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Effect of Farm Succession and Farm Inputs use on Coffee Productivity in Kisii County, South Western Kenya

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Authors' contributions

This research work was carried out in collaboration between all authors. Authors JCN, AAS and EAB designed the study, wrote the first draft of the manuscript, all authors edited the paper after peer-review. Authors JCN and LOA administered the questionnaire and managed the analysis of the study. All authors read and approved the final manuscript.

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ABSTRACT

Aims: The study aimed at establishing the effect farm succession on farm input usage and coffee productivity.
Study Design: The study employed a case study research design.
Place and Duration of the Study: the study was conducted in Kisii County, Kenya, between August 2013 and July 2014.
Methodology: Multistage, simple random and purposive sampling procedure was used to sample 227 respondents out of the 69,000 coffee farmers' population in Kisii County. Structured questionnaires, focus group discussion, interviews were used to collect data and secondary data was achieved through literature search and existing record information.
Results: The findings indicate majority of the respondents are ageing with an average age of 57

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years, coffee farming is done in small-scale, those farmers who have identified a successor have the successor between the age of 19-35 years .It was further found that most farmers (77.1%) do not use lime in their farms while majority of the farmers use fertilizer (83.7%) and pesticides (74.8%). On the effect of succession on fertilizer, pesticides and lime use, the research found a Pearson correlation p = 0.087, 0.026 and 0.395 respectively.

Conclusion and Recommendation: From the statistics computed, identification of a successor in relation to use of insecticides and pesticides has significant effect on production while use of fertilizer and lime are independent of farm succession. It is therefore prudent that succession plan is carried out in a timely manner to ensure that new energy and skills are put on coffee farming hence sustain its productivity.

Keywords: Coffee farming; farm succession; coffee production; agricultural practices and management; quality coffee production.

1. INTRODUCTION

The declining of Kenya's coffee production from 130,000 MT in 1980's to 50,000 MT in the year 2012 and from 4,500 MT to 1600 MT for Kisii county has been attributed to many factors that include real estate growth, competition with other crops that seem profitable and poor pricing [1]. Poor pricing has on the other hand been associated to poor corporate governance, poor agro-practices to coffee farms and global market price fluctuations [2-4]. Many studies have put little effort on the study of effect of us age of farm inputs and farm succession on coffee production. Coffee is labour intensive crop and venturing on it means one has to put in energy and dedication to ensure that the profits are increased [5].

The agricultural sector provides a livelihood for about 80 per cent of Kenya's population, with 600,000 households being coffee farmers [6], most of who are subsistence farmers in rural areas. The sector contributes about 24 per cent to the GDP and another 27 per cent indirectly through sector economic linkages; it accounts for 65 per cent of the Country's export earnings, [7]. 69,000 of Kisii farmers derive livelihood from coffee farming.

The economy of Kenya is directly proportional to the performance of the agriculture, thus improving the quality of rural areas spills over to the urban centers and this can only happen by improving agriculture. The strategy remaining in poverty reduction is by improving agricultural extension strategies to improve profitability [2]. The farm is the rural source of income and may be an important inheritance for the family when people retire or die. Farm succession planning is a crucial process to allow landowners to pass farmland on to the next generation without incurring a potentially debilitating tax liability for the heirs [8].

Access to land and Land Mobility is an issue for young farmers and the agricultural industry [9]. Bogue found out that, half of the landowners in Ireland were aged over 55 years and only 6.2% were aged below 35 years, Similarly [10] established that average coffee farmers in Mukurweini in Kenya is 51 years minimum average age. The age imbalance is compounded by the fact that many older farmers do not have a farming successor. Farm succession is transfer of coffee farm management control in its value chain. The presence of a successor provides an incentive to expand the farm [11] and taking charge of running coffee business. Kenya government policy identifies farming as business [6] and stresses that farms should be managed like any other business including transferring of responsibilities at the right time and to the right people.

Coffee is known for its introduction to Kenya where the Africans were not allowed to cultivate [4,12]. The culture of "special class" for coffee is still there, where the men who are heads of the families, command the say while the women and youth do the farm work while the men get the money [1]. It is harmful to delay the transfer of control of farms from fathers to the next generation where the fresh ideas and enthusiasm of the children are needed to influence business policy that can spur coffee farming business.

The average minimum age for coffee farmers in Kenya is 51 years [7] with average coffee production of 2 Kg per tree down from the optimal average production of 10 Kg per tree of coffee [13]. In Kisii County, the average coffee production per tree is less than 1 kg [1] with most coffee farmers being the retirement age of active and formal employment. Coffee farms have been neglected or abandoned especially farms whose

original owner died or are old that they are unable to carry out coffee farming activities due to ownership wrangles or uncertainty and this is a scenario in Kenya at large [14]. The coffee bushes in Kisii County are poorly pruned with no change of cycle for the old trees, low usage of fertilizer and untimely weed and pest control thus causing low productivity and profitability. The younger generation is not actively involved in the coffee farming [1] since they are not given chance to farm. The complicated nature of farm succession makes the usage of farm inputs a difficulty. The purpose of the study was to establish effect of farm inputs and farm succession on coffee productivity in Kisii County and give a recommendation based on the outcome of the research.

2. RESEARCH METHODOLOGY

This study employed a case study research design, which was a deliberate attempt by the researcher to collect data from members of population in order to determine the current status of the population with respect to one or more variables [15]. A case study research design was used because the target population was too large to observe directly.

3. STUDY AREA

Kisii county is located in Nyanza region, on Latitude: 0° 41' 0 N and Longitude: 34° 46' 0 E. Kisii town, the headquarter of Kisii County is 309 km (192 mi) from Kenya's capital city of Nairobi. Migori is to the south-west 67 km (42 mi) which connects the town to the Kenya /Tanzania border at Isebania town located a further 31 km (19 mi) south. Kisii County is predominantly inhabited by the Abagusii community, a Bantu speaking people who speak Ekegusii dialect. The community is traditionally a farming community with patriarchic bias of functionality [12].

The area is averagely 1,800 feet above sea level with bimodal rainfall whose seasonal distinction is not clearly defined. The terrain is undulating valleys and hills that are gentle. Kisii County is one of the leading coffee growing areas in the country and in the western Region of Kenya [1]. Kisii County has a high potential of revitalization of the coffee industry despite many issues that the area is facing, the opportunity of revitalization is due to existing infrastructure, like the Gusii Coffee mills and Hema Coffee mills both of which are within the county and which could necessitate reduction of transport costs hence increase profitability more so, mature coffee trees are in existent and which needs just an improvement of agricultural practices. Kisii County has a population of 1.1 Million people according to 2009 census report, in an area of 1,317 km^2 having a population density of 874.7 people per Km^2. The county comprises of 10 constituencies namely; Bonchari, South Mugirango, Bomachoge, Bobasi, Gucha, Nyaribari Masaba, Nyaribari Chache, Marani and Mosocho. The county has a total of 24 coffee farmers' cooperative societies, [1,16].

4. SAMPLING AND DATA COLLECTION

Multistage, simple random and purposive sampling procedure were used to collect data through consultation between the researchers and stakeholders in the ten constituencies' where priority was given to constituencies that has more coffee famers' cooperative societies.

Multi-stage sampling was used to sample farmers with the big cluster being the county, purposive sampling was used to sample the sub-county with emphasis given to sub-counties growing coffee, from the sub-county the constituencies were sampled where the sampling frame for coffee farmers was constructed and farmers chosen randomly for the survey. A total of 227 respondents comprising of family heads or their spouses were involved in the survey upon which 214 respondents returned their responses while 13 dropped. The secondary data was obtained from coffee co-operative records. Data was collected by use of open and closed ended questionnaires and interview that provided structured information. Questionnaires were self-administered providing the respondents with opportunity to provide information without influence by the researcher. In depth interview was conducted to get information that would have been missed or that which was not clear. During the entire process the researcher took notes while treating all data and records with confidentiality and stored securely for ease of retrieval. A focus group discussion was conducted with the representative of coffee farmers, cooperative union, coffee Board of Kenya, coffee research foundation, ministry of agriculture and cooperatives with aim of getting valuable information, definitions and interpretation of concepts and terminologies got from the research exercise.

5. STUDY OBJECTIVE

The objective of the study was to establish effect of farm inputs namely fertilizer, agrochemical and use of lime and farm succession on coffee productivity in Kisii County and give a recommendation based on the outcome of the research. The hypothesis of the study was that H_1 Farm succession influences use of fertilizer hence coffee production, H_2 Farm succession influences use of pesticides and insecticides hence coffee productivity, H_3 Farm succession influences liming of soil hence coffee productivity.

6. RESULTS AND DISCUSSION

A total of 227 questionnaires were administered and 214 were returned giving a return rate of 94.3%.Majority (71%) of the respondents in the study area as shown in Table 1 were aged over 50 years in age. The mean age was 57 years while the modal age group was 50-60 years age cohort or cluster and by implication therefore, coffee farmers in the study area are ageing. The mean age of 57 years indicates an ageing farmer who should be retiring from active farming. The findings concur with that of [10] in Mukurweini district and who found out that the average minimum age of coffee farmers in Kenya is 51 Findings indicate further in Table 2 that most farmers in the study area are small-scale farmers as 61.1% reported farm size of less than an acre while only 24.4% had between one and two acres of land. This is a pointer that coffee farming in Kisii County is on small-scale basis.

Research findings in Table 3 indicate that 47.7% of the respondents had a successor while 49.1% didn't have a successor. This is an indication that coffee farmers are partially ready to give out coffee farms.

The findings indicated in Table 4 that 7.8% of the sample had successors aged below 18 years, 51.0% had successors of age 19-35 years, 34.3% had successors of age 36-50 years while 6.9% had successors of age above 50 years with the oldest assigned successor aged 59 years. The mean age of successors is 33.26 years with standard deviation of 10.26. This could infer unwillingness of coffee farmers releasing coffee farms to next generation as indicated by the focus group members and who further expressed fear of releasing farms to young ones who could change the farming enterprises very quickly.

Table 1. Age of farmers

Age in Years	Frequency	Percent
<50 Years	61	28.5
50-60 Years	62	29.0
61-70 years	55	25.6
70< Years	35	16.4
No response	1	.5
Total	214	100.0

Table 2. Farm acreage

Acreage	Frequency	Percent
Less than 1 acre	131	61.1
1-2 acres	52	24.4
More than 2 acres	16	7.5
No response	15	7.0
Total	214	100

Research findings indicated in Table 5 on farm succession shows that 88.2% had male successors and 11.8% of respondents had female successor respectively. This is due to traditional customsthat male children should be the heirs of their father's property and affirms finding by [12,14].

Table 3. Farmer identified successor

Successor identified	Frequency	Percent
Yes	102	47.7
No	105	49.1
No response	7	3.2
Total	214	100

Table 4. Age of successor

Age of successor	Frequency	Percent
18> Years	8	7.8
19-35 Years	52	51.0
36-50 Years	35	34.3
50< Years	7	6.9
Total	102	100

Table 6 shows that a total of 83.7% of the population use fertilizer while 12.1% do not use fertilizer, indicating that high population of Kisii county residents uses fertilizer. This contradicts findings by [2], that decline in coffee production is due to reduced use of fertilizer. Hence we may infer it as being caused by other factors that may include use of wrong type of fertilizer or poor timing of fertilizer application.

Table 5. Gender of successor (n=102)

Gender	Frequency	Percent
Male	90	88.2
Female	12	11.8
Total	102	100.0

Table 6. Farmers' use of fertilizer

Response	Frequency	Percent
Yes	179	83.7
No	26	12.1
No response	9	4.2
Total	214	100.0

Research found out that a total of 74.8% spray their coffee for insect and pest control while 19.6% do not use insecticides and pesticides (Table 7). This concurs with findings by [2] that reduction in coffee production was not due to low insecticides and pesticides usage in farms as many coffee farmers spray their farms.

Table 7. Farmers' use of pesticides and insecticides

Use pesticides/insecticides	Frequency	Percent
Yes	160	74.8
No	42	19.6
No response	12	5.6
Total	214	100.0

A total of 77.1% had not used lime in their farms while 10.3% had not used lime (Table 8). Since use of lime increases P^H level and enhance absorption of nutrients, this therefore could be a factor that contradicts absorption of nutrients despite high rate of usage of fertilizer by the Kisii coffee farmers. The results concur with reports from [1,13], of low soil liming in the west of rift valley.

Table 8. Farmers' use of lime

Use of lime	Frequency	Percent
Yes	22	10.3
No	165	77.1
No response	27	12.6
Total	214	100.0

Table 9 shows that majority of respondents (61.68%) reported coffee production per tree per year was less than 1 kg of cherry. This agrees with the report from [1] that the average coffee production per tree is less than 1kg down from the optimal 10 kgs.

Table 9. Coffee production in kg per tree/year

Production per tree	Frequency	Percent
Less than 1kg of cherry/tree	132	61.68
More than 1kg of cherry/tree	66	30.84
No response	16	7.48
Total	214	100.0

From the Pearson Correlation in Table 10, it is noted that use of fertilizers is not correlated to farm successor *P*=0.086, while use pesticide and insecticides is correlated to farm successor identification *P*=0.026 and hence affecting coffee productivity. It was also found out that use lime in the coffee farms is independent of farm succession *P*=0.395. Use of pesticides and insecticides has an influence on coffee production as suggested by [2]. The study findings concur with findings by [2] that reduction in coffee production was due low usage of insecticides and pesticides.

Table 10. Effect of farm succession on agricultural practices

		Use fertilizer	Spray coffee for pests and insects	Use lime
Identified farm successor	Pearson Correlation	0.122	.159*	0.064
	Sig. (2-tailed)	0.087	0.026	0.395
	N	198	195	180

8. CONCLUSION

Results of the study affirm that identification of a successor encourages use of insecticides and pesticides while use of fertilizer and lime are independent of farm succession. However, the use of fertilizer could be influenced by succession in that the new generation could go further in establishing which fertilizer type and time of application is appropriate. It is therefore prudent that succession plan is carried out in a timely manner to ensure that new energy and skills are put on coffee farming hence sustain its productivity.

9. RECOMMENDATION

Coffee farmers need to encourage young generation to take up coffee farming and to practice good agricultural practice by timely pruning, weeding, spraying using insecticides and pesticides, use of right fertilizer and soil testing to determine extend of liming and type of fertilizer to be used.

9.1 Recommendation for Further Study

From the study we do recommend further study on effect of different types of fertilizers on coffee production in Kisii County and determinants of agricultural practices on coffee in Kisii County.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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