

**FACTORS AFFECTING THE PRODUCTION AND MARKETING OF MAIZE AMONG
SMALLHOLDER FARMERS IN BUYEMBA PARISH, BUKATUBE SUB-COUNTY, MAYUGE
DISTRICT**

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BU/UP/2020/0691

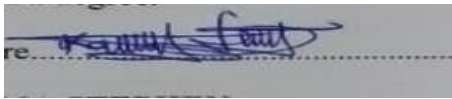
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**A DISSERTATION SUBMITTED TO THE DEPARTMENT OF AGRICULTURE IN PARTIAL
FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF A DEGREE OF
BACHELOR OF SCIENCE EDUCATION OF BUSITEMA UNIVERSITY**

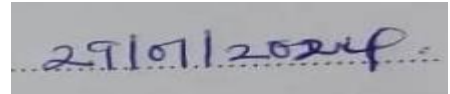
DECEMBER, 2023

DECLARATION

I **KAVUMA STEPHEN**, hereby declare that I am the rightful author of this study, and that any assistance received in its preparation is fully acknowledged and disclosed. This Dissertation is my original work, and has never been presented to Busitema University or any other University for the award of a degree.



Signature.....



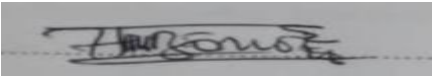
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APPROVAL

This Dissertation titled “Factors Affecting the Production and Marketing of Maize among Smallholder Farmers in Buyemba Parish, Bukatube Sub-County, Mayuge District”, was written by **Kavuma Stephen** under our guidance and supervision and meets the requirements set by Busitema University for the award of Bachelors Degree of Science and Education. It has been submitted with approval of the University Supervisor.



signature.....



Date.....

Mr. Otema Patrick Ben Emoi
Supervisor

DEDICATION

This report is dedicated to my beloved parents **Mr. Osinde John Peterson, Mr. Waiswa Emmanuel and the Late Mrs. Nyadoi Grace**. Without your toil to sponsor my Education, this piece of work would have remained a dream event, to my siblings and friends for the extra support. I also dedicate this report to my friends **Madam Namutosi Dorothy, Mr. Mugisa John** and others, May God Bless You Abundantly.

Lastly to my Uncle **Mr. Osinde John Peterson** for sponsoring my studies right from Senior One up to the University. It was a seed gainfully sown.

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ACRONYMS

NAADS-	National Agriculture Advisory Services
IPM-	Integrated Pest Management
CDO-	Community Development Official
NGO-	Non-Government Organization
FAO-	Food and Agricultural Organization
FO-	Farmers Organization
NARO-	National Agricultural Research Organization

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ABSTRACT

Zea mays has become a staple food in Mayuge District, with the total production of maize surpassing that of wheat and rice. In addition to being consumed directly by humans, maize is also used for corn ethanol, animal feed and other maize products such as starch and corn syrup. This study assessed the factors affecting production and marketing of maize and its products among smallholder farmers in Bukatube Sub-County, Mayuge District. Data was collected through a survey of 50 maize farmers. 80% of small-scale farmers deal in growing maize and only 10% use improved varieties and pesticides. According to farmers, the perceived yield losses amounted to 583kg/ha of maize, making 35% of the average maize yield obtained by farmers. Most farmers use cultural methods to improve on the yields and prevent pests and diseases, which they found more cheaper than synthetic pesticides. The study found that limited access to agricultural inputs, limited access to market due to poor transport network, government policies, limited technologies, conservativeness of the farmers and lack of knowledge on how to improve the production and marketing of maize and its products greatly affects production. More research is required to improve on the production and marketing of maize, sensitization of the farmers is also needed as well.

CHAPTER ONE:

1.0 INTRODUCTION

1.1 Background

Agriculture remains Africa surest bet for creating inclusive economies and providing great jobs for both the youth and adults. Growth in agriculture output increases farm productivity and profitability leading to improved wellbeing of the farmers and those living in the rural encouraging rural development. Prime objective of agricultural and rural development in countries like Uganda is to achieve improvement in rural levels of living achieved primarily through increases in small farm income, output and productivity along with genuine food security as a critical way out of poverty towards great rural development.

Market oriented farming is among the top leading economic activities that contribute to better living standards through employment which helps to curb poverty. As a result, the livelihoods of most rural households are also improved. This sector consists of crop farming, animal rearing horticulture among other enterprises.

Crop farming especially cereal growing for so many years has gained ready market due to increased demand of its products both locally and internationally. This agricultural subsector of cereal growing plays a vital role in enhancing quality food and reducing the number of those suffering from malnutrition hence achieving the Sustainable Development Goals. This is greatly achieved by encouragement of the private sector led development. It entails production of crops like Maize, Rice, Sorghum, Millet among others.

Maize (*Zea mays*) also known as corn in North American and Australian English, is a cereal grain first domesticated by indigenous people in Southern Mexico about 10000 years ago (Rangel,

2015). The leafy stalk of the plant produces pollen inflorescence and separate ovuliferous inflorescence called Ears that when fertilized yield kernels or seeds, which are fruits.

The term maize is preferred in formal, scientific and international usage as the common name because this refers specifically to this one grain whereas *Corn* refers to any principle cereal crop cultivated in a country. For example, in North America and Australia *corn* is often used for maize, but in England and Wales it can refer to wheat or barley, and in Scotland and Ireland to Oats.

Scientific classification of maize

Kingdom:	<i>Plantae</i>
Phylum:	<i>Tracheophytes</i>
Clade:	<i>Angiosperms</i>
Clade:	<i>Monocots</i>
Clade:	<i>Commelinids</i>
Order:	<i>Poales</i>
Family:	<i>Poaceae</i>
Sub-family:	<i>Panicoideae</i>
Genus:	<i>Zea</i>
Species:	<i>Zea mays</i>
Binomial name;	<i>Zea mays</i>

Maize has become a staple food in many parts of the world, with the total production of maize surpassing that of wheat and rice. In addition to being consumed directly by humans, maize is also used for corn ethanol, animal feed and other maize products, such as corn starch and corn syrup (Foley, 2019).

Maize can also be harvested and consumed in unripe state, when the kernels are fully grown but still soft. Unripe maize must usually be cooked to become palatable; this may be done by simply boiling

or roasting the whole ears and eating the kernels right off the cob. Sweet corn, a genetic variety that is high in sugars and low in starch, is usually consumed in the unripe state. Such corn on the cob is a common dish in the United States, Canada, United Kingdom, Cyprus, some parts of South America and the Balkans, but virtually unheard of in some European countries.

Types of maize (Ranum et. al., 2014)

- Dent corn
- Flint corn
- Pod corn
- Popcorn
- Flour corn &
- Sweet

Sugar-rich varieties called sweet corn are usually grown for human consumption as kernels, while field corn varieties are used for animal feed, various corn-based human food uses including grinding into cornmeal or masa, pressing into corn oil, fermentation and distillation into alcohol beverages like bourbon whiskey, and as feedstock for the chemical industry. Maize is also used in making ethanol and other biofuels.

Maize is widely cultivated throughout the world, and a greater weight of maize is produced each year than any other grain (Seal, 2016). In 2021, total production was 1.2 billion tones. Maize is the most widely grown grain crop throughout the Americas, with 384 million metric tons grown in the United States of America alone in 2021.

Genetically modified maize made up 85% of the maize planted in the United States of America in 2009. Subsidies in the United States of America help to account for its high level of cultivation of maize and its position as the largest producer in the world (Saavoss, 2021).

Maize production in Uganda

Maize is the most important cereal crop in Uganda providing over 40% of the calories consumed in both rural and urban areas. The crop has increasingly become a staple food in many parts of the country. Small scale farmers who constitute the bulk (80%) of the rural poor also account for the largest share of maize production. It is grown in every part of the country and a direct source of livelihood to over 2 million households, over traders/merchants and over 600 millers. Increasingly, maize has become a major non-traditional export cash crop particularly benefiting smallholder farmers (Benin, 2007).

GROWING CONDITIONS

Ecological requirements of maize

Soil

Maize requires well-drained soils with a good supply of nutrients and moisture. It cannot withstand even a slight degree of water logging and therefore can be killed if stands in water for a day. Preferred soil for maize production should also be deep, well-aerated with moderate pH 5.5-6.5 and rich in organic matter.

Altitude

Maize grows well at all altitudes but particular varieties are more suitable for the different altitudes ranging from 0 to 2900m above sea level. The optimum temperature for maize growth is 30⁰C.

pH

The maize crop generally grows well over a pH range of 5.5-7.8. The effect of pH outside this range is usually to make certain elements less available so that toxicity or deficiencies develop. Avoid the use of excess fertilizer especially those mentioned above as shown in Appendix 3

1.1 PROBLEM STATEMENT

Maize production is suited to smallholder production because maize has unique characteristics such as faster growth rates, ability to be grown in areas of low rainfall, ability to adopt the changing weather conditions, and maize products have ready market (Bakht et al., 2006). However, Maize production is constrained by harsh weather conditions and unreliable rainfall; poor maize varieties; low price from traders inadequate extension services; and limited processing facilities. The current demand for the maize grains as well as its products by both the local and export markets has led to an attempt in adoption of its production to fetch the high market prices. This would increase the farmer's household income and even raise the standards of living of farmers in Buyemba Parish, Bukatube Sub-County, Mayuge District. This study aims to address key factors affecting maize production and marketing by promoting sustainable maize farming, management and marketing practices. This serves as a basis for this research to establish the gaps limiting the extensive maize farming and marketing, formulate the solutions and recommendations to address the problem.

1.2 MAIN OBJECTIVE OF THE STUDY

The major objective of the study is to identify the different factors affecting maize production and marketing among smallholder farmers in Buyemba Parish, Bukatube Sub-County, Mayuge District.

1.3 SPECIFIC OBJECTIVES OF THE STUDY

1. To identify the existing factors affecting maize production in Bukatube Sub-County, Mayuge District
2. To find out the existing maize market structure and prices in Bukatube Sub-County
3. To find out what ways farmers can improve production and marketing of maize and its products in Bukatube Sub-County, Mayuge District

1.4 RESEARCH QUESTIONS

The research study has its research problems being answered by the following questions;

1. What are the factors leading to low maize yield production in Bukatube Sub-County, Mayuge District?
2. What are the factors affecting maize production in Bukatube Sub-County?
3. What are the existing factors affecting marketing of maize in Bukatube Sub-County?
4. What are the ways of improving production and marketing of maize grains and their products in Bukatube Sub-County?

1.5 HYPOTHESIS

The hypothesis for this research topic is that multiple factors, including access to inputs, market access, and government support, significantly affect the production and marketing of maize products among smallholder farmers in Bukatube Sub-county, mayuge District.

By understanding these factors, the study seeks to identify potential solutions to improve the productivity and profitability of smallholder farmers in the region.

1.6 SIGNIFICANCE OF THE STUDY

The study findings would contribute to substantial awareness to different stake holders working with maize production on the factors affecting the production and marketing of maize among smallholder farmers in Bukatube Sub-County like the Non-Government Organizations (NGOs).

It will inform all stake holders on ways of increasing maize yield production and improving marketing of maize.

The study will also add to existing knowledge bank regarding production and marketing of maize.

The results also would serve as a source of reference to student's scholars and researchers interested in maize production and management.

1.7 SCOPE OF THE STUDY

The study will be conducted on randomly selected maize growing households, Sub-County Agricultural Officer and local leaders in 6 parishes of Bukatube Sub-County namely; Buyemba, Lwanika, Mauta, Mbirabira, Bukaleba and Nkombe all in Mayuge district located in Busoga sub region, Eastern Uganda.

It will concentrate on assessing the factors affecting production and marketing of maize and establishing the possible remedies to such problems in order to maintain stable maize production and marketing.

1.8 JUSTIFICATION OF THE STUDY

There are some factors that affect the production and marketing of maize and they constitute mainly of the use of indigenous varieties of maize which lead to a decrease in the level of output of maize per unit area. This is also stimulated by the fact that most local smallholder farmers intercrop maize with other crops such as common beans, soybeans, groundnuts to increase output by generally maximizing land use for increased revenue and sustainable food production.

Farmers face a challenge in access to agricultural research facilities and organizations such as National Agricultural Research Organization (NARO) which is located far away hence minimizing the dissemination of new technologies and innovations to the farmers. This has contributed to levels of adoption experienced in the country despite the high demand from foreign markets.

Conducting this research study was therefore to oversee that the challenges are taken into account and solved to increase the adoption by making critical recommendations to the relevant

policy makers. Also, both the National and Local governments will be advised on employing more agricultural extension workers to promote dissemination of useful information and new technologies and hence result into increased adoption hence high maize output to meet the market demand.

1.9 CONCEPTUAL FRAMEWORK

A conceptual framework builds a structure or “concept” of what has been learned in a particular area of study. It is a hypothesized model of identifying the concepts under study and their relationship (Mugenda O, 2003). The conceptual models derived from variables are put to test in order to establish the significance of the proposed relationship. The variables considered in this research are economic, institutional, physical and social variables.

Conceptual framework of the linkage of production and movement of maize and their products within Mayuge district and to other parts of the country

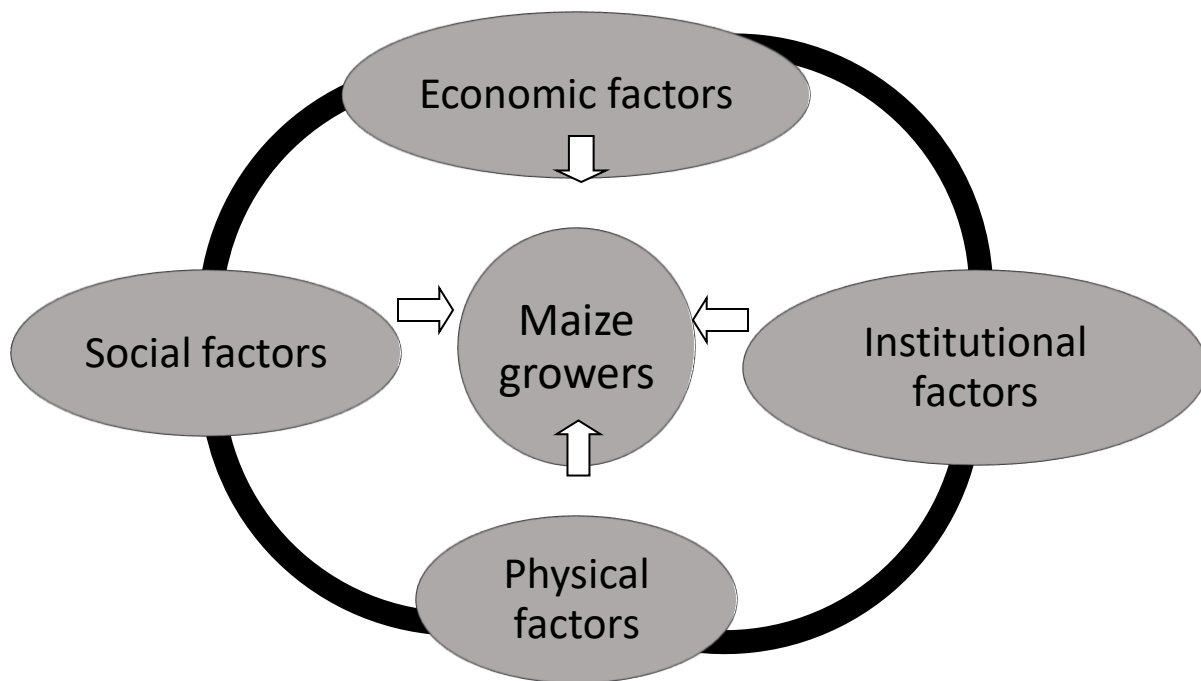


Figure 1: Conceptual Frame work

CHAPTER TWO

2.0 LITERATURE REVIEW

Introduction

Tropical and sub-tropical maize can make a significant direct contribution to the subsistence small-scale farmers by providing locally nutritious food that is often available when other agricultural crops have not yet been harvested. Maize is a versatile product that, depending on need, can be consumed within the household or sold. Marketing fresh and processed maize products generates income which can act as an economic buffer and seasonal safety net for poor farm households. Diversification into maize production can generate employment and enable small-scale farmers to embark on a range of production, processing and marketing activities to complement existing income generating activities (Nain, 2019)

The demand for maize has rapidly grown in the recent years especially in developed markets in the need of its high content of maize nutrients and taste. The adoption and production of maize should be based on a value chain approach where all value chain actors and facilitators are incorporated (Meribole, 2018).

About 90% of the maize grown is initially planted using local varieties. This has helped farmers to produce viable seedling rootstocks by their own in their farm nurseries hence promoting and influencing its adoption.

Maize production and adoption

According to (Penniman, 2018), nowadays it is easy to adopt and grow maize as a way of sourcing income to improve the living standards of the smallholder farmers since the start-up cost is very less than in any other crop farming business. The maize plants also require low care and management for optimum production of crops.

The selection of a suitable site is of the utmost importance since maize is extremely susceptible to pests, diseases, poor soil conditions and harsh weather conditions hence no maize plant is completely resistant to pests like fall armyworm, maize stalk borer among others and plants of most maize varieties grow quite poorly if not well managed. If sufficient land is available, a wider spacing is preferred. A higher planting density gives higher returns per season of the planting, but it can also give more pest management problems in the early stages. Planting distances depend on soil type and fertility, current technology, and economic factors. Ploughing should be deep and done during the dry season to eradicate weeds and fine tilth that may accelerate soil erosion is not necessary.

Maize planting and management

In commercial groves, maize is planted 30cm in rows and 75cm between lines. Thinning during the first 2-3 weeks encourages proper growth and recommended spacing. This helps in the smothering of weeds, provides optimum plant population per unit area leading to better yield, each crop plant gets adequate nutrients, Farm operations like weeding, spraying, harvesting are made easier and reduces incidences of disease spread as well as correct seed rate is used.

According to (Mucheru-Muna et al., 2007), Chemical inputs entirely evade neither for fertilization nor for pest treatment. Fertilizers can be applied before planting or when the crop is already established. They are applied to supply nutrients that are not sufficiently provided by the soil. Chemicals like pesticides and herbicides can be used in control pests and diseases as well as weeds. This should be done if the crops are to give better yields and avoid losses; use of chemicals, biological agents, use of cultural practices help to control both pests and diseases.

(Bakht et al., 2006), Planting is done at the onset of the rains, this helps the crops to benefit from nitrogen flush, crops get sufficient rainfall throughout the growing season, crops mature at the right time for harvesting, allows proper farming Program, that is, farming

operations are done timely, some weeds can be suppressed if the crop is planted before the weeds germinate, this also helps to reduce pest attack and dry planting in areas with inadequate rainfall is necessary. Irrigation can also be done in case there is shortage of rainfall in an area, this is an artificial method of providing water to crops in arid or semi-arid areas where there is no rain or where rain is inadequate and unreliable and it facilitates crop production throughout the year, crops get adequate and sufficient moisture, increased yields may be obtained and more land can be put under production. Overhead/sprinkler irrigation where piped water from dams, boreholes, wells, rivers, lakes or other sources is pumped and sprayed on the land under high pressure just like rain is used in irrigating maize because no leveling of land is required which is an expensive venture, fertilizers/herbicides can be applied uniformly with irrigation water, it is an ideal method to use in sandy soils, the amount of water to be supplied can be controlled and infiltration of water into the soil is adequate.

Maize harvesting

Maize harvesting usually commences when the maize plants start to dry (at least 75% of the field) is the principal maturity index used by farmers. Maize takes between 4-12 months after planting depending on variety. Harvesting is largely executed by child Labour by using hands. The later practices cause weevil infestation that may cause physical injury at any time. The study conducted by (Allen, 2005) showed cuts, punctures and bruises to maize increased ethylene production and hastened maize seeds and ultimately delays. In order to decide when to harvest the maize, it is important to find the minimum maturity, in other words; how early the harvest can be conducted and still be sure that the maize will dry to an acceptable eating stage.ⁱ

Harvesting is the process of gathering farm produce after maturity. Harvesting should be done at an appropriate time (Suge, 2011). The problems associated with early harvesting may include: inadequate drying of produce due to a high moisture content which may result in

produce heating up during storage, seeds harvested prematurely are sunken, small and of poor appearance and results in poor quality produce, processing of too early harvested produce may be difficult like threshing of maize, the germination capacity of too early harvested maize is low because either the embryo is immature or much of the food material remains in stem and stalk, maize harvested too early goes weevilly too quickly. On the other hand, delayed harvesting leads to; loss of produce due to rotting in case of too much rainfall, increased number of volunteer plants or self-sown plants which harbor pests and diseases and help in carrying them over to the next season as well as encouraging pests like birds (Alakonya et al., 2008)

Storage of maize grains after harvesting

However, after harvesting crop products should be thoroughly dried in order to reduce the attack by storage insects and fungi. Maize should be before storage in order to; reduce rotting and decay by fungi, reduce insect damage, maintain the quality of maize seeds, preserve seed viability and preventing germination of seeds while in storage, prolong shelf life of the produce, to avoid development of aflatoxin in some produce and to reduce weight and ease transportation (Akhtaruzzaman et al., 2021)

Storage of dried products: This is the safe keeping of farm produce mainly after harvesting and drying in good stores. A good store must be of good construction and rain proof, raised off the ground to avoid dampness, well ventilated and dry, vermin proof, securely located to prevent thieves, treated against pests such as weevils, thoroughly cleaned before new crops are put, have lockable doors to control theft of the produce and its surroundings should be kept clean (Williams et al., 2017)

In order to reduce losses during storage the following should be considered; drying the produce, seed dressing, ensure a leak proof roof, proper ventilation, clean the store to reduce

attack by pests from the previous crop, stores should have lockable doors, rat proof guards among others (Bakhtavar et al., 2019)

Factors affecting production of maize among smallholder farmers in Mayuge District.

Maize production is a significant agricultural activity in Mayuge District, located in the Eastern Region of Uganda. However, several factors can affect the productivity and yield of maize farming in the area. Here are some of the major factors affecting maize production in Mayuge District: (Maize Production in Uganda: A Review of the Challenges and Opportunities. , 2017)

Soil Fertility:

Soil fertility is a critical factor that affects maize production in Bukatube Sub-County, Mayuge District. The district's soils are generally fertile, but the continuous cultivation of maize without proper fertilizer application can lead to soil degradation and nutrient depletion. To address this, farmers can use organic manure and inorganic fertilizers to maintain soil fertility and improve crop yields.

Climate change:

Climate change is another significant factor affecting maize production in Bukatube Sub-County, Mayuge District. Changes in temperature and rainfall patterns can lead to droughts, floods, and other extreme weather events that can negatively impact maize yields. To mitigate the effects of climate change, farmers can adopt climate-resilient maize varieties and implement conservation agriculture practices such as crop rotation, intercropping and mulching.

Pests and diseases:

Pests and diseases are common challenges facing maize farmers in Mayuge District. The most prevalent pests include stem borers, root borers, and armyworms, while the most common diseases are maize streak virus, maize mosaic virus, and rust. To manage these pests and

diseases, farmers can use integrated pest management (IPM) techniques such as crop rotation, biological control and chemical control. (Smallholder Maize Farmers' Perceptions of Climate Change and Their Adaptation Strategies in Mayuge District, Uganda., 2017)

Water availability:

Water availability is also a critical factor affecting maize production in Bukatube Sub-County, Mayuge District. Maize requires adequate water for proper growth and development, and lack of water can lead to reduced yields. To address this, farmers can use irrigation systems such as drip irrigation and rainwater harvesting to ensure adequate water supply for their crops.

Seed Quality:

Seed quality is another important factor affecting maize production in Mayuge District. The use of low-quality seeds can lead to reduced yields, poor seed germination and disease susceptibility. To address this, farmers can use certified seeds that are disease-resistant, high-yielding and tolerant to drought and pests.

Marketing and value addition:

Marketing and value addition are critical factors affecting maize production in Bukatube Sub-County. The lack of access to markets and value addition opportunities can lead to low prices for farmers' produce, making it difficult for them to earn a decent income. To address this, farmers can form cooperatives and associations to collectively market their produce and add value to their products through processing and packaging.

In conclusion, the factors affecting maize production in Mayuge District are complex and interrelated. Addressing these challenges requires a comprehensive approach that include the use of improved seed varieties, integrated pest management techniques, water management practices and market access. By adopting these strategies, farmers in Bukatube Sub-County, Mayuge (Climate Change and Maize Production in Uganda: A Case Study of Mayuge District., 2017)

Factors affecting the marketing of maize and its products in Bukatube Sub-County, Mayuge District. ("Maize Marketing in Uganda: A Review of the Literature." (2017).)

The marketing of maize and its products in Bukatube Sub-County, Mayuge District is influenced by several factors, including: climate and Soil Conditions: The climate and soil conditions in Mayuge District play a significant role in determining the quality and quantity of maize produced. Factors such as temperature, rainfall, and soil type can affect the growth and yield of maize, which in turn affects the marketing of the crop and its products.

Market demand:

The demand for maize and its products in Bukatube Sub-County, Mayuge District is influenced by various factors, including population growth, economic development, and consumer preferences. An increase in demand for maize and its products can lead to an increase in marketing activities.

Access to Markets:

The accessibility of markets for maize and its products in Mayuge District is a crucial factor in the marketing of the crop. The availability of transportation infrastructure, such as roads, railways and waterways, can affect the cost and efficiency of transporting maize and its products to markets.

Government policies:

Government policies and regulations can also affect the marketing of maize and its products in Bukatube Sub-County, Mayuge District. For example, subsidies and taxes on maize and its products can influence the supply and demand for the crop, and regulations on the use of pesticides and other input can affect the quality of the crop.

Price Fluctuations:

The price of maize and its products can significantly fluctuate due to various factors, including weather conditions, government policies and global market trends. These price fluctuations can affect the profitability of maize farming and the marketing of its products. ("Climate Smart Agriculture in Uganda: A Review of the Literature". (2018)., 2018)

Technology and Innovation:

The adoption of technology and innovation in maize farming and marketing can also affect the success of marketing efforts in Mayuge District. For example, the use of precision agriculture techniques can improve the yield and quality of maize, while the use of E-commerce platforms can improve access to markets and increase the efficiency of marketing activities.

Competition:

The marketing of maize and its products in Mayuge District is also affected by competition from other crops and products. The availability of alternative crops and products can influence the demand for maize and its products, and the prices that farmers receive for their crops.

Farmer Organizations and Cooperatives:

The participation of farmer organizations and cooperatives in the marketing of maize and its products can also affect the success of marketing efforts in Mayuge District. The organizations can provide farmers with access to resources, such as credit and market information, and can help them to negotiate better prices for their crops.

In conclusion, the marketing of maize and its products in Bukatube Sub-County, Mayuge District is influenced by a variety of factors, including climate and soil conditions, market demand, access to markets, government policies, price fluctuations, technology and innovation, competition and farmer organizations and cooperatives. Understanding these factors is essential for developing effective marketing strategies for maize and its products in the District.

CHAPTER THREE: METHODS

3.0 INTRODUCTION

This chapter mainly describes how the research will be carried out and it shows the methodology that will be employed in data collection process on the topic of the study. It covers the area of study, research design, the population of study, sampling design and techniques, sample size and its determination and data collection methods, data collection instruments, data analysis and management.

3.1 STUDY AREA

The study was conducted in Buyemba parish, Bukatube Sub-County in Mayuge district 5km away from Mayuge Town Council. The parishes present in the Sub-County are six and they include; Buyemba, Lwanika, Mauta, Bukaleba, Nkombe and Mbirabira parishes.

Mayuge district is located in the Eastern part of Uganda. It borders Namayingo district in the East, Jinja in the West, Iganga District in the North and Bugiri district in the North East.

Mayuge district headquarters are located in Mayuge Town Council and with a distance of about 120km from Kampala the capital city and 40km from Jinja city. Mayuge district is in Eastern Uganda on coordinates; 00⁰20'N, 33⁰30'E, Latitudes 0⁰06'N, 1⁰12'N and at Longitude 33⁰10'East, 33⁰0'E.

The area lies in the Southern part of Uganda, Busoga Sub-region and receives relief rainfall which mounts to 1350mm per year. People in this area are typically small-scale farmers, growing both crops and rear animals. The crops grown include cassava, beans, sweet potatoes, bananas onions, coffee among others. The fruit trees are also planted along the edges of their farms and these include; mangoes, avocados, oranges, jack fruits, guavas and lemons.

Bukatube sub-county has a land area of 5643 square kilometers with a population of 4846

Location of Mayuge District on the map of Uganda



Figure 2: Study Location

3.2 RESEARCH DESIGN

The researcher used a cross-sectional survey design, quantitative approach to gather detailed information needed. Both quantitative and qualitative approach will be used in the research, these are considered complementarily in line with Dey (1993) who state that enumeration depend on adequate conceptualization which cannot ignore numbers.

How the study was mainly qualitative according to Marshall and Rossman (1989), qualitative design are appropriate for in depth research, this approach will be chosen as accuracy is central to it. It minimizes bias and maximizes reliability of the results. The study will be gender focused where both men and women will be selected.

3.4.1 TARGET POPULATION

The information was collected from different categories of people including men and women, youths, local council officials, extension workers and politicians in the area.

SAMPLE POPULATION

A sample of 40 respondents was selected from the target population including one Community Development Official (CDO), one extension worker, two political leaders and 36 farmers.

SAMPLING TECHNIQUES

Both probability and nonprobability sampling were employed. The probability sampling was simple random and the nonprobability sampling was purposive.

Simple random sampling was used in collecting data from farmers and purposive sampling was applied to the local leaders and an extension worker at the sub-county.

DATA COLLECTION

The method of data collection was; questionnaires, interviews and observations.

The data was collected by use of questionnaires randomly in the area of study and farmers were involved in helping source the required data. The data was then sorted into categories of those who had adopted maize farming and those who had not yet adopted.

Questionnaires

These consisted of structured questions and unstructured questions that were designed and issued to various respondents. Questionnaires were designed for 36 maize growers in Bukatube Sub-county; these were open ended and close ended type. Close ended were distributed to large groups of people who filled the forms.

Interviews

Face to face and telephone interviews were also carried out with respondents who participated in the study as key informants. This mainly targeted the key respondents like local leaders, Agricultural officers and Community Development Officials (CDO).

Observations

In addition to the above methods, observation was also used. This was used to see the type of maize farms Bukatube Sub- County had. It consisted of items observed for example the effects of pests like fall army worm, maize stalk borer, diseases like chlorosis, and the effect of climate on maize production and it was designed to supplement information that was given in the questionnaires.

DATA PROCESSING AND ANALYSIS

The data was cleared of all the errors before entering into excel spread sheet. The data was imported into Statistical Package for Social Scientists (SPSS) version seventeen. The data was analyzed using descriptive statistics, a Scientific Package for Social Scientists (SPSS) and was presented in form of tables, percentages and frequencies. Qualitative data was presented in themes.

Data presentation

The data presentation involved the use of graphs to show the outcomes of the study for each variable. For example, the extent to which various factors affects the production and marketing of maize amongst smallholder farmers.

Data analysis

This method includes the determination of variance, mean for testing hypothesis and regression if possible.

This was done basing on the objectives of the study.

Inferential statistics was used to analyze the data obtained from the field.

LIMITATIONS AND DELIMITATIONS OF THE STUDY

The unwillingness from some respondents to participate in the study. Some respondents did not return back the questionnaires, so the researcher picked 50 farmers to get the required 40 respondents.

The study was also affected by financial constricts as the researcher was self-sponsored; the researcher reduced the area of study.

CHAPTER FOUR: RESULTS AND DISCUSSIONS

4.0 Introduction

This chapter includes discussion and interpretation of the data obtained from the methodology; how other factors affected the production and marketing of maize among small-scale farmers in Bukatube Sub-County, Mayuge District.

4.1 Discussion

The researcher found out that most smallholder farmers in Bukatube Sub-County, use poor quality seeds for the previous seasons other than buying improved seed varieties from the shops and hence this has led to low yields per unit area. This is because there is limited access to Agricultural input shops and as well some areas lack these input shops.

“The agricultural shops are located very far which is costly in terms of transport in order to access good quality seeds for planting, and in addition the seeds are expensive to buy. Directly translated from the local language”

The study found out that there is limited access to extension services to the farmers who can help them identify the pests and diseases that are attacking their maize plant since most of the farmers are uneducated and they have little knowledge about the different kinds of pests and diseases as well as their mode of spread on the farm and hence affecting the yields of maize produced.

“We have only one extension officer in the whole Sub-County who may appear once in a month and so we don't have any assistance in case of pest and disease outbreak.

Directly translated from the local language used by the farmer.” Direct speech.

The study also found out that, there was limited land for production due to the ever-increasing population of the area which has led to continuous land fragmentation and hence

leaving small plots that can only support subsistence farming for home consumption and cannot be sold to earn a living for improving their level of life. This is evidenced by;

“There is lack of enough land for commercial maize growing and therefore we are basing on subsistence farming to sustain our families in terms of food because of the big number of people in families which has also caused division of land into small pieces for the children to construct houses and hence leading to limited land for maize production.

Direct speech”

The researcher found out that there was the effect of pests and diseases especially the pest called fall armyworm which has greatly affect maize plants resulting into massive destruction of the crops and diseases like chlorosis, Maize streak virus disease, maize mosaic virus among others has led to a reduction in maize yields per unit area. One of the respondents informed the researcher that;

“We are much affected by fall armyworms which I think they are active at night and we have limited knowledge on how to control them from causing much damages to the maize plants and the diseases as well have led to low yields.” Direct translation.

The study also found out that there are undeveloped transport infrastructures because the researcher faced a challenge in accessing some parts of the Sub-County due to poor roads and some farmers were not reached to obtain information specifically from Buyemba trading center to Lwanika fish landing site. This also affects the accessibility to market centers by the farmers as well as traders and it hinders extension services to farmers which leads to unawareness of ways to improve crop production.

“The government should help us and improve on the roads so that we can access the markets and sell our maize at better prices but here trader buy at very low prices and we end up making losses because we have nothing to do.” Directly translated from the local language.

The study found out that the climate of the area greatly affects maize production due to the prolonged drought which can sometimes last for 3-4 months more especially from November-March which leads late planting with its associated effects of weeds, pests and disease infestations resulting into very low yields per unit area. On the other hand, heavy rains that are too much also affect the growth of maize at early stages and rotting when maize is approaching the harvesting period. The rain is always too much in the months of April, May, June, September, October and sometimes November.

“Most farmers complained about the climate that is not favorable for the proper growth of maize and they talked of the harsh weather conditions that favor the spread of pests like fall armyworms, maize stock borers, maize root borers and diseases like maize streak virus disease.”

The researcher also found out that the area lacks processing and value addition facilities to improve on the quality of maize products before marketing and this leads to low prices at which farmers sell their maize. The processing and value addition facilities are located in trading centers which is somehow far for the people in villages to access them. For example, people from Bukaleba, Bukasero, Lukindu among others have to use around 3000/= to 5000/= to access processing facilities.

*“My son has to ride a bicycle from here in Lukindu up to Katwe to process/grind maize into flour which is very far”. Said by **one of the interviewed farmer and citizen of Lukindu “A”** village in Bukatube Sub-County.*

The study found out that farmers lack good storage facilities and this has led to the deterioration of quality of maize due to rotting, pest attack, fungal attack while in the store due to poor qualities of the store, for example, dampness of the floor, poor ventilation, putting the grains on the ground which is not allowed by the principles of cereal storage. Some farmers have no stores and they end up putting the produce in their houses which are

congested thereby affecting the quality in case of mishandling of liquids which may pour into the grains.

“We lack storage facilities like granaries which are no longer existing and this has led to increased loss maize both in quality and quantity due to storage pest attack.” Direct translation.

The researcher also found out that there is a high level of conservativeness among some farmers in different place who still believe in traditional farming and do not want to adopt new farming techniques which can help to improve on soil fertility like crop rotation, bush farrowing, and they continue with cultivation of the same piece of land continuously leading to depletion of soil nutrients hence causing infertility of the soil.

The study found out that soil infertility on the hills of Bukaleba in Bukaleba parish, Bukatube Sub-County caused by soil erosion affects farmers’ yields and the establishment of Busoga Forest Company (BFC) has led to limited land for maize growing today as compared to early 2000s where people used to grow maize in large quantities before the establishment of the Busoga Forest Company.

“In Bukaleba, we have been much affected with the establishment of Busoga Forest Company which has caused limited land for cultivation and that is why we are depending on fish in Nakalanga fish landing site which is also restricted by the Uganda People’s Defense Forces (UPDF).” Directly translated from the local language.

Table 1: Results obtained in Bukatube sub-county

<i>S/N</i>	<i>Name of the farmer</i>	<i>Village</i>	<i>Acres of land</i>	<i>Output(tones)</i>
<i>1</i>	<i>Kirunda Abdulrahman</i>	<i>Lukindu</i>	<i>5</i>	<i>3</i>
<i>2</i>	<i>Waiswa moses</i>	<i>Bukaleba</i>	<i>3</i>	<i>2</i>

3	<i>Owere Joseph</i>	<i>Ndhokero</i>	4	2.5
4	<i>Mulondo Henry</i>	<i>Bukasero</i>	2	1.5
5	<i>Katebe Charles</i>	<i>Luubu</i>	7	5.5
6	<i>Malijani Akimu</i>	<i>Bukatube</i>	10	8
7	<i>Okoth Julius</i>	<i>Kabuki</i>	6	5
8	<i>Dhikusoka Ali</i>	<i>Buyemba</i>	9	7.5
9	<i>Kasadha Swaibu</i>	<i>Mauta</i>	8	7
10	<i>Odoto Emmanuel</i>	<i>Bubalagala</i>	6	5

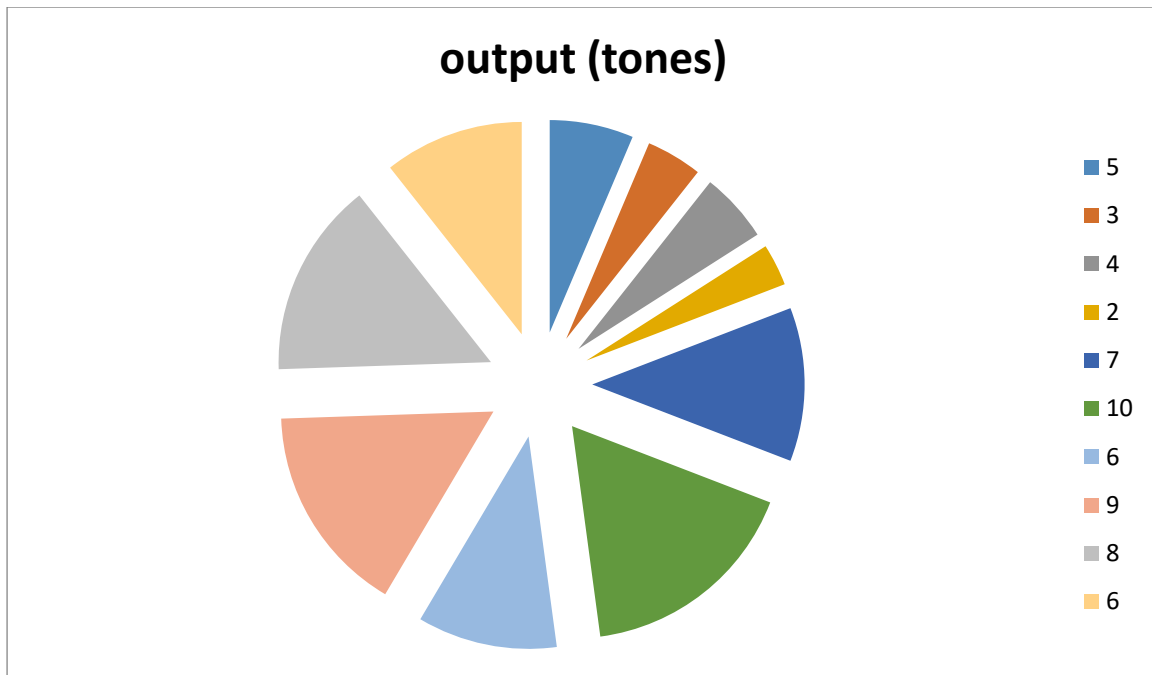


Figure 3: Pie Chart

CHAPTER FIVE: CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This chapter includes the conclusion, recommendations and solutions to the problems faced by the small-scale maize farmers in Bukatube Sub-County, Mayuge District in order to improve on the yields per unit area throughout the year.

Conclusion

In conclusion, the report on the factors affecting the production and marketing of maize and its products among smallholder farmers are land, climate conditions, poor seed quality, poor transport facilities among others. The results of the study clearly explain the problems faced by farmers and what they are supposed to do in order to overcome the constraints. As a result, the study calls for more research to be carried out so as to help farmers get better yields.

Recommendations to be put into account in order to improve on the production and marketing of maize among small-scale farmers in Bukatube Sub-County

Fertilizer Application

Farmers should use organic fertilizers to maintain soil fertility and improve crop yields. In addition, farmers can also use inorganic fertilizers like DAP, NPK for their soil to gain fertility that will improve on the yields of maize for both home consumption and sale to earn income that can be used in improving their standards of living.

Climate change mitigation

To mitigate the effect of climate change, farmers should adopt climate-resilient varieties like Bazooka and implement conservation agriculture practices like crop rotation, intercropping and mulching so that soil moisture is maintained and erosion is controlled as well and this will ensure proper utilization of resources for the maximum output of the land.

Pest and disease management

In order to manage pests and diseases, farmers should use integrated pest management (IPM) techniques like crop rotation, biological control and chemical control methods. This will help to overcome severe crop destruction by pests and diseases hence increasing yields per unit area on the farm among smallholder farmers.

Adequate water supply to the crops

To solve the problem of water shortage, farmers should use irrigation systems such as sprinkling and drip irrigation and rainwater harvesting to ensure adequate water supply for their crops. This will enable farmers to produce maize throughout the year due to the availability of enough moisture in the soil that supports crop growth.

Use of certified seeds

To solve the problem of low-quality seeds which leads to reduced yields, poor seed germination and disease susceptibility, farmers should use certified seeds that are resistant diseases, high yielding and tolerant to drought and pests.

Marketing and value addition

The farmers should form cooperatives and associations to collectively market their produce and add value to their products through processing and packaging in order to solve the lack of access to markets and value addition opportunities.

Government policies

They should provide subsidies to the trading companies that deal in maize and also reduce on the taxes imposed on the inputs like pesticides, and others to improve on the demand and supply of maize and its products in the area.

Technology and innovation

The farmers should adopt the use of precision Agriculture techniques that can improve the yield and quality of maize, while the use of E-commerce platforms which can improve accessibility to markets and increase the efficiency of marketing activities.

Formation of Farmer Organizations and Cooperatives

The farmers should form Organizations that can provide farmers with access to resources such as credit and market information and can help them to negotiate better prices for their crops.

REFERENCES

- Akhtaruzzaman et al. (2021). *Evaluation of drying performance, energy consumption, and quality of two-stage dried maize grain*. Journal of Biosystems Engineering, 469.
- Alakonya et al. (2008). *Effect of delayed harvesting on maize ear rot in western Kenya*. Am Eurasian J Agric Environ Sci, 4, 372-380.
- Allen, e. a. (2005). *FAO-56 dual crop coefficient method for estimating evaporation from soil and application extensions*. Journal of irrigation and drainage engineering.
- Bakht et al. (2006). *Response of maize to planting methods and fertilizer N*. Journal of Agricultural and Biological Science, 1(3), 8-14.
- Bakhtavar et al. (2019). *Implementing the 'dry chain' during storage reduces losses and maintains quality of maize grain*. Food Security, 11, 345-357.
- Benin. (2007). *Assessing the impact of the National Agriculture Advisory Services (NAADS) in the Uganda rural livelihoods*. Intl Food Policy Res Inst.
- Climate Change and Maize Production in Uganda: A Case Study of Mayuge District. (2017). *Journal of Environmental Science and Health, Part B, vol. 52, no. 1, 23-34*.
- Climate Smart Agriculture in Uganda: A Review of the Literature. (2018). (2018). *World Bank Group*.
- Foley. (2019). *On the mechanism of proteins*. Analytica chimica acta.
- Maize Marketing in Uganda: A Review of the Literature. (2017). (n.d.). *International Food Policy Research Institute*.
- Market Access and Farmers Organizations in Uganda: A Case Study of Maize and Beans in Mukono District.". (2019). *International Fund for Agricultural Development*.
- Maize Production in Uganda: A Review of the Challenges and Opportunities. . (2017). *"Journal of Agriculture and Rural Development, vol. 3, no. 2, 1-12*.
- Meribole, E. C. (2018). *The Naigerian health information system policy reviewof 2014*. Health Information and Libraries Journal.
- Mucheru-Muna et al. (2007). *"Effects of organic and mineral fertilizer input on maize yield and soil chemical properties in a maize cropping system. Meru South District, Kenya: Agroforestry systems, 69, 189-197*.
- Mugenda O, M. (2003). *Research Methods: Qualitative and Quantitative approaches*. Nairobi: Acts Press.
- Nain, e. a. (2019). *A study of content sharing*. indian Journal of Agricultural sciences.

Penniman, L. (2018). *Farming while black: Soul fire Farm's practical guide to liberation on the land*. Chelsea Green Publishing.

Rangel. (2015). *A brief look at the long history of GMO technology*. science in the news.

Ranum et. al.,. (2014). *Global Maize Production, Utilization and Consumption*. New York: Annals of the New York Academy of Sciences, 1312(2), 105-112.

Saavoss. (2021). *Trends in Production Practices and costs of the US Corn Sector*.

Seal. (2016). *Whole-grain Dietary recommendations*. British Journal of Nutrition.

Smallholder Maize Farmers' Perceptions of Climate Change and Their Adaptation Strategies in Mayuge District, Uganda. (2017). *Journal of Rural Development, Vol. 36, no. 2*, 155-171.

Suge, J. K. (2011). *Effect of organic and inorganic sources of fertilizer on growth, yield and fruit quality of eggplant*. Archives of Applied Science Research.

Williams et al. (2017). *Storage of maize in Purdue improved crop storage (PICS) bags*. PLoS One 12(1), e0168634.

APPENDICES

APPENDIX 1: RESEARCH INSTRUMENT: QUESTIONNAIRE

Dear respondent

I am **KAVUMA STEPHEN**, a student of Busitema University pursuing a bachelor's degree in science education. I am conducting a study on the factors affecting production and marketing of maize in Bukatube sub-county, Mayuge District. You have been identified as the one of the resourceful people for this study and the information given will only be handled with honesty, confidentiality and only used for academic purposes and development purposes. I'm looking forward for your responses and cooperation in answering the questions below.

Name of the Parish

PART A: Respondents Information

1. Age

20-39 years 30-39 years 40-49years

50 and above

2. Sex

a) Male b) Female

4. Level of Education

Uneducated

O level

A level

Others

5: Farming experience

(a) 1-5 years (b) 5-10years (c) 10-15years (d) 15-yearsandabove

PART B: WAYS OF IMPROVING MAIZE PRODUCTION IN BUKATUBE

SUBCOUNTY, MAYUGE DISTRICT.

Are there ways which are already put in place to improve maize production in Bukatube Sub-County, Mayuge District?

Yes

No

Not sure

What are the ways that are put in place to improve maize production in Bukatube sub-county, Mayuge District?

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How are the ways for improving maize production being put in to consideration?

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PART C: THE CHALLENGES LIMITING MARKETING OF MAIZE AND ITS PRODUCTS IN BUKATUBE SUBCOUNTY, MAYUGE DISTRICT.

In your view, are there challenges being faced during the marketing of maize and its products.

Yes

No

Not sure

What are the challenges being faced during the production and marketing of maize and its products?

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.....

How can challenges being faced during process of maize production and marketing be minimized?

.....
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.....
.....

PART D: THE IMPACT OF MAIZE PRODUCTION ON THE SUSTAINABLE LIVELIHOOD TO THE PEOPLE OF BUKATUBE SUBCOUNTY, MAYUGE DISTRICT.

In your view, are there impacts of maize production on the sustainable livelihood of the people of Bukatube Sub-County, Mayuge District

Yes

No

Not sure

What are the impacts of maize production on the sustainable livelihood of the people of Bukatube Sub-County, Mayuge District?

.....

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What can be done to improve on maize production for the betterment of sustainable livelihood of the people of Bukatube Sub-County, Mayuge District.

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APPENDIX 2: Tables showing work plan and the budget of the research

Table 2: Work plan

<i>ACTIVITY</i>	<i>SEPTEMBER</i>	<i>OCTOBER</i>	<i>NOVEMBER</i>	<i>DECEMBER</i>
Visitation of the farmers for interactions about maize growing and sampling				
Giving out questionnaires to the farmers for data collection				
Visiting different farmers and assessing the factors affecting production and marketing of maize				
Addressing of the challenges faced by maize growers				
Data analysis of the research outcomes and writing of the research report				

Table 3: Budget

<i>S/N</i>	<i>ITEM</i>	<i>QUANTITY</i>	<i>UNIT PRICE</i>	<i>TOTAL COST</i>
1	Overall	1	30000	30000
2	Gumboots	1pair	15000	15000
3	Questionnaire printing	200	100	20000
4	Transport		100000	100000
5	Rent	2months	75000	150000
6	Feeding		150000	150000
7	Pens	10	500	5000
8	Data	30GB	2000	60000
9	Fulscaps	50sheets	100	5000
10	Report printing	50pages	100	5000
11	Total amount			540000

APPENDIX 3: Soil pH Chart

Soil pH - what is it?

- measure of the acidity or alkalinity of a soil
- concentration of hydrogen ions (H⁺) in the soil solution

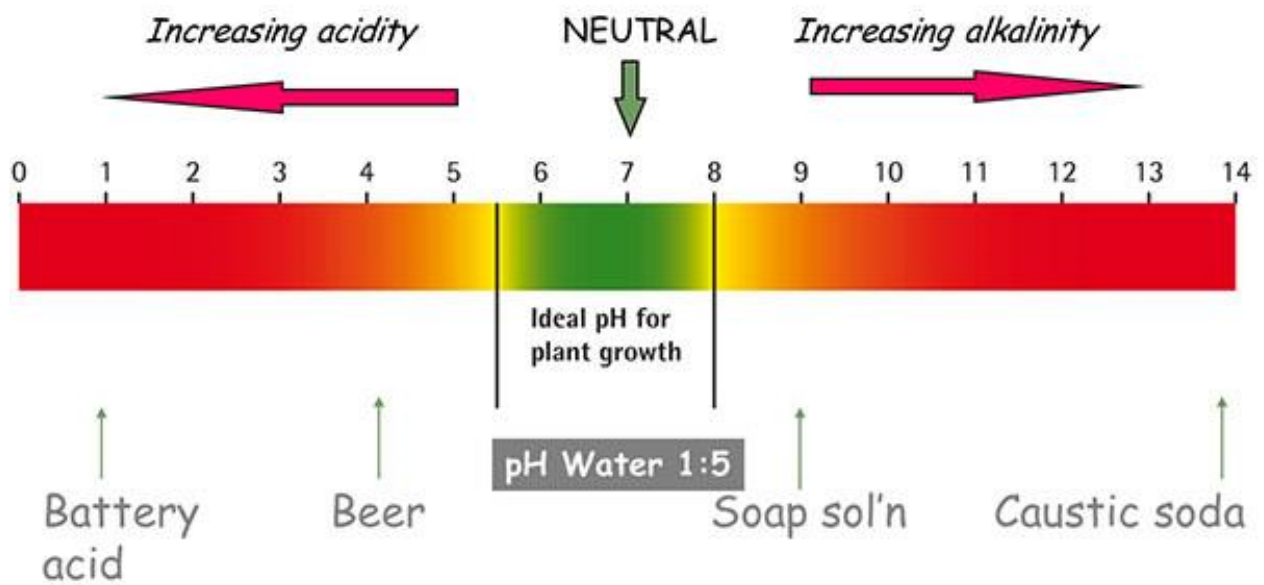


Figure 4: Soil pH Chart

APPENDIX 4: Pictures showing maize structures, planting up to harvesting



Figure 5: Maize plant with all parts



Figure 6: Different maize Varieties



Figure7: Land Preparation



Figure8: Planting



Figure9: Weeding



Figure10: Harvesting
