



**AgEcon** SEARCH  
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

*The World's Largest Open Access Agricultural & Applied Economics Digital Library*

**This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.**

**Help ensure our sustainability.**

Give to AgEcon Search

AgEcon Search  
<http://ageconsearch.umn.edu>  
[aesearch@umn.edu](mailto:aesearch@umn.edu)

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

Proceedings of the 4<sup>th</sup> Biennial Conference  
of the  
African Farm Management Association

# **Farm and Farmer Organisation for Sustainable Agriculture in Africa**



Edited by  
Johann Laubscher

26 - 30 January 1998  
University of Stellenbosch, South Africa

# ECONOMIC ANALYSIS OF IRRIGATED HORTICULTURAL PRODUCTION: A CASE STUDY OF GENDER ISSUES IN KENYA

O.L.E. Mbatia

Department of Agricultural Economics, University of Nairobi, Kenya

## ABSTRACT

*The purpose of this study was to evaluate the economic contribution of irrigation to productivity of horticultural crops in semi-arid areas/districts of Kirinyaga and Murang'a Kenya, and to evaluate economic variables such as income, employment in relation to gender issues. A random sample of 140 small-scale farmers was interviewed using a structured pre-tested questionnaire for cropping season 1991/1992.*

*Ninety percent of small-scale farmers were growing irrigated horticultural crops. The average family size was 4.0 persons. Furrow irrigation was used by 65 % of farmers. Other irrigation systems such as sprinklers, bucket and general flooding were also used.*

*Forty seven percent of respondents were males and 38 % were females. The average income from horticultural production was Ksh. 35,363 and Ksh. 15,279 for female and male farmers respectively. The wage rate was the same for male and female ranging between Kshs. 25 to Kshs. 35 per day.*

*The decision making on growing horticultural crops, expenditure, marketing and food reserved for home consumption were jointly made.*

*The major problems expressed were water shortage, markets, extension services, and capital and credit facilities. In conclusion, the small-scale irrigation scheme is contributing by ensuring household food security and sustainable development in the rural areas. The study made recommendations that problems encountered be addressed by, for instance, providing credit facilities and extension services.*

## 1. Introduction

Kenya's economy is agriculturally based. The agricultural sector employs 70 % of the total Kenyan population with smallholdings accounting for 85 % of the total agricultural employment (World Bank, 1990). The total Kenyan population is estimated to be 28 million people (Republic of Kenya, 1997). Kenya's total area is approximated to be 580,367 square kilometres, which is equivalent to 58 million hectares. The total usable land area is 10.6 million hectares; 41.2 million hectares, that is, 72.4 %, is arid and very arid.

With such a large area falling under the classification of semi-arid, arid and very arid lands, irrigation remains a possible option for increasing the productivity. Further, with increasing pressure on land as a result of population increase and demand for food, irrigation would require to be intensified to bring more arid land into productivity. This would create employment and generate income. The country's irrigation potential is estimated as being 500,000 hectares. (Republic of Kenya, 1988).

Small-scale farmers with land having river fronts or river bottoms do sometimes carry out irrigation, mainly growing cut flowers, vegetables and fruits for home consumption and for

sale in local markets. By definition irrigation is the application of water by human agency, to assist the growth of crops. By irrigating land farmers have managed to earn some income for purchasing staple food and meeting other household expenses. Some crops are grown for export. For example, cut flower farming has become an attractive business for the export market. It requires heavy capital investment in building green houses, buying and installing the irrigation system and buying planting materials. Only a few potential farmers have embarked on this commercial farming of cut flowers such as roses, alstroemeria, solidaster and others.

## **2. Gender**

The dimension of bringing gender issue into this study is quite important, since women form 50.4 % of Kenya's population according to 1979 population census. Further, 88 % of Kenyan women stay in the rural areas, with farming being their main occupation. Kibera (1984) indicated that women form the backbone of Kenyan agriculture. They contribute 80 % of the country's food production and are also involved in cash crops production. It is even further shown that 96.1 % of the rural women in Kenya are involved in their own household farms compared to 80.4 % of their rural male counterparts (international labour Organisation, 1986). The gender component in the present study aims at finding out what role Kenyan women play in labour supply, farm production, decision making, crop sales decision, and income distribution decision.

## **3. Methodology**

The study was carried out in the semi-arid areas/districts of Kirinyaga and Murang'a in Kenya where small-scale farmers were engaged in irrigation farming of various horticultural crops. The small-scale farmers to be included in the study were identified by use of agricultural officers, women's groups and extension workers in the study areas.

A random sample of 70 respondents from each district was interviewed by using a structured pre-tested questionnaire. The enumerators were trained and all of them came from the study area. The data collected was for cropping season 1991/1992. Secondary data was also used as a check on production, employment and inputs used on irrigated horticultural crops and rain-fed crops. Informal discussions were held between the researcher and extension workers and agricultural officers working in the area as a counter check on data collected.

The data analysis was carried out by use of SPSS/PC. The cross tabulation analysis was carried out for various combinations of variables. The statistical tests were carried out at 5 % level of significance on various variables to test if significant difference existed on the basis of gender.

## **4. Empirical analysis**

The number of households surveyed was 140, of which 4 questionnaires were spoiled. The remaining 136 were used for empirical analysis. The average household size was 4.1, composed of males and females of average age of 34 years. All of them were engaged in farming activities. The education level distribution was as follows: 4.5 % had no education, 9 % had lower primary education, 32.3 % had upper primary education, 4.7 % had secondary education and 6.8 % had gone to high school.

The main occupation of the population living in the study area was farming. A total of 90.4 % were farmers, and the rest indicated that there were cashiers (3 %), businessmen (3 %), civil servants (1.5 %) and teachers (2.2 %). The family life was relatively steady, where 65.7 % were married, 32.6 % were single, 1.5 % were widowed, and less than 1 % were divorced. As for the relationship to the head of the household, 44.1 % were head, 19.1 % were spouses, 33.8 % were sons and 0.7 % each were daughters and relatives, while only 1.5 % were non-relatives.

The average farm size was 3.9 acres. There are two crop seasons, namely: the long rain season from March to September and a short rain season beginning October to February. The area farmed during the long rain season (1<sup>st</sup> season) was on average 2.2 acres and during the short rain (second season) was 2.3 acres. There was a statistical difference in the area farmed during 1<sup>st</sup> and 2<sup>nd</sup> seasons, that is during short-rain and long-term season at 5 % level of significance.

The irrigable area on the average was 3.1 acres. The farm under irrigation was 1.84 acres and 1.83 acres in 1<sup>st</sup> season and 2<sup>nd</sup> season respectively. No statistical difference existed in land utilisation during 1<sup>st</sup> and 2<sup>nd</sup> season at 5 % level of significance. This is due to the fact that the farmers were able to irrigate all the time.

The area under horticultural crops per household on average was 0.689 acres and 0.770 acres during 1<sup>st</sup> season and 2<sup>nd</sup> season respectively. Some of the problems indicated by the farmers as reasons for not irrigating the entire irrigable areas were: 6.2 % could not get the pipes; 10.3 % had water availability problems; 43.3 % stated a lack of money; 12.4 % stated a lack of inputs such as chemicals and planting materials; 6.2 % stated that labour was a problem; and 5.2 % indicated a shortage of land.

A small section of farmers, 21.4 %, had some land elsewhere. Sixty percent cultivated an average of 2.2 acres and 2.6 acres during 1<sup>st</sup> and 2<sup>nd</sup> season respectively. The irrigable portion of land elsewhere averaged 1.83 acres. The land fully utilised per household averaged 1.371 acres. On average 1.930 acres was under horticultural crops. Some farmers leased land for growing horticultural crops.

The methods of irrigation used in the study areas were sprinkler, river basin, furrow, general flooding and bucket. Out of 136 households, 22 % used a sprinkler system, 65.2 % used a furrow system, and 9.1 % used a bucket system. Irrigation water was conveyed into the farm by pumps or a gravity system. About 62 % of the farmers used pumps and 31 % used gravity systems.

Among the males, 64.62 % stated that they irrigated horticultural crops while on the same issue 37.5 % of females farmed the horticultural crops. About 49.2 % and 55.1 % males and females respectively practised rain-fed farming. The total average income earned from all crops, that is rain-fed and horticultural crops, by household was Ksh. 62,451.00. The average income earned from horticultural production for female farmers was Kshs. 35,363 and for male farmers Kshs. 15,279. The males controlled earnings from cash crops.

The number of days worked per week on horticultural crops amounted to 216 days per year of which females worked 99 days and males worked the rest, 117 days. The contribution by each gender was 45.2 % females and 54.2 % males. On irrigated cash crops, women worked 26 days. The demand for labour on irrigated horticultural crops was much higher than that for

irrigated cash crops. This is because the irrigated horticultural crops are both labour and capital intensive.

Rain-fed crops demanded less labour than irrigated horticultural crops but more than irrigated cash crops. Women worked 63 days (47 %) and men worked 71 days (53 %) on horticultural crops. The major rain-fed crops were maize and beans, which are staple food crops in the surveyed area.

The marketing of horticultural crops is highly buyer controlled. The buyers normally buy produce at the farm gate or at marketing centres. The buyers normally set the prices; therefore there was no room for negotiation. In general, 64 % of farmers felt that the prices were fair. For those crops that were sold in markets at urban centres farmers fetched better prices. The prices were normally high during the dry season. Some of the problems mentioned by the farmers were lack of a ready market and high transportation costs, as well as exploitation by the middlemen.

The head of a household and a member of a family faced many decisions that had to be made: what crops should be planted; what chemicals and fertilisers should be used on different crops; what to sell and when to sell, and how much food should be kept for home consumption, and how to spend the money earned from sales. The study was interested in finding out which member of a household contributed in these choices. It was found that males made 77.5 % of all decisions regarding growing, expenditures, sales of irrigated horticultural crops and rain-fed crops. The females contributed 22.5 % in decision making.

On irrigated horticultural crops, husbands made 90 % choice of horticultural crops to grow. Both husband and wife made 74.2 % of the decisions concerning farming, spending and use of farm resources. The males were less involved in decision making regarding rain-fed crops and food to be left for home consumption. In all cases no decision could be made without input from females. Hanger and Morris (1973) carried out a study in Mwea and Nembure areas regarding women participating in decision making. It was found that 64.4 % women participated in decision making relating to household affairs in Mwea and 66 % in Nembure; 49 % in Mwea and 58 % in Nembure regarding farm decision; and 15 % in Mwea and 32 % in Nembure regarding general household finance decisions. No doubt women participated actively in decision making as the two studies have shown.

The farming of the irrigated horticultural crops requires use of a lot of fertilisers and chemicals. In this study, it was found that the commonly used fertilisers were Di-ammonium phosphate (DAP) and Calcium Ammonium Nitrate (CAN). About 79 % and 87 % of male and female farmers respectively used DAP whereas 64 % and 38 % of male and female farmers used CAN respectively. The hypothesis that there were no differences in fertiliser use between the genders was not rejected. The computed chi-square was 4.932 for 5 degrees of freedom, which was less than the critical at 11.070 at 5 % level of significance. The hypothesis that there was no difference in pesticide use was also tested. The calculated chi-square was 18.484 for 15 degrees of freedom, which was less than the critical at 25.08 at the 5 % level of significance. Again the hypothesis was rejected. Therefore it was concluded that there is no difference in resource use between the genders.

## 5. Conclusion and policy recommendations

The farming of irrigated horticultural crops provides the household source of employment, income and food for home consumption. This study has shown that 90 % of the farmers were involved in farming of irrigated horticultural crops and rain-fed crops.

Farmers used sprinkler irrigation, river basin, furrow, bucket and general flooding. The furrow system was used by 65 % of farmers. The source of water for irrigation was pumped from the Thiba, Kinga and Nyamindi rivers in Kirinyaga District while in Murang'a District water was pumped from Maragwa and Sabasaba rivers. These rivers had water all year round. The soil in Kirinyaga District was black cotton soil, while in Murang'a it was a mixture of red and black cotton soil.

Forty seven percent of males stated that they were farming irrigated horticultural crops, while 38 % of females were in horticultural crop farming. About 49.2 % and 55.1 % males and females respectively practised rain-fed farming.

Households preferred farming of horticultural crops because they were able to earn quick income. There were statistical differences in income between the genders at 5 % level of significance. The total days worked per week on horticultural crops totalled 216 days, of which females worked 99 days and the rest, 117 days, was worked by males. The wage rates per day were the same for male and female, which ranged between Kshs. 25 and Kshs. 35 per day.

The decisions on growing, expenditure, marketing and food to be kept for home consumption were jointly made. Husband and wife jointly made about 74 % of the decisions. Females mainly made decisions regarding rain-fed crops.

The major problems expressed by the farmers were the lack of water, marketing facilities, extension services and lack of capital. Hardly any credit facilities were available. The farmers were highly exploited by the middlemen who bought their produce.

One of the major policy recommendations is that the government should show some keen interest in small-scale irrigation for horticultural crops. A programme could be started whereby irrigation equipment could be made available to farmers at reasonable prices. The study revealed that no statistically significant difference between genders was noted in terms of earnings, employment and fertiliser and chemical uses. Therefore both males and females should be treated as equals in acquiring loans to purchase equipment and inputs required for irrigation.

There is a great need to organise marketing facilities in the study area. Some farmers suggested that co-operative societies could be organised. A study could be carried out to establish whether co-operative societies are feasible or not.

The farmers felt that the extension service was inadequate. Therefore the government could look into some ways of training the extension workers in areas of horticultural education such as use of inputs, namely fertilisers, spraying chemicals and disease control. The farmers were concerned about the quality of some inputs and the exorbitant prices charged by sellers.

## REFERENCES

Hanger, J. and J. Morris (1973). "Mwea: An Irrigated Rice Settlement in Kenya." In R. Chambers and J. Morris (Eds.): Africa Studies No. 83 IFO. Munchen.

International Labour Organisation (1986). "Women's Employment Patterns Discrimination and Promotion of Quality in Africa – The Case study of Kenya." Jobs and Skills Programme for Africa, Addis Ababa. Prepared by Dr. Wairiara Mbugua of Population Studies and Research Institute, University of Nairobi.

Kibera, K. (1984). "Women and Agriculture." Report of Kenya Non-Governmental Organisation Subcommittee Workshop. Report No. 7. Reports compiled at the Institute of Development Studies, University of Nairobi. Nairobi.

Republic of Kenya (1981). Integrated Rural Surveys 1976-1979: Basic Report. Central Bureau of Statistics, Ministry of Planning and Development. Nairobi.

Republic of Kenya (1997). National Development Plan 197-2001. Central Bureau of Statistics, Ministry of Planning and Development. Nairobi.

Republic of Kenya (1984). Situation Analysis of Children and women in Kenya, Section 3: The Role and Situation of Women. Central Bureau of Statistics and UNICEF. Mangraphics Limited, Nairobi.

Republic of Kenya (1990). Profitability of Smallholder Irrigation in Kenya, part I, Main Report. Ministry of Agriculture, Irrigation and Drainage Branch. Nairobi.

Smok, A.C. (1981). "Women's Economic Roles." In Killick, T. (Ed.), Papers on Kenyan Economy: Performance, Problems and Policies. Heinmann Education Book Limited. Nairobi.

World Bank (1987). Study on Options and Investment Priorities in Irrigation Development in Kenya. World Bank, Washington D.C. and the Directorate General of International Co-operation, Kingdom of the Netherlands.