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Potato Growers Needs for Information on the Varieties and Fertilizers in Kafr Al-Zayat District in Al-Gharbia Governorate, Egypt

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The research aimed to identify the level of information need of the respondents with regard to the technical recommendations for potato crop varieties, as well as for fertilizing the potato crop, and to determine the relationship between the degree of information need, of technical recommendations for potato crop varieties, for fertilizing the potato crop, each as a dependent variable and all the independent variables studied. Other aims included identifying the sources from which respondents derive their information about the potato crop, to identify the problems encountered by the respondents concerning the varieties and fertilization of the potato crop.

This research was conducted in three villages randomly selected from 35 villages in Kafr Al-Zayat district in Al-Gharbia Governorate, namely, Qasta, Abeg and Al-Dalgamon, the sample size was 115 farmers. The data collection tool is an interview schedule, it was used to collect data during March 2019. Descriptive statistics frequency were used for presenting and analyzing the findings, along

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with, percentages, range, arithmetic average, standard deviation, chi- square test of independence, and Pearson's simple correlation coefficient.
The main findings indicate that: 71.3% of the respondents were of moderate levels of information need of the technical recommendations for potato crop varieties; 69.6% of the respondents were of moderate information need of technical recommendations for fertilizing the potato crop. Furthermore, correlation relationships of varieties lurks in a statistically significant relationship at the probability level of 0.01 between the degree of respondents information need for technical recommendations for potato crop varieties and the degree of education of the respondents as well as correlation relations for fertilization was shown in a statistically significant relationship at the probability level of 0.01 between the degree of respondents information need of technical recommendations for fertilizing the potato crop and between the degree of education of respondents, and the average productivity of the potato crop.

Keywords: Information needs; potato; growers; varieties; fertilizers; Egypt.

1. INTRODUCTION

Potato is a widely grown vegetable crop and one of the main and common edible crops all over the world. It occupies second place in importance following yields. Egypt has a comparative and competitive advantage in potato production, and seeks to increase productivity for export in order to obtain hard currency, and provide food security for domestic consumption and manufacturing [1]. Data indicates that the area of potato cultivation in Egypt is 376,631 Feddans representing about15% of the total area allocated to vegetable cultivation [2] in 2016 producing about 4 million tons annually worth more than 10 billion Egyptian Pounds. Potato ranked second in 2018, of Egypt's total exports reaching 4.7 million tons, including 759,100 tons of potatoes [3].

Abulkheer [4] Compares between potato and rice crop, being two main food crops, in terms of cultivation requirements of each. He states that the -in the one hand- usual potato season ranges between 100 to 110 days, and each Fadden requires only 2000 m3 of irrigation water. Each Fadden produces about 15-20 tons ready for consumption as food, on the other, the same area if cultivated with rice will require 6000 m3 of the water, which is triple the amount of water required for cultivating potato. The cultivation period of rice is 1.5 time higher than that of potatoes, moreover, it produces only 4.1 tons of barley rice, which later needs to be husked and bleached to produce a net of 3 tons white rice. This amount is equivalent to only 20% of potato production, this focused the attention to potato cultivation as a way to deal with food and water crises [4].

Egypt relies on importing potato seeds annually to grow the Potato of the summer season, where the breading and production of a new variety requires investment of efforts, and big budgets over a long period of years that might reach 11-12 years, to produce a variety that supersedes the current ones, satisfies farmers and consumers, and be free of diseases, especially viral ones [5].

Hassan [6] emphasizes that without the use of quality seeds in agriculture, it is not possible to get a good profitable crop no matter how much attention is given to other agricultural processes. Therefore, quality seeds must be obtained from the highly reliable sources, and to be characterized as being pure and free of grass seeds, with high germination potential rate, free of pathogens borne inside or on the surface, and identical to their variety, as the variety must be high-yield, quality, and compatible with the environmental conditions and farming methods present in the area in which it is cultivated [6].

The kind of seeds is one of the main factors, which determines the productivity of potato crop and the “Kind” means qualities that affect productivity such as genetic composition of the class, physiological age, pre-germination before agriculture, resistance to diseases, and health of the seeds i.e. free of physiological, fungal, bacterial and viral diseases. Varieties are determined according to the purpose of agriculture, whether for export, domestic consumption, manufacturing, or for the production of seeds [5].

Potato is a vegetable crop that requires intensive fertilization, hence it is a soil-stressing crop, and especially for the late-maturity varieties which require larger amounts of fertilizer compared to early-maturing varieties [7].

Mohammed [8] states that the need for fertilization of crops arises as a result of many

factors, the most important are depicted in Exhibit 1.

The use of fertilizers in terms of quantities and types depends on several factors affecting farmer's decision in this regard, including prices, quality, availability, expected yield of the crop, the cultivated variety, as well as soil fertility and properties, along with some other elements related to farmers themselves, like their income, education level, previous experience in agriculture, and their tendency towards the use of fertilizers [9]. Swanson [10] states that identifying extension needs and educational objectives associated with them, helps to plan mentoring programs accepted by the farmers. While Gupta [11] explained that the assessment of needs is the process of measuring the cognitive and performance gaps of the individual. This process includes comparing the current situation of the individual to the desired one, as well as identifying problems, along with understanding and realizing the behaviors and mechanisms that must change in order to reach the desired situation and how to effect the change and finally support the procedures and actions required for change. Moreover, the process of assessing the needs aims to solve the current problem, avoid it in the future, and create future that opportunities need that farmers develop learning. El-Shafei et al. [12] believe that the knowledge of any educational extension program contents must be developed to meet real needs of targeted groups and should be related to a specific area in order to achieve the goal of the extension program. Hence, it is necessary to know the level of knowledge of the targeted group first in certain fields, to know where they stand in their current knowledge.

Through field work it turns out that there is a knowledge gap among potato farmers of different varieties and types of fertilizers traded in the market, i.e. between the current situation and the ideal or desired situation. There is a strong desire among farmers to complete their knowledge needs of varieties known for abundant crop yielding and its export and storage quality under the conditions of the Egyptian environment, in the light of the spread of many items with unknown technical recommendations, as well as the appropriate fertilization for varieties and costs. It is worth mentioning the varieties and fertilization have the greatest impact in different stages of production and increase of productivity, efficiency and quality of harvesting, marketing and storage.

The above mentioned highlights call for the importance of studying the information needs for the technical recommendations for the variety and fertilizer of the potato crop. The needs are in constant change due to the generation of new varieties almost annually, as well as the wide range of imported and locally produced fertilizers and nutrients. the above mentioned ideas urged the researchers to study this problem to know the level of the information need for technical recommendations of varieties and fertilizers of the potato crop, and the variables that depend on them, the sources from which the respondents derive their information about the potato crop varieties and fertilization, The results of the study would assist in building extension programs capable of meeting the needs of potato

Exhibit 1. Factor determining the crops need for fertilization

(1) Population growth and limited arable land and water resources.
(2) Concentration of vegetable crops cultivation, resulting in the depletion of certain nutrients and symptoms of shortage became visible.
(3) The development of genetic engineering and plant breeding has produced new varieties and hybrids that largely need nutrients compared to the old varieties and hybrids.
(4) In some types of lands such as alkaline and salty ones, it is difficult for the roots of the plant to absorb elements of phosphorus, iron, zinc, manganese, copper and boron, because they are in a non-dissolved form and fixed to the soil, and thus inaccessible and unsuitable. Therefore, it became imperative to add these elements through fertilization.
(5) Dependency on organic fertilizers is declining.
(6) Development of the chemical fertilizer industry and improvement of its quality. It is more purely produced, which leads to the result that it no longer contains significant quantities of minor elements that were mixed with it as impurities in order to meet the need of the plant.

Source: Mohammed [8]

growers to increase production. According to the finding of the literature review and based on the research problem, the following objectives have been formulated:

1. Identify the level of respondents need to information on technical recommendation of potato crop varieties.
2. Identify the level of respondents need to information on technical recommendation of potato crop fertilizing.
3. Determining the relationship between the degree of respondents need to information on technical recommendations of potato crop varieties as a dependent variable and the following independent variables: the degree of education of the respondents, the crop rotation, average productivity of potato crop per feddan, the total cultivated area, the area cultivated with potato crop, the availability of seeds, availability of fertilizers, affordability of prices of imported potato seeds, affordability of fertilizers prices, purpose of potato cultivation, communication of agents of agricultural extension.
4. Determining the relationship between the degree of respondents need to information on technical recommendation of potato crop fertilizing as a dependent variable and the independent variables studied mentioned in the previous.
5. Identifying the sources from which the respondents derive their information about the potato crop.
6. Identifying the problems faced by respondents in relation to the varieties and fertilizing of potato crop.

1.1 The Study Hypotheses

To achieve the objectives of the study, the following research hypotheses were set:

1. There is a correlation between the degree of respondents need to information on technical recommendations of potato crop varieties as a dependent variable and each of the following independent variables: the degree of education of respondents, the average productivity of the potato crop, the total cultivated area, and the potato cultivated area, the purpose of potato cultivation.
2. There is a correlation between the degree of respondents need to information on technical recommendation of potato crop fertilizing as a dependent variable and all the independent variables mentioned above.
3. There are significant differences between the level of respondents need to information on technical recommendations of potato crop varieties as a dependent, and each of independent variables such as: the crop rotation, availability of seeds, availability of fertilizers, affordability of prices of imported potato seeds, affordability of fertilizers prices, and communication of agents of agricultural extension.
4. There are significant differences between the level of respondents need to information on technical recommendation of potato crop fertilizing as a dependent variable, and each of the independent variables such as: the crop rotation, availability of seeds, availability of fertilizers, affordability of prices of imported potato seeds, affordability of fertilizers prices, and communication of agents of agricultural extension. These assumptions were tested using null hypotheses.

1.2 Significance of the Research

Potato crop has great socio-economic importance on the map of Egyptian agricultural export, consumption, and productivity. Due to such significance, the potato crop should be ranked among the highest priorities of Egyptian agricultural development programs to reach the highest productivity levels of the crop. This primarily depends on the quality of cultivated seeds and applying the appropriate fertilization. This will only be possible through planning and developing some programs in potato cultivation areas, so as to identify the best recommendations for each variety, the purpose of its cultivation, and appropriate fertilization program to keep pace with the development of production and climate changes. The findings of this research should be in planning of such programs, to provide farmers with extension recommendations on new and updated varieties of imported seeds and the purpose of cultivation and appropriate fertilization needs.

1.3 Research Limitation

Due to the widespread and the wide multiplicity of potato varieties in recent years in Egypt generally, and in Gharbeya Governorate particularly, it became difficult for farmers to

recognize all these varieties and their technical recommendations, fertilization requirements, their cultivation methods and marketing requirements, the research has been limited to the varieties grown in the study area.

2. METHODOLOGY

This research is of quantitative nature using a survey questionnaire to collect primary data. It was conducted in Gharbia governorate, which is one of the main governorates in cultivating and producing potato crop for both the domestic and export markets. The potato cultivated reached in 2018/19 season approximately 27,000 feddans. [13].

Kafr Al-Zayat district was selected as being the oldest potato-producing district, It is the location of several potato export stations and storage refrigerators. The potato cultivated area was 9,150 feddans in 2018/19 season. Three villages were randomly selected from the 35 other villages of the district, which are Qasta, Abeg, and Al-Dalgamon.The area of potatoes in of Kafr El-Zayyat district represents 33.9% and 2.4% of potato area in both Gharbia Governorate and Egypt respectively [13].

2.1 The Study Sample

The sample of the study was derived from the total population of all the potato farmers of the three selected villages, which amounted to 1146 farmers, distributed as follows: 667 farmers in the Village of Qasta, 327 farmers in the village of Abeg, and 152 farmers in the village of Al-Dalgamon. The sample was drawn as 10% of the total farmers in each of those villages, which produced a total sample of 115 respondents distributed as 67, 33, and 15 respondents of the selected villages respectively. According to Chehimi et al. [14], being an exploratory research Yamane's [15] formula helps the purpose in this case. [n = [N/(1 + N e2)] where, N being the population, n the sample and e = 9% resulting in 112 farmers. Respondents were selected randomly and systematically from potato farmers' log, which is registered by agricultural cooperative each year [16].

2.2 Data Collection Tools

A questionnaire was designed for collecting data from respondents through personal interviews, to achieve the objectives of the study. The questionnaire included 4 sections: personal and socio- economic data of the respondent and a set of technical recommendations of the varieties and fertilization of the potato crop, which were extracted from the available references and technical publications. Information sources on the potato crop. The questionnaire is included an open-ended question to identify the problems facing the farmers in regards varieties and fertilization of the potato crop. The contents of the questionnaire were reviewed by horticulture researchers at the Horticultural Research Institute of the Agricultural Research Center to check validity of the technical recommendations included. A pretest was conducted on a sample of (30) non-sample respondents from the selected 3 villages (10) from each. The needed corrections were made and a final version became ready for field data, which took place during March 2019.

2.3 Quantitative Processing of Dependent Variables

1. **First dependent variable:** First dependent variable the total degree of respondents need to information on technical recommendation of potato crop varieties. In order to determine this degree, the varieties of potatoes cultivated in the area of research were restricted to (11) varieties of potatoes which are (Berne, Kara and Aspunta, Gelatica, Mundo, Daimond, Bamba, cylan, Hermes, Walidi, Rosetta and Crusoe). Therefore, a scale was designed, included (15) statements referring to their most important technical recommendations. The respondent was asked 15 questions, including (65) items of information to respond to, in order to determine the total level of their knowledge of technical recommendations for potato crop varieties. The correct response was assigned (1) degree, and the wrong response was assigned (0) degree, the total degree would range between (65) at maximum and a (zero) at minimum. The score was calculated using the equation used by El-Shafei et al. [17] whereby the total degree of knowledge needs of farmers = the maximum level of knowledge (65) - the degree obtained by the respondents. The grades for each clause answered by the respondents were collected and divided by the number of respondents to obtain an average for each clause. The average was then divided by the maximum score multiplied by 100 scoring to get average%. According to

percentages of the average of this degree, the level of information need of respondents could be divided into three levels: high level of information need 70% and above, moderate level of information need from 50% to 70% and a low level of information need less than 50%.

2. **Second dependent variable:** Second dependent variable the total degree of respondents need to information on technical recommendation of potato crop fertilizing. In order to determine this degree, a scale was designed to include (14) clauses pertaining to the most important technical recommendations related to the fertilization of potato crop. Therefore, respondents were asked 14 questions, including (46) items of information to respond to, in order to determine the total degree of their knowledge of technical recommendations for potato crop fertilization. The correct response was assigned (1) degree, and the wrong response was assigned (0) degree, the total degree would range between (46) at maximum and a (zero) at minimum. The score was calculated following the same method proposed by El-Shafei et al. [17].

2.4 Data Analysis

Tabular representation of data frequencies and percentages used for viewing and analyzing the data, along with, range, arithmetic average, standard deviation, and use of chi- square test of independence, and Pearson's simple correlation coefficient to determine the relationship between the two dependent variables and other independent variables.The statistical analysis was done using computer using Statistical Package for the Social Sciences (SPSS).

3. RESULTS AND DISCUSSION

3.1 The Level of Respondents Need to Information on Technical Recommendation of Potato Crop Varieties

Table 1 shows that 71.3% of the respondents were of moderate levels of information need of the technical recommendations for potato crop varieties, indicating the need to provide farmers with more extension activities with knowledge and on technical recommendations for potato crop varieties. The results were consistent with the study of Risha [18], the level of knowledge need for the fields of preserving the agricultural environment is moderate among most of the sample by 95.5% and Deshmukh et al. [19], found that information needs of the tomato growers in variety and seeds revealed that 50% tomato growers were in medium group.

The data in Table 2 indicate that the information needs of the respondents are high, when it comes to technical recommendations for potato varieties resistant to blights, potato varieties sensitive to blights, and varieties Multi-purpose potatoes. The average levels of information need in percentage were 88.70%, 84.20%, and 78.26%, respectively. The results of Table 4 indicate that the level of information need of respondents for technical recommendations for potato crop varieties as a whole was moderate, with a general average of 57.84%. Khedr's study [20] indicated; there is high level of cognitive need of peanut growers respondents for the rate of seeding. And Rawal and Ansari [21], found that majority of the respondents. 56.87 % expressed the need for information related to pre-sowing stage.

3.2 The Level of Respondents Need to Information on Technical Recommendation of Potato Crop Fertilizing

It is clear from Table 3 that 69.6% of the respondents were of moderate information need of technical recommendations for fertilizing the potato crop, which indicates the need to intensify the efforts of extension efforts to provide farmers with information on technical recommendations for fertilizing potato varieties to cope with current development of types of fertilizers and methods of fertilization. The results were fit with the study of Rawal and Ansari [21] found that 51.87 of respondents need for information related to growing stage.

The data provided in Table 4 indicate that the information needs of the respondents are high for technical recommendations for the addition of bio fertilizers, compost, and magnesium fertilizer and its equivalent. The percentages of the average of the information need of the respondents were 92.87%, 88.70%, and 86.96% respectively. The results of Table 4 show that the level of information need for respondents for technical recommendations for fertilizing the potato crop as a whole was moderate, with a general average of 60.81%. This in line with Khedr [20]

who found that respondents needed knowledge for potassium and organic fertilization.

3.3 The Relationship between the Degree of the Respondents Need for Information on Technical Recommendations for Potato Crop Varieties and Some Independent Variables

As shown in Table 5, there is a statistically significant relationship at 0.01 with the educational level of respondents, where the value of the simple correlation coefficient was -0.411. There is also a statistically significant relationship at 0.05 with the purpose of growing the potato crop where the value of the simple correlation coefficient was -0.217. Results supported by Risha [18] as he found a relationship between the knowledge needs of the farmers in the fields of conserving Agricultural Environment and the degree of education. Mikhael and Sharaf-El-Din [22] found a relationship between the degree of the respondents' need to implement the technical recommendations of onion post-harvest processes and the main purpose cultivating onion crop.

However, there is no statistically significant relationship with variables of average potato yield productivity, total cultivated area, and area cultivated with potato crop. These results are supported by Mikhael and Sharaf-El-Din [22] who found no relationships between the degree of the respondents' need to implement the technical recommendations of onion post-harvest processes and total cultivated area and the area cultivated with onion crop. Based on these findings, the previous research hypothesis was accepted for each of the independent variables with a Statistically significant correlation, Educational level of respondents and the purpose of growing the potato crop yet it could not be accepted for the variable of average potato yield productivity, total farmed area, and area cultivated with potato crop.

3.4 Differences among Respondents in their Level of Information Need for Technical Recommendations for Potato Crop Varieties According to Some Independent Variables Studied

The findings in Table 6 show that there are no statistically significant differences among respondents in their level of information need for technical recommendations for potato crop varieties as a dependent variable and the independent variables the crop rotation, availability of seeds, availability of fertilizers, appropriateness of prices of imported potato seeds, appropriateness of prices of fertilizers, and communication of agents of agricultural extension. Was not significant at 0.05. It is clear that the research hypothesis for these variables cannot be accepted.

3.5 The Relationship between the Degree of the Respondents Need for Information on Technical Recommendations for Fertilizing the Potato Crop and Some Independent Variables

Table 7 shows that there is a statistically significant relationship 0.01 with the educational level of respondents and the average productivity of potato crop, where the values of the simple correlation coefficient were -0.513 and -0.247, respectively. Results are consistent with what Risha [18] found of a relationship between the knowledge needs of farmers in the fields of conserving agricultural environment and the degree of education. And agree with El-Shafei et al. [17] who found a relationship between the knowledge needs of onion growers in the field of onion cultivation and service and size of productivity.

Table 1. Distribution of respondents according to the level of information need of the technical recommendations on potato crop varieties

The level of information need for recommendations	No. of respondents	Percent
Low (less than 25)	17	14.8
Moderate (25-42)	82	71.3
High (more than 42)	16	13.9
Total	115	100
Range 47-7	Arithmetic mean 33.8	Standard deviation 8.47

Table 2. Level of information need averages of technical recommendations for potato crop varieties

S/N	Items of technical recommendations for potato varieties	Maximum level of information need	Average of information need	Average %	Level	Order
1	Potato cultivated in the study area	11	7.217	65.61	Moderate	7
2	Local consumption potato varieties	2	0.869	43.48	Low	10
3	Export potato varieties	3	2.304	76.81	High	4
4	Manufacturing potato varieties	3	2.174	72.46	High	5
5	Multipurpose potato variety	3	2.425	78.26	High	3
6	early and medium maturity potato varieties	3	1.278	42.0	Low	11
7	Medium/ late maturity potato varieties	8	5.061	63.26	Moderate	9
8	Characteristics of good seeds	6	3.896	64.93	Moderate	8
9	Planning for different varieties	2	0.461	23.05	Low	15
10	Farming distances for different varieties	2	0.557	27.85	Low	14
11	Varieties best be cultivated in summer season	2	0.722	36.09	Low	12
12	Varieties best be cultivated in winter season	3	0.922	30.73	Low	13
13	Varieties best be cultivated in two seasons	6	4.174	69.57	Moderate	6
14	Varieties resistant to blights	5	4.435	88.70	High	1
15	Varieties sensitive to blights	6	5.052	84.20	High	2
General average:		2.77		57.84	Moderate	

Table 3. Distribution of respondents according to of information need for the technical recommendations for fertilizing the potato crop

The level of information need for recommendations		No. of respondents	Percent
Low (less than 19)		15	13
Moderate (19-31)		80	69.6
High (more than 31)		20	17.4
Total		115	100
Range 8-36 points	Arithmetic mean 25.3	Standard deviation 6.26	

The table also shows a statistically significant relationship at 0.05 with the total area of potato crop cultivation and the purpose of growing the potato crop where the values of the simple correlation coefficient were -0.216 and -0.183 respectively. Which is consistent with Shalaby and El-Melegy [23] who found a relationship between the degree of extension knowledge needs of Date Palm growers and the area planted with palm. And findings of Mikhael and Sharaf-El-Din [22] who found a relationship between the degree of the respondents' need to implement the technical recommendations of onion post-harvest processes and the main purpose cultivating onion crop.

Based on these findings, the previous research hypothesis was accepted for each of the independent variables with a statistically significant correlation yet it could not be accepted for the variable of total cultivated area. Mikhael and Sharaf-El-Din [22] there was none a relationship between the degree of the respondents' need to implement the technical recommendations of onion post-harvest processes and total cultivated area.

Table 4. Level of information need and averages of technical recommendations for fertilizing potato crop items

S/N	Items of technical recommendation for potato crop fertilization	Maximum level of information need	Average of information need	Average %	Level	Order
1	Organic manure	2	0.452	22.60	Low	13
2	Compost	1	0.887	88.70	High	2
3	Azotobacterial mineral fertilizers and equivalents	4	1.104	27.61	Low	12
4	Phosphate fertilizers and equivalents	2	0.687	34.35	Low	11
5	Potassium fertilizers and equivalents	3	1.390	46.33	Low	10
6	Agricultural Sulfur and equivalents	1	0.174	17.39	Low	14
7	Magnesium fertilization and equivalents	3	2.609	86.96	High	3
8	Calcium fertilizers	2	1.104	55.22	moderate	9
9	N P K	5	3.948	78.96	High	5
10	Foliar fertilization with micro elements	3	2.321	77.39	High	6
11	Spray fertilization reserve	5	4.061	81.22	High	4
12	Adding amino acids	6	4.330	72.17	High	7
13	Adding humic substance	4	2.783	69.57	Moderate	8
14	Adding bio fertilizers	5	4.643	92.87	High	1
General average:		2.18		60.81	Moderate	

Table 5. The relationship between the degree of the respondents need for information on technical recommendations for potato crop varieties and some independent variables

Independent variables	Simple correlation coefficient
Educational level of respondents	**-0.411
Average productivity of potato crop	-0.163
Total cultivated area	-0.105
Total potato cultivated area	-0.155
Purpose of potato crop cultivation	*-0.217

*** Statistically significant relationship at level 0.01*
** Statistically significant relationship at level 0.05*

3.6 Differences among Respondents in their Level of Information Need for Technical Recommendations for Potato Crop Fertilization According to Some Independent Variables

Table 8 shows that there were no statistically significant differences among respondents in their level of information need for technical recommendations for potato crop fertilization as a dependent variable and the independent variables of crop rotation, availability of seeds, availability of fertilizers, and affordability of prices of fertilizers. It was not significant at 0.05. Thus, it was clear that the research hypothesis for these variables cannot be accepted.

Statistically significant differences were found among respondents in their level of information need for technical recommendations for potato crop fertilization as a dependent variable, and communication of agents of agricultural extension and affordability of prices of imported potato seeds as independent variables. The estimated chi 2 values were 22.820 and 11.001, respectively. It is statistically significant at the probability level of 0.01, 0.05. Based on this result, the research hypothesis can be accepted. Such hypothesis states that ther were significant differences among respondents in their level of

information need for technical recommendations for fertilizing the potato crop as a dependent variable and both the communication of agents of agricultural extension, and affordability of prices of imported potato seeds as independent variables.

3.7 Sources of Information for Farmers about Potato Crop

Table 9 indicates that 100% of the respondents do not acquire their information about potato crop from any of the following sources: extension fields, horticultural care specialists at the district, or the Faculty of Agriculture in the governorate. It has been shown that pesticide and fertilizers traders, experienced people, and the internet are common sources of obtaining information where said that: 60.9%, 52.2%, and 10.4% respectively. The results are in agreement with the findings of Sokar and Zayed [24], who showed that respondent personal experience, pesticide and fertilizers shopkeepers, and neighbors and friends are the most important information sources disorders where said that 93.3%, 71.7%,64.2%.

3.8 Problems Facing Respondents with Varieties and Fertilization of the Potato Crop

The results in Table 10 indicate that there are 14 problems related to the varieties and fertilization of the potato crop. They were mentioned by respondents in percentages ranging between 10.4% to, 92.2% of the total sample respondents. The problems were arranged in descending order according to percent mentioned by respondents. The results similar to the results of the study of Mahrous and Zeyada [25] who found that 94.6% of respondents face the problem of high prices of seeds and fertilizers and Embark [26] indicated that one of the productivity and marketing issues they face is access to the seeds mentioned by 28% of respondents, and 77.2% of them faced the problem of providing fertilizer for the crop.

Table 6. Differences among respondents in their level of information need for technical recommendations for potato crop varieties according to some independent variables studied

Independent variables	Chi- square
Agricultural cycle	3.370
Availability of seeds	5.483
affordability of imported potato seeds crop prices	5.187
Availability of fertilizers	3.900
affordability of fertilizers prices	5.884
communication of agents of agricultural extension	8.362

Degree of freedom= 4

Table 7. The relationship between the degree of the respondents need for information on technical recommendations for fertilizing the potato crop and some independent variables

Independent variable	Simple correlation coefficient
Educational level of respondents	**-0.513
Average productivity of potato crop	**-0.247
Total cultivated area	-0.123
Total potato cultivated area	*-0.216
Purpose of potato crop cultivation	*-0.183

*** Statistically significant relationship at level 0.01; *statistically significant relationship at level 0.05*

Table 8. Differences among respondents in their level of information need for technical recommendations for potato crop fertilizing according to some independent variables

Independent variables	Chi- square
Crop rotation	7.885
Availability of seeds	4.040
Affordability of imported potato seeds crop prices	*11.001
Availability of fertilizers	0.312
Affordability of fertilizers prices	4.570
communication of agents of agricultural extension	**22.820

*** Statistically significant relationship at level 0.01;*statistically significant relationship at level 0.05 Degree of freedom= 4*

Table 9. Sources of information for farmers about potato crop

Sources of information	Degree of exposure							
	Always		Sometimes		Seldom		None	
	No.	%	No.	%	No.	%	No.	%
Symposium	-	-	2	1.8	15	13	98	85.2
Extension fields	-	-	-	-	-	-	115	100
Printed instructions	7	6.1	19	16.5	3	2.6	86	74.8
Horticultural care specialists at the district	-	-	-	-	-	-	115	100
Agricultural Cooperative	10	8.7	17	14.8	25	21.7	63	54.8
Agricultural television programs	-	-	25	21.7	10	8.7	80	69.6
Potato export stations	-	-	7	6.1	20	17.4	88	76.5
Fertilizers and pesticide traders	70	60.9	22	19.1	12	10.4	11	9.6
Experienced people	60	52.2	35	30.4	-	-	20	17.4
The internet	12	10.4	26	22.6	-	-	77	67
The Faculty of Agriculture in the Governorate	-	-	-	-	-	-	115	100

N = 115

Table 10. Ranking of the problems facing respondents related to varieties and fertilization of the potato crop according to the percentages respondents

S/N	Problems	Frequency	Percent
1	High prices of imported seeds	106	92.2
2	High prices of all types of fertilizers	100	86.9
3	Lack of knowledge of on technical recommendations for potato varieties	89	77.4
4	Lack of knowledge of foliar fertilization, bio fertilizations and how to use them	71	61.7
5	Adulteration of most fertilization, especially foliar fertilization	67	58.3
6	Adulteration of imported seeds	60	52.3
7	Absence of a cooperative or contractual marketing system for potato crop to compete with greedy traders and exporters	53	46.1
8	Lack of reliable sources of production supplies in the absence of the role of agricultural cooperatives and potato producers	46	40
9	Absence of agricultural extension role in the production, marketing and preparation of guidelines and bulletins for each potato variety	43	33
10	Lack of real control over production supplies, especially imported seeds and pesticides.	37	32.2
11	The majority seeds types of are infected with the viruses and are not resistant to blights	35	30.4
12	Lack of information for farmers on price forecasts, or on varieties suitable for local marketing and export	31	26.9
13	High prices of potassium fertilizers	26	22.6
14	Lack of knowledge of appropriate ways to reduce adverse weather impacts on potato crop production or issuing warning for farmers of bad weather forecast	12	10.4

N=115

4. CONCLUSION

Scientific advancement in agriculture has led to the multiplication of potato varieties and the diversity of fertilizers. This has been accompanied by a high need for farmers for more knowledge and information, especially with regard to the cultivation and production of new varieties desirable for export and processing. The knowledge needs of farmers in regard to varieties and fertilization of potato crop are related to socio-economic factors, the most important level of their education And their purpose of cultivating the potato crop, their average productivity of potato crop, as well as total potato cultivated area. Potato cultivation is surrounded by a number of problems facing farmers, the most important are the high prices of seeds and fertilizers and lack of information, whether related to new varieties or types of advanced fertilizers due mainly to the absence of agricultural extension services and presumably the most important sources of those information. This requires activating the role of extension to satisfy the needs of farmers for sufficient information to keep abreast of developments in the varieties and fertilization of potato crop.

5. RECOMMENDATIONS

Based on the findings of this study, the following is recommended:

- The results show that the vast majority of respondents (farmers) are with moderate level of cognitive need for information on potato varieties and fertilizers. So the study recommends increasing extension efforts in potato growing areas, working to present field extension, pilot programs, seminars, and the preparation of technical bulletins for farmers to be updated with new recommendations for each variety and its fertilization needs, especially with the increase and multiplication of potato varieties and continuously varying fertilizers.
- The results of the study show that pesticide and fertilizer traders constitute the main sources of information that meets the need of farmers for information related to the potato crop. Therefore, the study believes that the Agricultural Extension should train them in crop recommendation.
- The problems indicated by the respondents are mostly related to the varieties and the fertilization of the potato crop. Therefore, the study recommends that the Ministry of Agriculture takes over the supervision of the process of importing and distributing seeds through agricultural cooperatives, the way it used to be in the past. It is crucial to establish a cooperative or contractual marketing system for the potato crop, to eliminate farmers' manipulation by traders and exporters. Packaging and distribution should be monitored, along with fertilizers, bio nutrients, micronutrients, and others, in order to eliminate adulteration, especially that the process of fertilizing the potato crop is becoming more expensive.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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