

THE INFLUENCE OF MARKETING AND EXTENSION SERVICES ON THE ADOPTION OF IMPROVED AMARANTH AMONG SMALL SCALE FARMERS IN BUURI DISTRICT, MERU COUNTY, KENYA

1

*Kyambo, Onesmus *; SouthEastern Kenya university*

2

Obara, James Egerton University

3

Muthoka, Patrick National museums of Kenya

4

Esther, Kioko National museums of Kenya

5

Robert, Kigali Jomo Kenyatta university of Agriculture and Technology

**Corresponding Authors, Emails:*

kyambo2010@yahoo.com Tel no. 0723225364

Jamesnet1@Hotmail.com Tel no.0722604782

Muthoka2000@yahoo.com Tel no. 0729382882

Esther2@yahoo.com Tel no.0722617508

ABSTRACT

The importance of *Amaranth* as a valuable source of food, medicine and income has been documented. In the recent past, the cultivation of *Amaranth* by small scale farmers in Kenya have been promoted by public extension services, Non-Governmental Organizations (NGOs), research organizations and universities. The extent of influence of access to extension services and availability of markets for *Amaranth* products on the adoption of *Amaranth* in Buuri District has not been adequately studied. The purpose of this study therefore is to determine and document how access to extension advice and availability of markets *Amaranth* products affect the adoption of the crop in Buuri District in Meru County. An *ex-post-facto* survey design was employed in this study and targeted common interest groups growing *Amaranth* among Buuri district stakeholders. The population sampled comprised of 360 members of all common interest groups in Ruiru and Nchoroiboro locations. A total sample of 110 respondents from the population of 360 small scale farmers was selected from these two locations within Buuri District using a random sampling approach. Questionnaires were administered to the sampled households. Data analysis was carried out using descriptive and inferential statistics. Pearson's product moment correlation coefficient analysis was appropriately used to determine the influence of independent variables on the dependent variable for each of the hypotheses and analyzed at alpha significant level of 0.05. This study found that availability of market influence the adoption of improved *Amaranth* in the study area. However, access to extension services does not significantly influence the adoption of improved *Amaranth*. Efforts should also be made to provide a competitive market for current farmers for continued *Amaranth* cultivation and also as a factor for influencing other farmers' perception of the crop.

Key Words: Marketing, extension services, adoption, improved amaranth, small scale farmers.

INTRODUCTION

The majority of the approximately 60 species of *Amaranthus* (collectively known as Amaranth) occurs in the wild and is regarded as weeds (Brenan, 1981). Throughout the world, however, a limited number of species are cultivated and their grain and leaves are utilized for animal and human consumption (Gerson, 1991). With its increasing human population in Africa and against the background of drought, mismanagement of natural resources and food shortages, Amaranth has become valuable source of human nutrition (Gerson, 1991). *Amaranthus* is among the orphaned crops in Kenya (Ray and Roy, 2008). However, there is a lot of potential in the cultivation of this species as well as orphaned crops such as cowpeas, spider plant and black nightshade. There is therefore the need to create awareness on the potential of these crops.

Several *Amaranthus* species are widely distributed throughout the world especially in the tropical regions. In Africa, *Amaranthus dubius* Thell., *Amaranthus hybridus* L., *Amaranthus cruentus* L., and *Amaranthus blitum* L., are the most commonly cultivated species. Several hybrid varieties of these species also exist. *Amaranthus dubius* Thell., is believed to be of American origin. It is short compared to other species, has simple ridged leaves, ovate lamina and conspicuous veins underneath the leaves. This species is fast growing, taking approximately three weeks before leaves are harvested (Maundu, Ngugi and Kabuye, 1999).

According to the Food and Agriculture Organization (FAO, 1988), traditional vegetables are all categories of plants whose leaves are accepted for use as vegetables. Cooked leaves are served as food particularly during famines and natural disasters. Generally *Amaranthus* species grow as weeds in the wild or as cultivated crops or semi-cultivated crops. *Amaranthus* is grown as a crop for grain and leaf vegetable which is very nutritious having high levels of vitamins A and C. The vegetables also contain valuable minerals such as calcium and potassium and are said to be tasty. In addition, *Amaranthus* seeds are unusually high in protein for a non-legume, containing around 14 to 16% proteins (FAO, 1988). Even better, the protein is well balanced in amino acids, and is high in lysine, an amino acid for which most grains are deficient (Simlaw Seed Company Ltd brochure, 2011).

Several constraints hinder the commercial cultivation of indigenous vegetables and these include pest and disease infestation (Palada and Chang, 2000). In most surveys undertaken across the African continent, the need for research on pest complexes of indigenous vegetables has been a priority. The plants damaged by insect pests become more vulnerable to diseases. The correct identification of insect pests occurring in a particular area and their damage symptoms is a first step towards the development of integrated pest management strategies (Cock, 1986).

Poor seed selection and seed management after harvesting can also lead to decline in agricultural production and low economic growth (FAO, 1986; Grant, Painer, Meijer and Witcover, 2001). Seeds are planted shallowly (1-2.5cm deep depending on soil moisture) in finely prepared soil to ensure good seed-to-soil contact. Deep planting may delay and decrease emergence. Seed germinates quickly when soil temperatures are between 15°C to 18°C. Due to the shallow planting depth, drying out of the soil should be prevented until plants are established. Grain *Amaranthus* grow slowly during the first several weeks when weed control is critical. Once the plant is about a meter tall, it begins to grow rapidly and is competitive among weeds (O'Brien and Price, 1983; Myers and Putnam, 1988).

Farmers who have frequent contact with extension agents usually have higher adoption rate for farming practices than those farmers with less contact with extension staff. Thus the extent to which the farmers make contact with members of the extension staff determines the adoption of recommended practices (Wilson and Gallup, 1985). Crop production extension services are

important for the adoption of crop production technologies. Farmers require technical advice on measures suitable for their farms. Wilson and Gallup (1985) found out that the level of expertise manifested by farmers with intensive extension contact was consistently higher than that of other farmers. However, this is in contrast with the findings of Wasula (2000), who found that the frequency of extension contacts with the farmers was not significant to the adoption of agro-forestry technologies.

In a study by Chitere (1985) to establish the extent to which farmers adopt recommended practices, it was found that nearly all the farmers in an area previously occupied by European settlers' were knowledgeable about improved farming practices. He also observed that farmers adopt improved farming practices largely because of early exposure to intensive extension teaching. Several studies indicated that a positive relationship between contact with agricultural information sources and adoption (World Bank, 1993 and Wasula, 2000). Farmers who have been exposed to an intensive extension education adopted many agricultural innovations in contrast to neighbours who are not exposed to extension campaigns.

If the market demand for Amaranth were larger, there would be thousands of farmers growing it at its current price. The species from the genus Amaranth are used for a wide variety of purposes. Although the crop is used exclusively for seed production in the USA in other regions of the world there are many other uses. In Africa and the Caribbean, Amaranth is commonly eaten as a pot herb, with individual leaves picked off the plants periodically. Farmers in China are reportedly growing over 100,000 acres of amaranth as forage for hogs. Many Amaranth species have therefore become popular ornamental plants (Jefferson, 2006). The primary Agricultural focus of rural, resource limited household in Kenya is food security. There is a range of markets running from local markets, which may be held as frequently as every day to global and import markets. This range implies different quantities of products, ranging from individually countable numbers of products in the village setting to bulk shipment at the international level. Encompassed within this discussion of economies of scale is the notable distinction between rural and urban markets within Kenya. Whereas rural markets mostly likely offer commodities fresh from the field (shamba), urban markets require high quality products. Rural resource limited household may not be able to benefit from those urban markets due to their lack of training and organization to meet those standards demanded by supermarkets and urban consumers (Bahigwa, 2006). Local markets tend to be solely in the female domain, consisting of subsistence produce brought from the household home garden (Aspaas, 1998; Momsen, 2004).

This aspect of marketing is likely to be a significant factor affecting adoption of grain and vegetable Amaranth, especially in cases where households aim to cultivate Amaranth rather than for domestic consumption. Prices of grain Amaranth and other agricultural commodities are likely to vary seasonally as well as annually in response to demand and supply constraints. The issue of marketing of Amaranth products will be carefully considered in this study, to assess whether grain Amaranth has a future as a food crop, cash crop or both (Bahigwa, 2006)

Although the Ministry of Agriculture and other stakeholders have been sensitizing and training small-scale farmers on the benefits of *Amaranth* products in human diet and production techniques, production has remained low even in Buuri District. This is evident in that the farmers are depending on exotic vegetables and grains despite the awareness to date.

Farmers who have frequent contacts with extension agents usually have higher adoption rate than those farmers with less contact with extension staff. Thus the extent to which the farmers make contact with members of the extension staff perhaps could determine the adoption of *Amaranth* for food.

The objectives of the study were to determine:

- i) The influence of access to extension services on the adoption of improved *Amaranth* in Buuri District.
- ii) The influence of availability of market for improved *Amaranth* products on the adoption of improved *Amaranth* in Buuri District.

The following hypotheses were derived from objectives (i) and (ii):

Ho₁ Extension service has no statistically significant influence on the adoption of improved *Amaranth* among the small scale farmers in Buuri District.

Ho₂ Availability of market for *Amaranth* products has no statistically significant influence on the adoption of Improved *Amaranth* Among small scale farmers in Buuri Distri

METHODOLOGY

The study used an *expost facto* descriptive survey design. In this study, the characteristics of the sampled *Amaranth* farmers were described and their influence on the adoption of *Amaranth* clearly described. The study was carried out in Buuri District of Meru County. The population under study comprised of farmers in Buuri District who were selected by KAPAP conglomerated stakeholders. The accessible population was farmers in Buuri District who had received training from Farm Concern International (FCI), Kenya Agricultural Productivity Project and relevant stakeholders promoting the cultivation in the target area. Over all, there were 360 farmers who were trained on *Amaranth* production and who here by form the accessible population for the study. The identified population comprised of 360 members who had received previous training on *Amaranth* production. A sample of 110 respondents from the population of 360 small scale farmers was selected from Ruiiri and Nchoroiboro locations within Buuri District using a random sampling approach. A questionnaire was designed and used as the main instrument of data collection for the small scale farmers growing *Amaranth* in Buuri District.

RESULTS AND DISCUSSION

General Information on Buuri farmers

Demographic and Socio-economic Characteristics of the Respondents

The demographic and socio-economic characteristics of the respondents were identified in order to establish the kind of farmers who participate in *Amaranth* farming in Buuri district Meru County. The demographic characteristics included gender of the respondents, age of the respondents, and level of education of the respondents while farm size and income of the respondents were the socio-economic parameters. These characteristics are believed to be crucial in understanding the nature and the role of farming in the area.

Level of Education of the Respondents

Hassan, (1998) has shown that the level of education and the use new technology are directly correlated. Findings of this study indicate that out of 100 farmers involved, only 15% were illiterate while 85% had acquired or qualified at least primary education and above. This shows that adoption of *Amaranth* could be high in Buuri since 85% of the respondents have primary education and above. Therefore, based on the above findings, the level of education may not negatively influence adoption of *Amaranth*.

Gender of the Respondents

Gender is an important factor in the household decision making process. Previous studies have indicated that male farmers tend to focus on income generating enterprises, while female farmers focus more on food crops (Kidula, 2005). Survey responses in this study indicated that 38% of the farmers engaged in the study were males while 62 % were females. This evidently shows that more female farmers were concentrating on the *Amaranth* as a food crop compared to their male counterparts.

Income of the Respondents

Income may enable farmers to procure investments required before they can adopt new crop. Any new crop is likely to be expensive in the initial adoption stages and therefore there is a need for reasonable income for farmers who may adopt. The responses of the study showed that 76% of the farmers earn Ksh 3,000 and below while 24% earn Ksh 3001 and above. This means that the rate of adoption of *Amaranth* production may be negatively affected by the income of the respondents.

Size of the Farm of Respondents

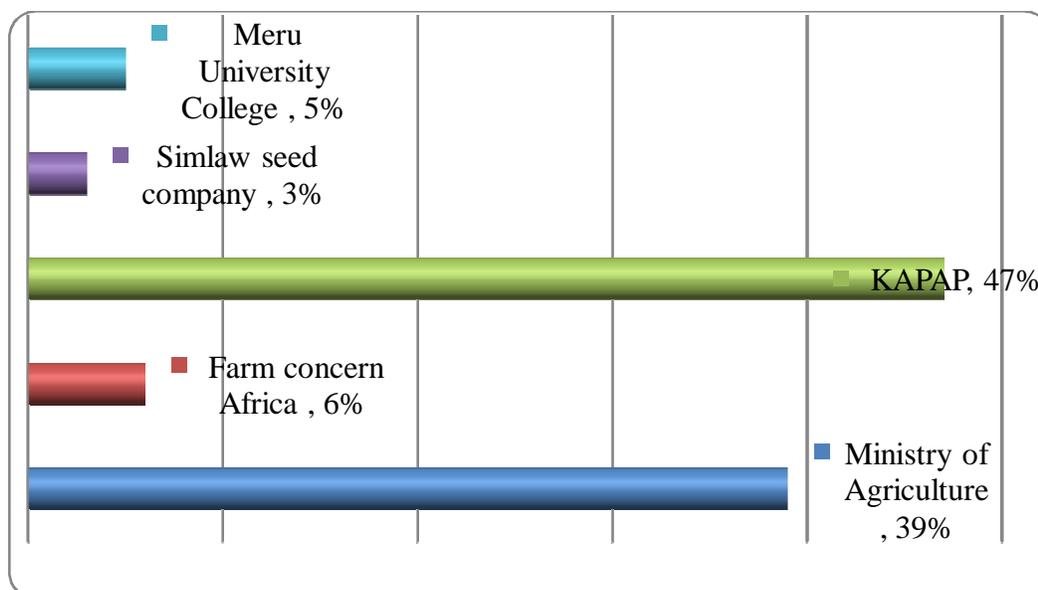
Land as a major factor of Agricultural production has been used in several studies. It is of immense importance since it is the original source of all material wealth. The economic prosperity of a country is closely linked with the richness of her natural resources. The quality and quantity of agricultural wealth of a country depends on the nature of soil, climate and rainfall (Douglas and Roy 1976).

Farmers with large farms adopt more advanced farm practices than small scale farmers (Amudavi, 1993). The results of this study indicate that 83% of the respondents had 2.9 acres of land and below while 17% had 3 acres of land above. This is likely to have contributed to the adoption rate of *Amaranth* since most farmers had small pieces of land and are not likely risk on new technology adoption.

Influence of Access to Extension Services on the Adoption of Improved *Amaranth* in Buuri District

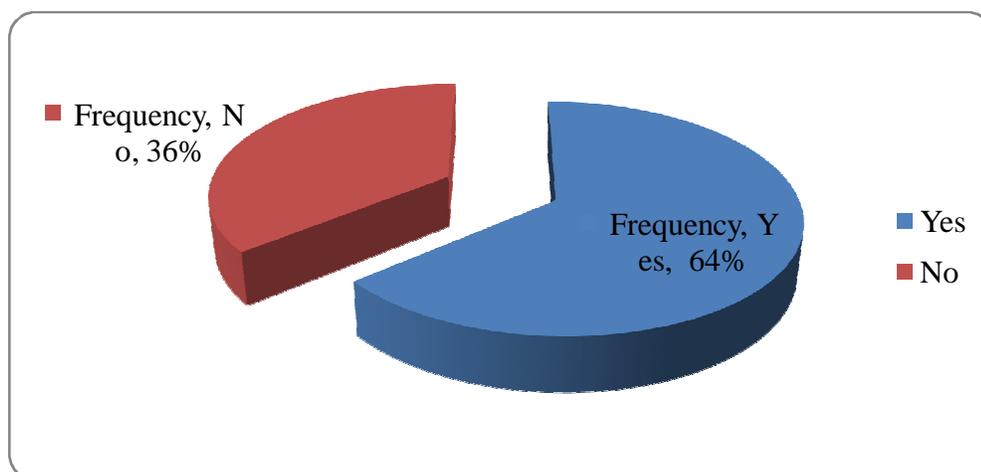
This section highlights the results and discussion of objective one. Figure below shows extension service providers to Buuri farmers and their frequencies.

The key stake holders who provide extension service within Buuri district were ministry of Agriculture (39%), Farm concern Africa (6%), Kenya Agricultural Productivity and Agri-business Project (47%), Simlaw Seed Company (3%) and Meru University College (5%). From the data derived in this study, KAPAP and Ministry of Agriculture are the main extension providers in Buuri District. However, there are other stakeholders in the provision of extension services providers.



Extension services providers

During the study, identification of farmers who had access to extension services and those who did not have was done. In addition, the different *Amaranth* extension services providers were also identified. The figure below shows the proportion of sampled farmers who had access to extension services compared to those who had no access.



Percentage of the respondents who receive extension services.

It is evident that in Buuri district, most of the farmers (64%) received extension services on the various ways of improving the production of *Amaranth*. There a few farmers 36% who indicated that they had never received extension services.

Test of Hypothesis H_{01}

Objective one was translated into the following hypothesis:

H_{01} : Extension service has no statistically significant influence on the adoption of improved *Amaranth* among the small scale farmers in Buuri District.

The hypothesis was tested using Pearson correction coefficient.

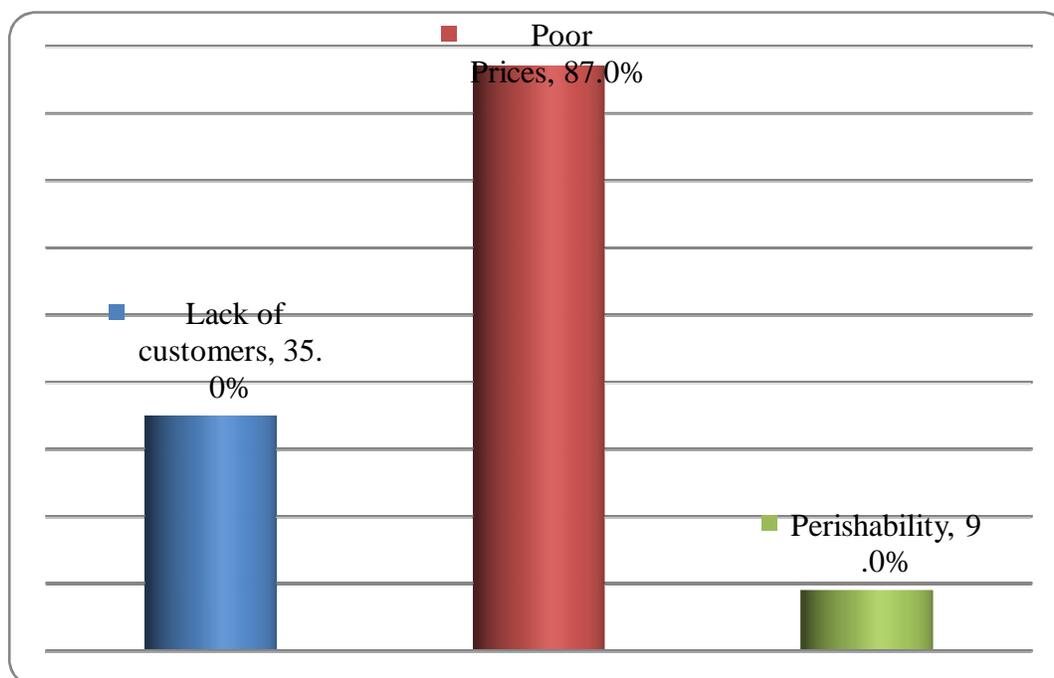
On testing the influence of access to extension services on the adoption of *Amaranth*, since a level of $P \leq 0.05$ significance level was adopted, a P-value of 0.212 was obtained. Access to extension services alone has no significant influence on the adoption of improved *Amaranth* among small scale farmers in Buuri District.

This study agrees with Wasula (2000) who found that the frequency of extension contacts with the farmers was not significantly correlated to the adoption of agro-forestry technologies.

Influence of Availability of Market for Improved *Amaranth* Products on the Adoption of Improved *Amaranth* in Buuri District.

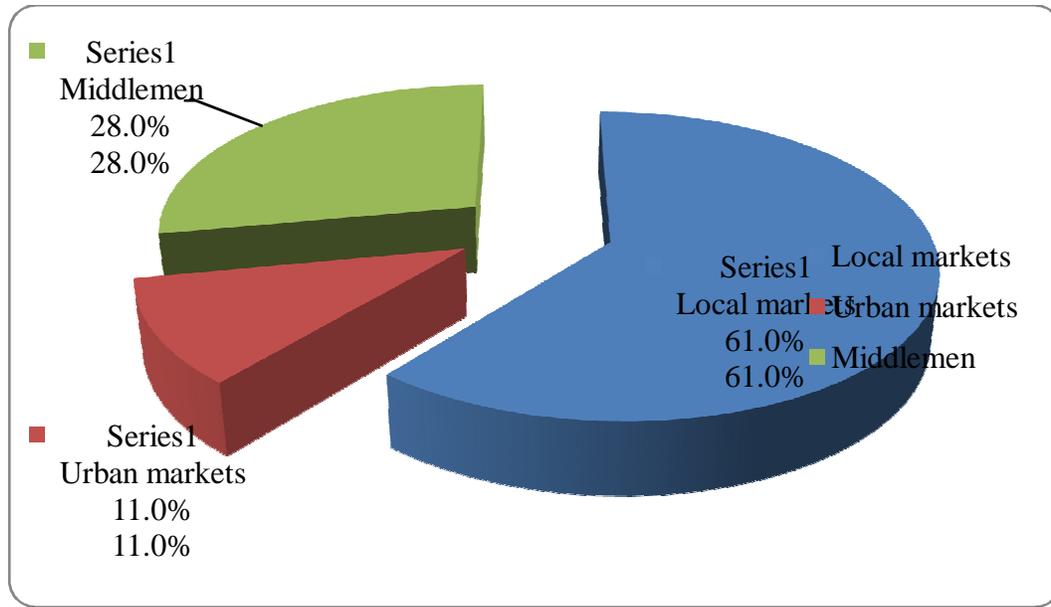
This section covers the results and discussions of objective two which was to determine the influence of availability of markets on the adoption of improved *Amaranth* in Buuri District.

The study sought to determine the problems faced by farmers when marketing their *Amaranth* products as well as the available outlets where the respondents sell their *Amaranth* produce.



Problems faced when marketing *Amaranth*

Most of the respondents indicated that the problems encountered during marketing included poor prices comprising about 87.0%. This was closely followed by farmers who cited that lack of customers was their main problem, of accounting for 35.0% of the total respondents. About 9.0% of the respondents indicated that perishability was a challenge prior to accessing markets. The existence of challenges on the marketing of *Amaranth* may be one of the reasons why some farmers have not adopted improved *Amaranth* production techniques. The lack of good market for *Amaranth* and the challenges involved in marketing are known to demotivate farmers to produce more leading to decline in adoption of *Amaranth*.



Outlets where the respondents sell their *Amaranth* produce.

Figure above shows the outlets through which *Amaranth* products are marketed in the study area. Majority of farmers (61.0%) sold their produce at the local markets while 28.0%) sold their *Amaranth* products through middle men. Urban markets particularly at Meru town were exploited by very few farmers representing 11.0% of the respondents.

The great popularity of *Amaranth* products at the local markets could be attributed to the farmers need to lower the marketing transaction costs as this is known to lower their profits. This implies that most farmers ensure that they do not travel long distances to dispose their products as there were local markets which could reduce marketing and other transactions costs and in return offer attractive profits.

Test of Hypothesis H₀₂

Objective two was translated into the following hypothesis:

H₀₃: Availability of markets for *Amaranth* products has no statistically significant influence on the adoption of Improved *Amaranth* among small scale farmers in Buuri District.

The hypothesis was tested using Pearson correction coefficient. Table below shows the influence of availability of markets on the adoption of improved *Amaranth* in Buuri District.

Influence of available market on the adoption of improved *Amaranth*

		Do you grow improved <i>Amaranth</i> in your farm	Where do you sell the <i>Amaranth</i> products
Do you grow improved <i>Amaranth</i> in your farm	Pearson correlation	1	.921(*)
	Sig. (2-tailed)	.	.010
	N	100	100
Where do you sell the <i>Amaranth</i> products	Pearson correlation	.921(*)	1
	Sig. (2-tailed)	.010	.
	N	100	100

* Correlation is significant at the $P \leq 0.05$ levels (2-tailed).

Table above shows that availability of markets has a direct correlation to the adoption of improved *Amaranth* ($P=0.01$, $R = -0.9$). Hence the hypothesis was rejected. Thus availability of market has statistically significant influence on the adoption of improved *Amaranth* among small scale farmers in Buuri District.

CONCLUSIONS AND RECOMMENDATIONS.

Access to extension service

Most of the farmers indicated that they received extension service on production technologies of *Amaranth* with a few farmers indicating that they had never received extension services. The stakeholders who provided extension services to farmers were identified as: ministry of Agriculture, Farm concern Africa Kenya, Agricultural Productivity and Agri-business Project Simlaw Seed Company and Meru University College.

This study accepted the null hypothesis that extension service has no statistical influence on the adoption of improved *Amaranth* among the small scale farmers in Buuri District. Therefore the extension service may not be a factor affecting the adoption of improved *Amaranth* in Buuri district.

Availability of markets

Most of the respondents indicated that the marketing problems that they face were poor prices. This was closely followed by farmers who cited that lack of customers was their main problem when it comes to the marketing of *Amaranth*. Few of the farmers indicated that perishability was the main marketing problem that they faced. Majority of farmers sold their produce at local market. Some sold to the middle men while a few sold in the nearby urban markets located in Meru town. There was enough evidence to conclude that availability of market for *Amaranth* products significantly influence the adoption of improved *Amaranth* in Buuri district in Meru County. Majority of the farmers with access to local and urban markets for the produce had better adoption of improved *Amaranth* as compared to farmers who sold their *Amaranth* mainly through the middlemen.

Conclusions

Based on the study findings, the following conclusions were made:

- i) Provision of extension service alone has no influence on the adoption of improved *Amaranth* among the small scale farmers in the study area mainly due to the weaknesses in the mode of agricultural extension delivery of the research results to the farmers.
- ii) Availability of markets for *Amaranth* products significantly influence the adoption of improved *Amaranth* with majority of the farmers with access to local and urban markets for

their produce having better adoption of improved *Amaranth* as compared to farmers who sold their *Amaranth* mainly through the middlemen.

Recommendation

- i) For sustainable *Amaranth* production in the region, provision of extension services should be strengthened through provision of support services alongside other advisory services to farmers. The extension service should also be combined with provision of farm inputs to farmers.
- ii) Efforts should also be made to educate the farmers on the availability of market opportunities for continued *Amaranth* cultivation and also as a factor for influencing other farmers' perception of the crop.

ACKNOWLEDGEMENT

I salute the Almighty God for giving me good health, sound mind and guiding every step of the way in the pursuit of knowledge. Great thanks goes to my supervisors, Drs. James Obara, Patrick Muthoka and Esther Kioko who spared a lot of their time to guide me through this study and their invaluable criticism which has made this work a success.

REFERENCES

- Amudavi D. M (1993). Influence of socio-economics factors on adoption of maize related Technology. The case of small holders farms in Hamisi Division Kakamenga District. *MSc. Dissertation*, University of Melbourne.
- Aspaas, H.R. (1998). Heading household and heading business: Rural Kenya woman in the informal sector. Nairobi. Professional Geographers.
- Bahiigwa, G. (2006). Access of eastern African farmers to domestic and international markets: Opportunity and Constrains, *Paper presented at international Association of Agricultural economics conference*. Newsbury Park. Sage Publication.
- Brenan, J. P. M. (1981). The genus *Amaranthus* in Southern Africa. *Journal of South African botany*. New York springer. Publishing Company.
- Cock, M. J. W. (1986). Requirement for biological control: an ecological perspective. *Biocontrol news and Information* 7 (1): 7-16.
- Chitere, P. A. (1980). Decentralization of decision-making process: Its implications for the Implementation of the crops improvement programmes in Kenya. IPGRI, Rome Italy.
- Douglas C.N and Roy H.M (1976) Land people and politics, the land Question in U.K 1878-1952. London Allisons & Busby Publishers.

- Food and Agriculture Organization, (1986). Consultation on irrigation in Africa: Proceedings of the consultation of irrigation in Africa. Rome Italy. FAO.
- Food and Agriculture Organization, (1988). Traditional food plants: A resource book for promoting the exploitation and consumption of food plants in arid and semi-arid and sub-humid lands of East Africa. Rome Italy. FAO.
- Gerson, R.T. (1991). Home gardening of indigenous vegetable: The role of women. Netherlands. Wageningen Publishers.
- Grant, M.W. Paisner, M. S, Meijer, S.Witcover, J. (2001), and FAO (1986).2020 Global food outlook, Trends, Alternative and choices.*Food policy Report August 2001*.Academic Hassan, E. (1998).Adoption and performance of maize in Kenya.Cambridge, Longman publication.Journal Inc.
- Hassan, E. (1998). Adoption and performance of maize in Kenya.Cambridge, Longman publication.
- Jefferson, R. A. (2006). Direct marketing option for amaranth farmers: Cambia Bio Initiative, University press. *Journal of Food Science and Nutrition*.
- Kidula, L. L. (2005). Influence of women involvement in sugarcane contract farming on sustainable food crop production in Mumias Division of Butere District., MSc. Thesis, Egerton University, Njoro.
- Maundu, P.M., Ngugi, G.W. and Kabuye, C.H.S. (1999). Traditional food plants of Kenya. Kenya Resource Centre for indigenous Knowledge. National Museums of Kenya. Nairobi. English Press Limited.
- Momsen, J. H. (2004). Gender and development, Routledge, London, U.K.
- Myres, R.L. and Putnam, D.H. (1998).Growing of *Amaranth* as a specialty crop.Minesota.Minnesota University Press.
- O'Brien, G. K. and Price, M. L. (1983).*Amaranth: Grain & Vegetable Type. Echo Technical Note*. ECHO. 17391 Durrance Rd, North Ft. Myers, FL 33917, USA.
- Palada, M. C. and L. C. Chang (2003).Suggested cultural practices for vegetable *Amaranth*.*International Cooperators' Guide*.Asian Vegetable Research and Development Centre.www: <http://www.avrdc.org> retrieved on May 10th , 2013.
- Ray, T., and Roy, S.C, (2008).Genetic diversity of *Amaranth* species.Analysis leading to the development of ecotypes. *Oxford journal* 100(3) 338-347
- Wasula, H.T. (2000). Factors related to adoption of selected Agroforestry technologies by small scale farmers as response to environmental degradation. MSc dissertation, Egerton University.

Wilson, M.J. and Gallup, S.J. (1985). *Spheres encountered by extension Agents*. U.S.D.A. Extension Service Circular No. 495. Washington, DC.

World Bank, (1993). *Reaching the rural poor. A renewed strategy for rural development*. The World Bank. Washington DC, U.S.A.

Cite this article as:

Kyambo onesmus, James Obara, Patrick Muthoka, Esther Kioko, Robert Kigali (2013). *The influence of marketing and extension services on the adoption of improved amaranth among small scale farmers in Buuri district, Meru county, Kenya.*

Figure: Map of Kenya showing Buuri district and the neighboring districts

