# Factors Influencing Adoption of Organic Farming among Farmers in Nembure Division, Embu County - Kenya

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## Abstract

*Organic farming has been mooted as an environmentally friendly farming practice in response to the growing concern over the environmental risks associated with modern agriculture. This paper examines the factors that influence adoption among farmers in Nembure division of Embu County, Kenya. Descriptive research design was used for the study. Proportionate stratified sampling was used in selecting 37% of organic farmers in the Division. All the twelve agricultural extension officers were purposively selected for the study. Pre-testing of the questionnaires was done to ensure their validity and reliability. The reliability coefficients obtained for the farmers' and extension officers' questionnaires were 0.79 and 0.82 respectively. The study found that women adopted organic farming practices more than men. Contrary to existing literature, age of the farmers, their level of education; labour availability and land size did not statistically influence adoption of organic farming in Nembure division.*

**Keywords:** Adoption, Organic Farming, influence.

## *Introduction*

### 1.1 Background Information

The negative environmental impacts associated with increasing industrialization of agricultural production and the belief that agricultural problems can be solved by the appropriate use of machines and chemicals has accelerated the development of alternative farming methods (David ,1995; Njoroge, 2000). The initial high yields experienced under conventional agriculture are usually accompanied by adverse side effects sooner or later. The negative side effects include reduced soil fertility, water pollution, and destruction of natural habitat among others. Lampkin (1994) notes that, developing countries are usually entangled in environmentally unstable production systems which are manifested in severe environmental damage and declining agriculture base, making it even more difficult for real development to take place. This, as Altieri and Anderson (1986) observe, serves to widen the gap between the rich and the poor. Various reasons ranging from political, economic, socio-cultural, and environmental as well as technological have been echoed for advocating and embracing organic farming. Njoroge (1999) and KIOF (1999) are in agreement that organic farming was as a result of failure of green revolution to meet the expectations, especially that of increasing agricultural production. To this end, KOAN (2007) opines that organic farming is a cheap and a sustainable alternative in which farmers can produce without causing health or environmental damages. However, KOAN (2007) while outlining the benefits of organic farming, it has overemphasised the financial benefits at the expense of other aspects as captured by this study.

Organic farming has been put forth by many agriculturalists, development practitioners, and social scientist as one such alternative for small-scale food producers. The search for an organic farming as an alternative agricultural production in Kenya started formally in Kenya in early 1980's when the pioneer organic farming training institutions were established. At the same time, a few horticultural companies started growing organic vegetables for export (UNCTAD, 2006). Initial efforts to promote organic agriculture in Kenya were made by rural development non-governmental organizations (NGOs), faith based organizations, individuals and community-based organizations (CBOs), who sought to help rural farmers address the issues of declining agricultural productivity (especially the degradation of soils and the natural resource base), high poverty levels, food insecurity and low incomes, which prevented farmers accessing high cost inputs.

The key players in the sector are NGOs including Kenya Institute of Organic Farming (KIOF), based at Juja, Manor House Agricultural Centre in Kitale, the Sustainable Agriculture Centre for Research, Extension and Development in Africa (SACRED- Africa), the Molo based Baraka College as well as the Association for Better Land Husbandry (ABLH) situated in Nairobi. Compared to conventional farming, the organic farming sector is relatively small but its growth is remarkable (KOAN, 2009). This growth is attributable to the contribution from private sector actively involved in organic produce mainly for export; and the NGOs with special focus in promoting organic farming (Jessica, 2005).

Statistics regarding organic farming have not been consolidated which makes it difficult to certainly give the exact acreage under organic farming. However, IFOAM and FiBL (2006), estimate about 0.69% (182,000 Ha) of the total agricultural land in Kenya to be under organic management. By the year 2007, it is estimated that around 30,000 farms had embraced organic farming methods (IFOAM & FiBL, 2006). It's however clear that vegetables and fruits grown organically on large farms have been exported since 1980's. Over time and with the development of organic farming sector, UNCTAD (2006), notes that exports in the recent past have grown to include products such as dried herbs, essential oils, spices; in addition to products for the cosmetic and pharmaceutical industries (Murage, 2006). Although, most of the new export products are mainly from smallholders, it is difficult to capture and give the contribution of the organic sector mostly occurring in rural areas in Kenya where organic farmers occur sporadically. Thus the contributions of the small holder organic farming to the socio-economic and environmental development were explored by this study.

### 1.2 Statement of the Problem

Agriculture being the backbone of the Kenya's economy relies heavily on environmental resources. Therefore, for Kenya to attain the Millennium Development Goals and realise vision 2030, environmental conservation by way of organic farming should be prioritised. This can only be carried out if there is a clear understanding of the factors that influence adoption of organic farming among farmers in rural Kenya where intensive farming is carried out. This therefore gave the impetus to the current study.

### 1.3 Objectives of the Study

The study focused on the following specific objectives:

1. To find out challenges associated with organic farming in Nembure Division, Embu County.
2. To evaluate benefits associated with organic farming in Nembure Division Embu County.

## *2. Materials And Methods*

### 2.1 Research Design

The study was conducted using a descriptive research design to evaluate organic farming practices, with an aim of finding out factors influencing its adoption. The design was used for the study because it is useful in securing evidence concerning an existing situation as well identifying standards and norms with which to compare present conditions in order to plan the next step (Good, 1992). The research design allows the researcher to study the variables under investigation without manipulating them, hence making it appropriate for this study. This design is a powerful form of qualitative analysis and involves a careful and complete observation of a social unit, be it a person, an institution, a cultural group or even the entire community.

### 2.2 Sampling Procedures and Sample Size

Luck Rubber as cited by Orotho (2004) observes that in descriptive survey studies, two categories of respondents are crucial; specialists and consumers or users. The current study targeted extension officers in the Division, representing the informed specialists. On the other hand, the organic farmers formed the consumers or users of the organic farming techniques. The study mainly focused on organic farmers of Nembure Division in Embu West Sub-county. The organic farmers were members of community based self help groups in Nembure Division which had been trained on organic farming by Green belt movement and or KIOF within the past decade but were registered by Greenbelt Movement.

According to Kothari (2001), one of the major criteria to use when deciding on sample size is the extent to which the sample is distributed in the same way as the population. The other consideration is that of the size of questionnaire; which in this case was detailed to capture adequate information on the objectives of the study. Out of the 159 organic farmers, a sample size of 60 respondents, representing about 37% of the organic farmers was considered for the study.

This was considered adequate since it represented more than the 30% recommended by Mugenda and Mugenda (1999). Proportionate stratified sampling was then used to select farmers for the study from each stratum. Stratified random sampling was used because it allows all variations in the population to be represented in the sample thus reducing the sampling error. Further, it offfers an opportunity for even spatial coverage while taking into consideration the aspect of randomness. However, this technique demands prior information about the population under the study, which in this case the researcher had.

**2.3 Instruments**

The research instruments used for data collection included structured questionnaires and an observation schedule. The first questionnaire was purposely designed in a way to collect data on the farmers' socio economic characteristics such as; the age of the farmer, educational level, family size, gender factor in organic farming, income levels, farm size, and organic farming techniques. The second questionnaire was designed to collect information from agricultural officers from the ministry of agriculture and non-governmental organizations on organic farming. The data obtained from these sources was used for comparison with data obtained from the farmers and other sources.

**2.4 Piloting**

Wiersma (1985) points out the importance of piloting in which he argues that piloting helps identify misunderstandings, ambiguities, redundant and inadequate items. Therefore, before the actual data collection took off, there was piloting of the research tools in the neighboring Manyatta Division, especially the questionnaires in order to conform to the reality on the ground without adulterating the research objectives. According to Borg and Gall (1989), validity of an instrument is improved through expert judgement. To this end, the researcher sought assistance of the supervisors. On the other hand, reliability is considered as a measure of the degree to which a research instrument yields consistent results or data after repeated trials under similar conditions Mugenda and Mugenda (1999). To enhance reliability of the instruments, a pilot study was conducted on small sample of 10 and 3 subjects for organic farmers and extension officers respectively, from the neighbouring Manyatta Division. For a descriptive survey, Mugenda and Mugenda (1999) suggest a piloting sample within the range of between 1% and 10% of the prospective sample size. Therefore, the indicated piloting sample was considered adequate for the study.

**2.5 Methods of Data Analysis**

The data generated from the field was organized according to the variables and research specific objectives. Both quantitative and qualitative techniques were employed to analyze the data. Qualitative data obtained from the open ended questions was organized into themes pertinent to the study. This entailed creating a factual code which served the purpose of identifying a fact, a feeling, or an attitude from the text. Therefore, data was coded and entered in the computer for analysis using the Statistical Package for Social Sciences (SPSS). As Martin and Acuna (2002) observe, SPSS is able to handle large amount of data, and given a spectrum of statistical procedures purposefully designed for sciences, it is also quite efficient. Tables, charts, frequencies, and percentages were used to present the findings. Bell (1993), maintains that when making results known to a variety of readers, simple descriptive statistics such as percentages have a considerable advantage over more complex statistics, since they are easily understood.

Analysis of variance (ANOVA) is based on the idea of comparing explained variance with unexplained variance. ANOVA came in handy to test the differences in means of length of practicing organic farming and the various age groups. Chi square is a technique designed for less than interval data with the most common forms being chi-square test for contigency and independence. Chi square was used to test for differences in means between family size and labor requirement; and secondly, the level of education of a farmer and adoption of various organic farming techniques, in pursuance of objective two, which examined factors influencing adoption of organic farming. Further, in analysing the variables in objective two, a t-test was used to test significant differences in the means of length of practicing organic farming between male and female organic farmers. The computed statistics were tested for significance at the 0.05 levels of significance. Pearson product moment correlation (r) is a relational statistic which gives a measure of the strength of some relationship between two variables but not their causality. The relationship between land size and length of practicing organic farming was tested using the Pearson correlation.

## *3. Results and Discussion*

### 3.1 Gender of the Farmers and Its Influence on Adoption of Organic Farming

A total of 60 farmers and 12 extension offices responded to the farmers' questionnaire and extension officers' questionnaires respectively. The information obtained through the questionnaire on gender composition is presented in Table 3.1.

The t-test was used to test for the differences in the means of the length of practice between females and males. The calculated t=2.13, d.f=58, p=0.033. The difference in the means of length of practice was statistically significant between males and females with females having a higher mean compared to their male counterparts. This implies that women have been practicing organic farming longer than men, having adopted the practice earlier have. This serves to entrench the opinion that farming is feminized as a result of outmigration of men. This is in tandem with views of Hamilton (1997), who advances the view that mothers understand food problems better than men and more often, the community may blame the mother if the children are malnourished. Therefore, the study found out that gender influenced adoption of organic farming techniques.

### 3.2 Age of the Farmers

An item in the farmers' questionnaire sought information on the age of farmer respondents. The distribution of various age groups for the farmer respondents is given in Table 3.2. The age group of 41-50 had the highest mean (3.77) implying that they had practiced organic farming the longest. This age group is most active and therefore adopted organic farming techniques faster than other age groups. Those aged over 60 years had the lowest mean (3.13) having had practiced organic farming for the least number of years, because they adopted organic farming slightly later than the other age groups. The overall mean of 3.52, tallies with the findings on the ground that organic farming was actively introduced in the Division in the past four years. To test the differences in the means for the length of practice and the various age groups, an ANOVA was used and the results are presented in Table 3.3.

From the ANOVA, the difference was not statistically significant at 5% significance level. It implies that the age categories do not statistically influence the length of practicing organic farming and therefore all age groups adopted organic farming. For instance, agro-biodiversity is an aspect that can easily be carried out by all. In addition the need for more output and hence more income could explain why all age groups adopted organic farming.

### 3.3 Farmers' Level of Education

Organic farming may not be well developed as conventional farming may be due to exposure through formal education of the practicing farmers. It was therefore the intention of the study to find out whether a farmer's level of education influenced adoption of organic farming techniques. To this end, a chi-square analysis was performed to establish the relationship between education levels and the categories of pests and diseases management in organic farming. The results are presented in Table 3.4. Sixty percent of the respondents with no formal education used inorganic chemicals to manage pests and diseases that commonly occurred on their farms, while 13.3% of them used EPM approaches. EPM approaches were strongly favoured by those who had primary level of education (40.9%), secondary level (70.6%) and 45% for those with post secondary level of education.

The computed value of chi-square statistic is given by $\chi^2$=15.53 and the p value=0.017. This means that the relationship between the level of education and the mode of pest and or disease management in organic farming is not statistically significant at 5% significance level. Therefore, statistically, the level of education of the farmers was found not to have influenced adoption of some of the organic farming techniques

### 3.4 Labour Demand of the Technique(s)

Labour is a crucial input in organic farming since all the activities are manual. An item in the farmers' questionnaire therefore sought information on the labour's requirement for each of the categories of organic farming techniques. Information on Table 3.5 presents labour requirements for each of the categories as stated by the farmer respondents. Majority of the famer respondents (60%) would hire labour to engage in tillage practices such as making of sunken beds, raised beds, sausage gardens and population seed holes (5/9 seeds in a hole technique). These practices were associated with intensive labour. Given other family chores, these farmer respondents would rather engage casuals when need arose for double digging and their resultant techniques. Fertility techniques as well necessitated engaging hired labour among 41.7% of the farmer respondents.

The hired labour was used in preparation of compost, making of plant teas and making of fertility trenches. However, biodiversity establishment required no hired labour since combining various biotic components was done over time. EPM and marketing of organic produce required minimal hiring of labour among minority (less than 10%) of farmer respondents.

The study found that while organic farming is generally considered to be a labour intensive venture, majority of the farmers adopted some of the techniques using family labour. Safe for tillage practices, the other techniques (fertility, biodiversity, EPM and marketing) could be adopted with the available family labour, as far as the family remained organized and committed to the undertaking. Therefore, some techniques were easier to adopt than others depending on their available labour. In effect, labour availability would not entirely influence adoption of organic farming techniques.

Further tests by chi square, in which the computed chi square was 1.241 and a corresponding p value of 0.265, revealed that there was no statistically significant relationship between family size being a source of labour and the labour required for adoption of organic farming. In effect, the study found that labour requirement of a technique did not influence adoption of organic farming. The size of a farmer's family being a source of farm labour did not influence adoption of organic farming techniques.

### 3.5 Influence of Soil Quality on Adoption of Organic Farming

Although the soils in Nembure Division are loam, there exists some notable differences across farms; therefore, it was necessary to find out how this difference influenced adoption of organic farming techniques. Farmers were required to indicate to what extent each of the following statement applied to them. Their responses are as presented in Table 3.6. Although soil type in the Division are fairly uniform, relatively poor soils motivated more people to adopt organic farming techniques as indicated by 65% of the farmer respondents. This is because whenever well composted manure or trench compost was incorporated in double dug beds on these poor soils, there was a remarkable improvement in the soils quality and crop performance improved. In addition, the need to produce more to meet family needs and get surplus just as farmers on good soils, pushed farmers into adopting organic farming techniques. Therefore, they argued that, motivation, the need, and or urgency to adopt are greater among farmers on poor soils than those in rich soils are.

Farmers on rich soils found no need to intensify on organic farming techniques because their soils were good, a view that was expressed by 3.3% of the farmer respondents. More than a third (31.7%) expressed the view that soil quality had no bearing on the adoption of organic farming techniques. This is because, both groups of farmers (on poor and rich soils), need different aspects of organic farming, such as double digging, EPM, value addition as well biodiversity. On the other hand, those on poor soils in addition to adopting the aforementioned techniques, their priority may be fertilization to improve on the quality of their soils. Therefore it emerged from the study that the quality of soil influenced adoption of organic farming techniques because farmers on poor soils adopted more than those on fertile soils.

### 3.6 Land Size

Pearson correlation coefficient was used to analyse the relationship between the length of practicing organic farming and the size of land holdings by the farmers. The Pearson correlation coefficient of -0.154 was obtained with a corresponding p value of 0.239. Therefore, the relationship between the length of practicing organic farming and the land size was not statistically significant. This serves to show that size of land does not influence adoption of organic farming. Those with big land sizes may adopt to increase on their production by adopting techniques such as 5/9 seed holes, mixed cropping and biodiversity. On the other hand, those with small land holdings, also intensify on the production by adopting double digging and composting.

The study therefore established that there is no statistically significant relationship between size of the farm and the period of practicing organic farming. As such, a farmers' land size does not influence adoption of organic farming.

## *4. Conclusions*

Gender of the farmer has great influence on adoption of organic farming where women adopt organic farming practices faster than men. This is because women, given their nurturing roles, are closer to the environment and agriculture than men are. Contrary to popular belief, all farmers, their family size notwithstanding, land size and level of education, could adopt organic farming.

### *5. Recommendations*

Based on the study findings, the researcher recommends the following:

1. The Ministries of Agriculture and Environment in liaison with KOAN and other stakeholders in the organic farming sector should work towards developing a policy on organic farming. The developed policy should work towards providing incentives to the organic farming sector and increasing consumer awareness.
2. The Ministry of Agriculture to conduct refresher courses on organic farming for their extension officers.

**Table 3.1: Gender and Length of Practice of Organic Farming**

| Gender | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|
| Male | 21 | 3.19 | .981 | .214 |
| Female | 39 | 3.69 | .766 | .123 |

**Table 3.2: Influence of Age on the Length of Practicing Organic Farming**

| Age group | N | Mean | Std. Deviation |
|---|---|---|---|
| 21-30 | 6 | 3.33 | 1.211 |
| 31-40 | 26 | 3.54 | .905 |
| 41-50 | 13 | 3.77 | .599 |
| 51-60 | 7 | 3.57 | .535 |
| >60 | 8 | 3.13 | 1.126 |
| Total | 60 | 3.52 | .873 |

**Table 3.3: ANOVA for Length of Practice and the Various Age Groups**

| | Sum of Squares | df | Mean Square |
|---|---|---|---|
| Between Groups | 2.291 | 4 | .573 |
| Within Groups | 42.692 | 55 | .776 |
| Total | 44.983 | 59 | |

**Table 3.4: Contingency Table for Level of Education and the Method of Pests/Diseases Management**

| | | | EPM Techniques | Use of Inorganic Chemicals Only | IPM | Total |
|---|---|---|---|---|---|---|
| Level of Education | None | Frequency | 2 | 9 | 4 | 15 |
| | | Percentage | 13.3% | 60.0% | 26.7% | 100.0% |
| | Primary | Frequency | 9 | 6 | 7 | 22 |
| | | Percentage | 40.9% | 27.3% | 31.8% | 100.0% |
| | Secondary | Frequency | 12 | 3 | 2 | 17 |
| | | Percentage | 70.6% | 17.6% | 11.8% | 100.0% |
| | Post-Secondary | Frequency | 4 | 0 | 2 | 6 |
| | | Percentage | 66.7% | 0% | 33.3% | 100.0% |
| Total | | Frequency | 27 | 18 | 15 | 60 |
| | | Percentage | 45% | 30.0% | 25% | 100.0% |

**Table 3.5: Labour Requirement for Various Organic Farming Techniques**

| Technique | Necessitates hired labour | |
|---|---|---|
| | Frequencies | Percentages |
| Tillage practices | 36 | 60 |
| Fertility | 25 | 41.7 |
| Biodiversity | 0 | 0 |
| EPM | 3 | 5 |
| Marketing | 5 | 8.3 |

**Table 3.6: Soil Quality's Influence on Adoption of Organic Farming**

| Classification | Frequency | Percentage |
|---|---|---|
| Soil quality did not have an effect on adoption | 19 | 31.7 |
| Poor soils encourage adoption | 39 | 65 |
| Rich soils encourage adoption | 2 | 3.3 |
| Total | 60 | 100 |

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