998). Further sensitivity trails of winter and durum wheat to post-emergence herbicides. Attidelle Giornale Fitopatologiche, 03-07.05.1998: 351-356.

Rola, H.; Domaradsky, K.; Kieloch, R., (1999). Tolerance of selected varieties of winter wheat on herbicides. Pamietnik Pulawski, Poland, №114: 305-311.

Stashinskis, E. (2001). Influence of herbicide application on the yield and quality of wheat. Agronomijasvestis, (no.3): 112-118.

EVALUATION OF ENERGY AND PROTEIN NUTRITION OF COMMON WHEAT VARIETIES TREATED WITH LEAF FERTILIZERS

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Abstract

The research was conducted during 2015 - 2016 in the experimental field of the Department of Plant Production in Agriculture Faculty at Trakia University, Stara Zagora, Bulgaria. The aim of this study is to investigate the effect of leaf fertilizer on the productivity of common wheat. In this study has examined the nutritional value of two common wheat: Diamond (by the varietal list of Bulgaria) and Ingenio (Syngenta). A comparative analysis of the results obtained from the treatment of varieties of common wheat with leaf fertilizers was made. Energetic and protein nutrition of ruminant wheat was evaluated in 1 kg of dry matter. Protein value of feed is extremely important for their nutritional value. The protein value of the feed is related to the bioavailability of the protein contained therein. The boundaries in which the protein values of the various feeding variants with different leaf fertilizers. The crude protein content ranges from 160.3 to 167.0 g/kg of dry matter (DM) for the Diamond variety and from 144.4 to 151.8 g/kg of dry matter Ingenio variety. On average, the content of raw protein in Diamond variety is higher by 10.7% of the found content of Ingenio variety.
Keywords: Common wheat, fertilization, intestinal digestible protein (PDI), correlation coefficient of Pearson (r), protein nutrition.

1. Introduction

Numerous studies have demonstrated the impact of agro-technical measures on the productivity and quality of wheat grain. The nutrient content, albeit genetically, varies depending on the level of agro-technology. Therefore still continue studies on the various components of the technology for growing common wheat.

Fertilization is one of the most powerful agro-technical measures to increase the yield and grain quality of wheat. The different regimen of diet created leads to specific varietal characteristics in terms of the ability to digest nutrients throughout the vegetation (Ivanova et al., 2006; Kindred et al., 2008). Mihailova et al., (2012) investigate the impact of soil treatment and fertilization on the nutritional value of grain in cereals.

The productive potential of wheat and grain quality are associated with increased tolerance to abiotic stress. In this respect, many countries are organizing environmental trials to gather information on the suitability of a given variety for a given region for years. Variety in wheat is a guarantee of success in stress conditions (Dimitrova et al., 2006; Demirevska et al., 2008; Hurkman et al., 2009; Tayyar, 2010).

Protein concentration and composition are key components of the end-use value for wheat (Triticum aestivum L.) grain. Although the qualitative composition of the grain is genetically determined, the quantitative composition is significantly modified by growing conditions, and there are important management × genotype × environment interactions (Maintaining grain quality of wheat under climate change is critical for human nutrition and for the feeding of animals (Martreet al. 2006; Nuttall et al. 2017). Simulation models explain a mechanical framework that explains the impact of the environment on the concentration and quality of the grain.

Agriculture is a sector of particular importance for the economy of the country, for the environment, for society, for the development of individual regions and has to solve a number of problems related to its stable and balanced development. The main objective is to analyze the factors that influence its development and to create models for studying and forecasting the productivity and economic efficiency of Bulgarian agriculture. (TodorovT., Tsanova S., Hristova M. 2011; Uzunova, R.& Atanasov D. 2017; Beluhova-Uzunova R., Atanasov D., Hristov K. 2017).

The aim of the study is to assess the influence of leaf fertilizers on the quality grain composition of two varieties of common wheat and to determine by correlation analysis the nature of the dependence between grain quality and the nutritional value of feed for ruminants and not ruminants.

2. Materials and Methods

For the purpose of the survey are used a data from a field experiment, drawn from the field of Trakia University, Agricultural Faculty, Stara Zagora, Bulgaria. The trials are staked on three fractions. In the period 2015-2016, in two varieties of common wheat, leaf fertilizers, imported alone and in combinations, were tested in the field.

Objects of the scientific experiment are Lactifrost, Lactofol baze and Wuxal Grano. Table 1 presents the content of micro and macroelements in the test liquid fertilizers. The variants on which the study was conducted are the following:1. Without fertilization, 2. Ammonium nitrate (N_{14}); 3. Lactifrost - l l/da; 4. Lactifros + Lactofol base - 1.0 l/da + 0.5 l/da; 5. Lactofol base - 0.5 l/da; 6. Wuxal Grano - 0,400 l/da; 7. Wuxal Grano - 0.400 l/da + 0.200 l/da. Except for the factors tested, the remaining agro-technological practices were carried out according to the common wheat technology adopted for the region.

Table 1. Content of Macro and Micro Elements in Leaf Fertilizers

Foliar fertilizers	**gram liter^{-1}**					**mg liter^{-1}**				
	N*	**P_2O_5**	**K_2O**	**SO_3**	**MgO**	**B**	**Cu**	**Mn**	**Mo**	**Zn**
Lactofol base	101	29.4	50.9	1.36	-	305	203	226	23	452
Lactifrost	13.8	42.4	37.9	2.12	-	477	106	106	2120	64
Wuxal Grano	219	-	-	365	29	-	0.0043	0.0043	-	0.0146
* NO_3-N + NH_4-N + NH_2-N (g l^{-1}): 22.6 and 13.8 + 11.3 and 6.4 + 67.8 + 0,3										

The field experiment includes two varieties of common wheat - Diamond (by the varietal list of Bulgaria) and Ingenio (Syngenta). The chemical analysis of grain is done by the method Weende.Is definitelythe content of the crude protein (CP), crude fiber (CF), crude fat (CFAT), digestible ether extract (DEE), minerals. The chemical analysis of grain is done by the method Weende. After determination of the qualitative composition the contents of FUM, FUG and PDI in ruminants and CE and OE in non ruminants by formula formulas (Todorov et al., 2004, 2007) are calculated:

GE = 0,0242 CP + 0,0366 EE + 0,0209 CF + 0,017 NFE

ME = 0,0152 DP + 0,0342 DEE + 0,0128 DCF + 0,0159 DNFEq=$\frac{ME}{GE}$

FUM = ME (0,075 + 0,039q)

FUG = ME (0,04 + 0,1q)

PDI = 1,11CP (1 - Deg) Dsi + 0,093 FOM
FOM = DOM - DEE - FP –FP-CP (1 - DEG)
FP = 250 – 0,5 DM
BPR = CP(Deg – 0,1) – 0145 FOM

Where: GE – gross energy; EE – ether extract; ME – metabolizable energy; NFE – nitrogen free extract; DP – digestible protein; E – digestible ether extract; DNFE – digestible nitrogen free extract; Deg– degradability of dietary protein in the rumen; FOM – fermentable organic matter; DOM – digestible organic matter; PDI – protein digestible in (small) intestine; Dsi– digestibility in small intestine

Digestibleenergy (DE) and metabolizable energy (ME) values for pigs and poultry were calculated using the equations (Todorov et al., 2004):

DEpg = 0,0242 DP + 0,0394 DEE+0,0184 DCF + 0,0170 DNFE
MEpg = 0,0210 DP + 0,0374 DEE+0,0144 DCF + 0,0171 DNFE
DEp = 0,0239 DP + 0,0398 DEE+0,0177 DCF + 0,0177 DNFE
MEp = 0,0178 DP + 0,0397 DEE+0,0177 DCF + 0,0177 DNFE

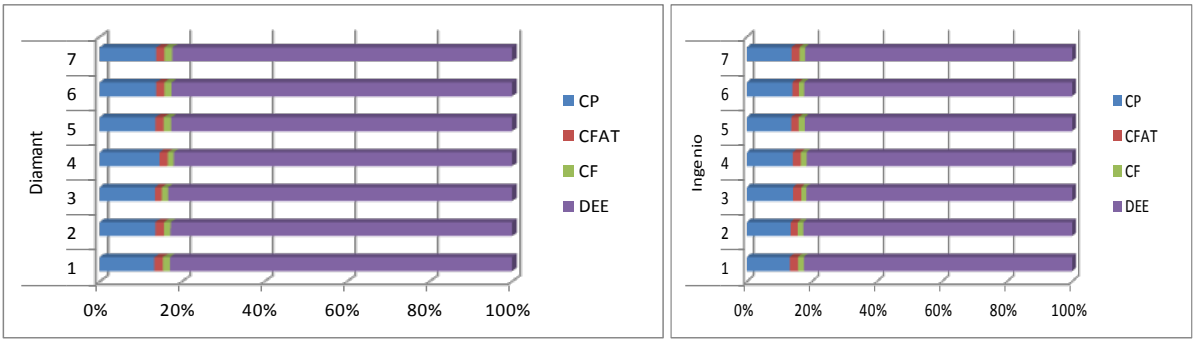
Experimental data were processed by a correlation analysis, which established and evaluated the relationship between the studied indicators. The same is expressed by the correlation coefficient r, determined through the statistical program SPSS 13.

The correlation dependencies are a product of the mathematical and statistical processing of Genchev's output data and others. (1975).

3. Results and Discussions

Protein value of feed is extremely important for their nutritional value. The protein value of the feed is related to the bioavailability of the protein contained there in. The analysis of the grain quality of the two varieties shows that the values crude protein crude fat, crude fiber and without nitrogenous extractsvary within narrow limits, under the influence of the applied liquid fertilizers. The boundaries in which the protein values of the various feeding variants with different leaf fertilizers are determined.

In the Diamond variety, the crude protein content ranges from 131.24 g/kg DMin the non-fertilizer control to 143.17 g/kg DMin the variant with the combined fertilization of Lactiftfost and Lactofol base. The increase of 9.1% shows the influence of fertilizers imported during tillering and ear formation in phenophase wheat. In Ingenio, an increase in crude protein levels was also observed, and the highest (139.76 g/kg DM) was recorded with Lactifrosts in the crop. Compared to non-fertilizer control, the increase was 7.8%.



a) Diamond b) Ingenio

Figure 1. Chemical Composition of the Grain in Two Variety Common Wheat, DM

Crude fiber content in the diamond varies, while the control values have been higher (16.0%) compared to embodiment 4. In Indzhenio crude fiber content varies in the range of 15.25 - 18.72 g/kg DM. Crude fiber lower digestibility of the feed and thus reduce the nutritional value. As seen from the attached diagram largest share is the content of DEE in both wheat varieties.

The energy and protein feed of ruminant wheat was evaluated in 1 kg of dry matter. The feed energy feed is a major indicator of the nutritional value of feed and is measured by gross energy, digestible energy, exchange energy and net energy.

In ruminants, there are two units of energy nutrition assessment: blood growth units (FUG), blood units for milk (FUM). Protein nutrition is determined by the amount of protein truly digestible in the intestine - digestible protein (PDI). This indicator takes into account the contribution of feed to meet the animal's protein needs. The crude protein shows the potential protein feed of the feed but does not take into account the quality of the protein.

After the treatment and analysis, the variance of the studied parameters was determined under the influence of the fertilizer introduced during the vegetation. The data shows a slight variation of FUM and FUG for both wheat varieties. At PDI again, the movement in the narrow range 102.38-104.14 g/kg DMfor Diamond and 101.49-103.3 g/kg DMat Ingenio was again reported. Slight variation indicates that fertilizing with liquid leaf fertilizer does not contribute to increasing the nutritional value of feed.

Table 2. Energy and Protein Value of Common Wheat for Ruminants, for Pigs and Poultry in 1 кgDM

		Ruminant Animals			**Non Ruminant Animals**			
		FUM	**FUG**	**PDI**	**DEp**	**MEp**	**DEpg**	**MEpg**
Diamant	1	1.48	1.65	102.38	15.91	15.27	16.50	16.20
	2	1.48	1.65	102.67	15.92	15.26	16.52	16.20
	3	1.47	1.64	102.81	15.87	15.22	16.45	16.15
	4	1.47	1.63	104.14	15.95	15.25	16.55	16.21
	5	1.47	1.64	102.66	15.87	15.21	16.47	16.15
	6	1.47	1.64	102.87	15.89	15.23	16.49	16.18
	7	1.47	1.64	102.92	15.86	15.20	16.46	16.15
Ingenio	1	1.48	1.65	101.49	15.89	15.26	16.50	16.19
	2	1.48	1.65	102.31	15.90	15.25	16.50	16.19
	3	1.48	1.64	103.27	15.98	15.29	16.59	16.26
	4	1.47	1.63	102.95	15.91	15.23	16.52	16.19
	5	1.48	1.64	102.59	15.91	15.26	16.53	16.21
	6	1.47	1.64	103.30	15.91	15.24	16.51	16.18
	7	1.48	1.65	102.58	15.94	15.28	16.55	16.23

A different approach has been adopted with pigs and poultry. For the pigs, the CE content is measured, which is measured in MJ/kg of feed. For the birds are assessed for OE content, the unit of measurement being the same as for pigs -MJ/kg. In the determination of digestible and exchange energy in non-ruminants again the slight variation of the values obtained is again impressed. Digestive energy values for pigs range from 15.87 to 15.95MJ/kg for diamond and 15.89 to 15.98MJ/kg for Ingenio.

The exchange energy for pigs is calculated and its values range from 15.24 to 15.29MJ/kg for both varieties. The digestible energy in birds has been found to be higher in pigs. The ranges of variation are narrow and are within 16.45-16.59MJ/kg for the two studied varieties. The trend for higher bird values is also maintained when determining the levels of exchange energy. The parameters for the exchange energy for birds 16.15-16.26MJ/kg have been established.

Following correlation analysis of the studied wheat varieties, a very high correlation (r = 0.979) between CP and PDI in the Diamond variety (Table 3) was found. We have a negative correlation between CP and FUG (r = -0.815), also between DEE and PDI (r = -0.755).

Mathematically unproven are the correlation relationships between CRAF, CF and the other indicators considered.

Table 3. Correlation Coefficients between the Chemical Composition of the Grain of Wheat, Energy and Protein Nutritional Value of Wheat Variety in Diamant for Ruminants, 2015-2016

	CP	CFAT	CF	DEE	FUM	FUG	PDI
CP	1						
CFAT	0.150	1					
CF	-0.387	0.180	1				
DEE	-0.866*	-0.459	-0.077	1			
FUM	-0.426	0.549	-0.181	0.378	1		
FUG	-0.815*	0.329	0.204	0.649	0.849*	1	
PDI	0.979**	-0.033	-0.497	-0.755*	-0.478	-0.858*	1

A negative correlation was observed between CF and DEp, MEp, DEpg and MEpg (r =- 0.600 ÷ 0.741). The relationship between CP, CFAT and exchange and digestible energy in non-ruminants is not mathematically proven.

Table 4. Correlation Coefficients between Wheat Grain Chemistry, Energy and Protein Nutrition of Wheat in Variety Diamant for non Ruminants - 2015-2016

	CP	CFAT	CF	DEE	DEp	MEp	DEpg	MEpg
CP	1							
CFAT	0.150	1						
CF	-0.387	0.180	1					
DEE	-0.866*	-0.459	-0.077	1				
DEp	0.592	0.500	-0.741	-0.392	1			
MEp	0.040	0.520	-0.635	0.109	0.820*	1		
DEpg	0.649	0.625	-0.600	-0.540	0.976**	0.744	1	
MEpg	0.406	0.641	-0.625	-0.288	0.953**	0.913**	0.935**	1

After the correlation analysis of the studied common wheat varieties, a high correlation correlation (r = 0.944) between CP and PDI in the Ingenio variety was found. A high positive value of r = 0.763 is reported between DEE and FUG. We have a negative correlation correlation between CP and DEE and FUG (r = -0.758, r = -0.760).

Table 5.Correlation Coefficients between the Chemical Composition of the Grain of Wheat, Energy and Protein Nutritional Value of Wheat Variety in Diamant for Ruminants, 2015-2016

	CP	CFAT	CF	DEE	FUM	FUG	PDI
CP	1						
CFAT	-0.121	1					
CF	-0.585	0.037	1				
DEE	-0.758*	-0.457	0.319	1			
FUM	-0.283	0.304	0.086	0.326	1		
FUG	-0.760*	0.082	0.137	0.763*	0.563	1	
PDI	0.944**	-0.403	-0.553	-0.507	-0.218	-0.651	1

Mathematically unproven are the correlation relationships between CFAT, CF and other indicators considered. (Table 5.)

Table 6. Correlation Coefficients between the Chemical Composition of the Grain of Wheat, Energy and Protein Nutritional Value of Wheat Variety in Diamant for non Ruminants, 2015-2016

	CP	CFAT	CF	DEE	DEp	MEp	DEpg	MEpg
CP	1							
CFAT	-0.121	1						
CF	-0.585	0.037	1					
DEE	-0.758*	-0.457	0.319	1				
DEp	0.660	0.313	-0.674	-0.501	1			
MEp	0.010	0.512	-0.316	-0.002	0.748	1		
DEpg	0.619	0.419	-0.532	-0.539	0.978**	0.775*	1	
MEpg	0.396	0.522	-0.442	-0.376	0.931**	0.898**	0.964**	1

The correlation analysis of the surveyed indicators indicates that dependencies are unproven in the Ingenio variety. There is a negative relationship between CF and DEp (r = -0.674). Positive correlation dependence (r = 0.660) between CP and DEp, as well as between CP and DEpg (r = 0.619) was found.

4. Conclusion

As a result of the present experiment, crude protein content ranged from 131.24-143.17 g/kg DM in the Diamond variety and 129.45 to 139.76 g/kg DM of the Ingenio variety.

Treatment of common wheat with liquid leaf fertilizers does not contribute to increasing the FUM, FUG and PDI content.

It is establish a very high positive correlation dependence with coefficient of correlation r = 0.979 between CP and PDI of the Diamond variety and r = 0.944 of the Ingenio variety was found.

The results of the present study show that the use of leaf fertilizers is not justified economically. The analysis of the nutritional value of the grain that the influence is insignificant. The cost of feeding wheat only increases its cost without contributing to an increase in protein nutrition, energy nutrition.

References

Beluhova, R., Atanasov, D., Hristov, K. (2017). Analisys of direct payments distribution in Bulgarian agriculture,Trakia Journal of Sciences, Vol. 15, Suppl. 1, pp 282-287, 2017,ISSN 1313-3551

Genchev, G. et al. (1975). Biometric methods in plant growing, genetics and selection. Zemizdat, Sofia, Bg.

Dimitrova F., & Pchelarova Hr. (2006). Fertilization with N, P, K and grain quality of corn and wheat. Sp. Ecology and Industry, Vol. VIII, No1-2, 159-160.

Demirevska K., Stoilova L., Vassileva V., Feller U.(2008). Drought response of Rubisco and some ATP-dependent chaperone proteins in wheat plants". *Plant Growth Regulation* 56:97–106.

Ivanova A., Nankova M. Tsenov H. (2006). Influence of variety and fertilization on macroelements absorption in T. aestivum L. in the vegetation period. Field Crops Studies. Vol. III-1, 137-145.

Kindred D. R.,Verhoeven T. M., WeightmanR. M., Swanston J., Agu R. C., Brosnan J. M., Sylvester-Bradley R. (2008). Effects of variety and fertiliser nitrogen on alcohol yield, grain yield, starch and protein content, and protein composition of winter wheat. Journal of Cereal Science. Volume 48, Issue 1, Pages 46-57.

Mihaylova M., Basitov R., Basitov V., Ganev G. (2012). Influence of soil treatment and fertilization on the nutritional value of the grain from a feed brush for non-ruminants. Science and Technologies, Animal Studies and Veterinary Medicine, Vol. I., Number 5, 54-59.

Martre P., Jamieson P. D., Semenov M. A., Zyskowski R. F.,Porter J. R.,Triboi E. (2006). Modelling protein content and composition in relation to crop nitrogen dynamics for wheat. European Journal of Agronomy. Volume 25, Issue 2, August, Pages 138-154.

Nuttall J.G., O'Leary G.J., Panozzo J.F., Walker C.K., Barlow K.M., Fitzgerald G.J. (2017). Models of grain quality in wheat—A review. Field Crops Research. Volume 202, 15 February 2017, Pages 136–145

Hurkman W. J., Vensel W. H., Tanaka C.K., Whitehand L., Susan B. (2009). Altenbach Effect of high temperature on albumin and globulin accumulation in the endosperm proteome of the developing wheat grain . Journal of Cereal Science. Volume 49, Issue 1, Pages 12–23.

TayyarŞ. (2010). Variation in grain yield and quality of romanian bread wheat varieties compared to local varieties in northwestern turkey. Romanian Biotechnological Letters. Vol. 15, No.2, 5189-5196.

Todorov N. et al. (2004). Animal nutrition, Textbook, Sofia.

TodorovN. et al. (2007). Guidefor Animal Nutrition. Matkom, Sofia.

Todorov T., Tsanova, S., Hristova, M. (2011). Optimization of production costs - a prerequisite for the sustainability and competitiveness of grain production. http://hdl.handle.net/10610/1613.

Uzunova R., &Atanasov,D. (2017).Economic Implications of Structural Changes in Bulgarian Agriculture, Collection of Scientific Conference Papers "The Role of Family Businesses for Sustainable Rural Development", pp. 25-32 ISBN 978-619-90128 -10-9.