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Role of Planning of Planting Maize on Food Production and Security in Moiben Sub-County, Kenya

Tecla J.Biwott[1], Javan Ngeywo[2]
[1]Department of Agriculture, Toloita Secondary School, Ministry of Education, Kenya
[2]Directorate of Coffee; Agriculture, Fisheries and Food Authority, Kenya

***Corresponding Authors**
Name: Javan Ngeywo
Email: jcngeywo@yahoo.com

Abstract: Maize is a staple food for the inhabitants of Moiben sub County and other parts of Kenya. However, its production is facing challenges that have led to decline in yield. Improving maize production is considered an important strategy of solving the problems of food insecurity in the countries where rapid population increase is a major challenge especially in Sub-Sahara Africa, this therefore, can be achieved by improving management practices of maize production and which is a main source of employment and income for the rural population. Maize accounts for 30−50% of low-income household expenditures in Eastern and Southern Africa and when the price of this commodity is increased, the poor suffers most. In addition, the grains are rich in vitamins A, C and E, carbohydrates, essential minerals, and contain 9% protein; they are also rich in dietary fiber and calories, which are a good source of energy. The purpose of the study was to determine the influence of maize planting management practices on maize production among farmers in Moiben sub-county with an objective of establishing the role of planning of planting of maize on food security in Moiben sub-county. The total population of Moiben sub-county is 138,409 people with 17,299 households, a sample size of 368 households was chosen through stratified sampling. Primary data was collected through; questionnaires, interviews, observations, and focus group discussions, secondary data was collected through review of articles, journals, Internet search and textbooks. Analysis was done using descriptive statistics with an aid of Statistical Package for Social Science (SPSS) software and Microsoft excel. Results indicated Planning of planting of maize has an influence on the total yield of maize and therefore recommend that farmers be sensitized on importance of planning forehand to enable high maize production and eventual food security.
Keywords: Maize production, Food security, household, planning, planting management

INTRODUCTION

Maize is a cereal crop that is grown widely throughout the world in a range of agro-ecological environments and is produced annually more than any other grain hence ensures food security if well managed [1]. About 50 species exist and consist of different colors, textures and grain shapes and sizes with White, yellow and red being the most common types, however, white and yellow varieties are preferred by most people depending on the region [2]. Maize is the most important cereal crop in sub-Saharan Africa (SSA) and an important staple food for more than 1.2 billion people in SSA and Latin America. All parts of maize crop can be used for food both for human and livestock and non-food products for industrial products. A heavy reliance on maize in the diet, however, can lead to malnutrition and vitamin deficiency diseases such as Night Blindness and Kwashiorkor [3].Worldwide production of maize is 785 million tons with Africa producing 6.5% and imports 28% of the required maize from countries outside the continent. Most maize production in Africa is rain fed; hence farmers need to time and plan well the planting time so as to ensure optimal maize production and hence food security. The harvest per acre vary from 2.5 to 7 tons depending on soil and its cultivation while worldwide consumption is more than 116 million tons, with Africa consuming 30% [3].Maize management has vital effects on food security just as high yield levels are related to high resource-use efficiencies due to optimization of growing conditions and maximum maize management practices [4].

Kenya suffered a maize deficit of 6.8 million bags in 2012 and spent millions of shillings for maize importation and at the start of the year 2014, the deficit was also reported to have increased to 10 million bags by the ministry of Agriculture and they recommended that the shortfall to be bridged by importation from the neighboring countries [5].

Food security exists when all people, at all times, have physical and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life [5]. 90% of the rural households in Kenya grow maize with its production dominated by small-scale farmers who produce 75% of the overall production and 25% is

grown by large-scale farmers. In recent years there has been an expansion of land used for maize production as evidenced by 1.7 million hectares in 2008 and 1.8 million hectares in 2009 [6]. The national maize production ranges between 24 and 33 million bags per annum which does not keep pace with the domestic consumption levels for example in 2008, the consumption was estimated over 36 million bags[7].

Improving agricultural production is essential to achieve a sustainable development process that will contribute to reducing poverty and enhancing food security and income growth [8]. Maize thrives best in a warm climate and is now grown in most of the countries that have suitable climatic conditions. Its growth depends more on high summer temperatures than on a high mean temperature and it ripen in a short hot summer while it withstand extreme heat. A large amount of water is needed during the growth of the maize. The average maturing period is relatively short and this makes it possible to grow at fairly high latitudes. For maize to be planted the aspect of planning is very crucial as it determines total yield per size of plot [9]. For the sake of food security, management of maize during planting relies on availability of water [10].

Maize is exceptional in yield per unit area; the harvest may vary from 2.5 to 6 tons per acre according to the soil and its cultivation, However, Yields above 7 tons per acre have often been recorded[11]. Maize crops around the world have their own unique production cycles of planting and harvest timeframes depending on climatic conditions and management practices. Grain prices tend to fluctuate the most during the growing seasons, as supply expectations can shift significantly due to planted acreage, weather and growing conditions [9].

Maize needs 450 to 600 mm of water per season, which is mainly acquired from the soil moisture reserves. About 15.0 kg of grain is produced for each millimeter of water consumed. At maturity, each plant will have consumed 250 L of water. The total leaf area at maturity may exceed one square meter per plant. The assimilation of nitrogen, phosphorus and potassium reaches a peak during flowering. At maturity the total nutrient uptake of a single maize plant is 8.7 g of nitrogen, 5.1 g of phosphorus, and 4.0 g of potassium. Each ton of grain produced removes 15.0 to 18.0 kg of nitrogen, 2.5 to 3.0 kg of phosphorus and 3.0 to 4.0 kg of potassium from the soil. No other crop utilizes sunlight more effectively than maize, and its yield per ha is the highest of all grain crops. At maturity, the total energy used by one plant is equivalent to that of 8 29315 W electric globes in an hour [11, 9].

The objective of the study was to establish the role of planning of planting of maize on food production and security in Moiben sub-county, Kenya

RESEARCH METHODOLOGY

Study Area and Target Population

The study targeted a total population of 138,409 with sample drawn that included small-scale farmers, medium scale, large-scale farmers and agricultural officers from the five wards in Moiben Sub County.

Table-1: Administrative wards of Moiben Sub County

Name	Population	No. of households
Tembelio	28201	3,502
Sergoit	16,220	2,027
Karuna/Meibeki	26048	3,256
Moiben	25,774	3,221
Kimumu	42,346	5,293
Total	138,409	17,299

Source: Kenya Demographic health survey, 2009

Sample size and sampling selection

The study applied stratified and simple random sampling techniques by selecting maize farmers from different categories i.e.; small scale medium scale, large scale and agricultural officers. In simple sampling technique, the sample is selected without bias to arrive at specific respondents from each stratum with a total of 368 respondents selected.

Table-2: the random selected sample wards.

Name	Population	No. of households
Sergoit	16,220	2,027
Karuna/Meibeki	26,048	3,256
Moiben	25,774	3,221
Total	68,042	8,504

Source: Kenya Demographic health survey, (2009).

The Morgan and Krejcie [14] table was used to determine the sample size for this study. Given the total target population 8,504 homesteads the corresponding was 368 homesteads as shown in table 2.

Research Instruments

The instrument that was used during the study was a questionnaire, which contained both open and closed ended questions and limited to maize farmers and stakeholders in Moiben sub-county. Questionnaire was used to gather information because it is a less costly way to reach more people, including people at some distance. The questionnaire keeps away from interviewer bias, guiding and cues that can impact the legitimacy and reliability of the data collection. This research also used face-to-face in depth interview and focus group discussion to validate views, opinions, perception, feelings and attitudes of the respondents.

Data collection procedure

Permission was sought from Moiben sub-county administrator prior to commencement of the

research study. Researcher reported to the sub-county education officer and sub-county agricultural officer before proceeding to the field. A letter of transmittal was used to introduce the research activity to the respondents and assure them of confidentiality on interview at pre-arranged dates.

RESULTS

Introduction

Descriptive Statistics was used to process all the responses from the questionnaires. Data collected was examined, sorted, categorized and tabulated with aid of SPSS and excel computer programmes. Data from the field was coded and edited for completeness then analyzed in form of percentages and presented in form of frequency distribution tables. In analyzing the data, the responses to the items in the questionnaire, the researcher assigned each response a number.

Return rate

The questionnaires were administered to 368 respondents/farmers and interviews conducted for 5 agricultural officers. A total of 350 questionnaires were returned, this translates to 95 % return rate thus the respondents were positive towards the study.

Demographic information

Background information of the respondents was sought and which included gender, age, education level, working experience of the respondents, which formed the basis of knowing what kind of individuals the researcher was dealing with.

Gender of Respondents

The results for gender findings are indicated on table 3 and from the findings, 240 respondents were male farmer's representing 68.3% this is almost in concurrence with research findings by Sadiq, Yakasai, Ahmad, Lapkene & Abubakar [12] of 67% male maize farmers in Niger state of Nigeria, while 111 respondents were female farmers representing 31.7%. The findings indicate a clear gender imbalance of farmers in Moiben Sub-county. This shows that women have a challenge in accessing land for practicing maize production however further analysis indicate gender orientation has a weak significant influence on maize production with p=0.5.

Table-3: Gender of the respondents

Gender	Frequency	Percentage
Male	239	68.3
Female	111	31.7
Total	350	100

Age bracket

To a greater extent age affects planning of production of maize hence food security with older tending to be more traditional in terms of field management practices and planting time(i.e. we have always done it like that). Age is also a critical factor in experience, older farmers are likely to be more experienced than relatively younger farmers, and a more experienced farmer is in a better position to relate production trend to food security. The findings are presented in table 4.

Majority of the respondents were aged 41-50 representing 38%, those of age of 21-30 were 50 (13%) while 102 (28) % of farmers who were aged between 31-40 years and 76 farmers representing 21% were aged over 50 years. The findings show that majority of farmers in Moiben sub-county are in their middle age. The results from the research further indicated that age has no correlation with production with P= 0.954.

Table-4: Age of respondents

Age	Frequency	percentages
20-30	32	13
31-40	47	28
41-50	131	38
Over 50	76	21
Total	350	100

Level of education for respondents

Majority of the respondents were O level holders as represented by 151 respondents or 41%, 110 respondents or 30 % hold diploma certificates while 69 (19%) were Degree holders with the remaining 39 (10%) were master holders as shown in table 5. These findings clearly show that majority of the farmers' level of education is quite low to understand the role the maize field planning management practices in facilitating the maize production performance. It also indicates that maize production applies some professionalism for better production hence food security. The findings indicated that the level of education does not affect the production of maize with p=0.702. Increased maize production could be due to the rate of adoption of new technologies of producing maize. The education level of farmers being below secondary on majority concurs with research by Oladejo &Adetunji [5] in Oyo state in Nigeria.

Table-5: Education level

Education level	Frequency	percentages
O level	151	41
Diploma	110	30
Degree	69	19
Masters	39	10
Others	0	0
Total	350	100

Farmer's maize production experience

From the findings in table 6, majority of the farmers had been producing maize for over 10 years as represented by 59%, 29.7% had been producing maize between 6-10 years, and only 11.1% of farmers had been producing maize for less than 5 years, Furthermore the findings the experience of production

of maize does not affect the production with a Pearson correlation *p*=0.860.

Table-6: Maize production experiences

Education level	Frequency	percentages
0-5	39	11.1
6-10	104	29.7
Over 10	207	59.2

Planning of planting of maize

The farmer's capabilities of acquiring land for production of maize in terms of land size determine the time to begin preparation and ultimate harvesting time and which has great influence on maize production.

Ploughing time

The table 7 shows the response on when farmers begins to plough their lands as part of preparation for planting of maize. Majority of the farmers plough their land between the months of January to February as represented by 77.3% while 17.2% of farmers plough their land in the month of March and 5.5 % plough their land for maize production during the month of April. Ploughing time means ready for planting in good time hence high production of maize. Further analysis reveals ploughing time has no effect on the production of maize with *p*= 0.743. However, planting immediately rainfalls is important because nitrogen flush is well utilized. Though this contradicts Quaye [13]. It has an influence in nutrient availability and survival of microorganisms both beneficial and destructive.

Table-7: Ploughing time

Time of ploughing	Frequency	percentages
January	138	39.5
February	132	37.8
March	60	17.2
April	19	5.5
Total	350	100

Planting time

Table 8 illustrates that 48.8 % of the farmers plant their maize during the month of March, a further 31.6 % plant in the month of April as 6.6% plant in the month of February and in some rare instances 11.4 plants during the month of May while 1.5% plant maize in the month of January. Long rains in Moiben sub-county are expected to begin in the month of March through to May thus farmers are advised to plant before the onset of the rains since Planting time influences maize production with *p*=0.03. This affirms research by Quayeet.al, [13];Iken&Amusa [9] &Lobell et.al [3], on interaction of water and nutrient uptake by the maize plant and which is determined by time of planting especially on rain fed maize production as in moiben.

Table-8: Planting time

Planting time	Frequency	percentages
January	5	1.5
February	23	6.6
March	170	48.8
April	110	31.6
May	40	11.5
Total	350	100

Buying of fertilizers and seeds

Majority of farmers purchase their farm inputs on the month of February as represented by 38.8%, closely followed by the month of January by 36.5% while few farmer represented by 25.7% purchases their seeds and fertilizers in March as shown in table 9. Early acquisition of seed and fertilizers enable the farmers to plant on time so as to maximize production of maize.

Table-9: Time when farmers buy their seeds and fertilizers

Buying time	Frequency	percentages
January	124	36.5
February	135	38.8
March	90	25.7
Total	349	100

CONCLUSIONS AND RECOMMENDATIONS

There is need for proper management practices on maize crop in order to realize high production of maize grain. Early acquisition of inputs enables the farmers to plant on time. The appropriate time for farmer to begin preparation for planting should be between November and February to allow the field to rest enough, for organic matter to fully decompose, allow for proper aeration of the soil and also to prevent the spread of maize diseases and pests.

Agricultural advice to farmers in relation to maize production in Moiben sub-county and which pertains, Good farm management –farm planning and layout leads to early land preparation, early planting, purchasing of farm inputs in time and rotational programme for his/her crops, weed control and pest control practice. Practice minimum tillage so that he/she purchases enough fertilizer for the maize crop using the money, which would have been used in ploughing or harrowing.

In view of the findings, we recommend future research on assessment of the impact of extension services in maize production and food security, Investigation on the effects of land subdivision and farm succession on maize production and to establish the effects of post-harvest handling of maize on food security.

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