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**FACTORS INFLUENCING THE ADOPTION OF IMPROVED CASSAVA VARIETIES AMONG
SMALLHOLDER FARMERS IN ALIKUA SUB COUNTY**

BY

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22/U/5941

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**SPECIAL RESEARCH PROJECT REPORT SUBMITTED TO THE DEPARTMENT OF AGRIB
USINESS AND NATURAL RESOURCE ECONOMICS IN PARTIAL FULFILMENT OF THE R
EQUIREMENT FOR THE AWARD OF A DEGREE OF BACHELOR OF AGRIBUSINESS MAN
AGEMENT OF MAKERERE UNIVERSITY**

SEPTEMBER 2025



DECLARATION

I, Dawa Vivian, hereby declare that this special project report is my original work and has not been submitted for any academic award at any other institution of higher learning.

Signature 

Date.....23/09/2025.....

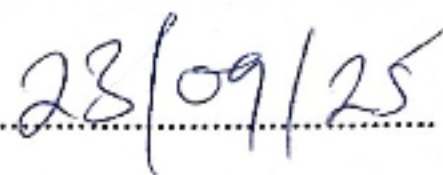
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APPROVAL

This project has been submitted to the Faculty of Agricultural and Environmental Sciences as partial fulfillment of the requirements for the degree of Agribusiness Management, with my approval.

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DEDICATION

This project is dedicated to my family for their unwavering support, encouragement and prayers throughout my academic journey, and to my friends and colleagues who stood by me.

I also dedicate this work to all smallholder farmers in Alikua Sub-County, Maracha District, whose experiences and insights made this study possible.

ACKNOWLEDGEMENT

First and foremost, I thank the almighty God for the gift of life, strength, and wisdom that enabled me to complete this work.

I sincerely express my gratitude to Prof. Elepu Gabriel for his invaluable guidance, support, and encouragement throughout this project. I also appreciate the Faculty of Agricultural and Environmental Sciences, Makerere University, for providing the necessary resources and an enabling environment for the successful completion of this work.

My heartfelt thanks go to the farmers of Alikua Sub-County, Maracha District for their cooperation and for sharing the information needed for this study. I am equally grateful to my colleagues and friends for their encouragement, advice, and moral support throughout the project.

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ACRONYMS/ABBREVIATIONS

CMD	Cassava Mosaic Disease
CBSD	Cassava Brown Streak Disease
NASE	National Agricultural Research Organization Series of Improved Cassava Varieties (NASE Series)
NAROCASS	National Root Crops Research Institute Cassava Series (NAROCASS Series)
SSA	Sub-Saharan Africa
UGX	Ugandan Shilling
UBOS	Uganda Bureau of Statistics
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries
DLG	District Local Government
PDLG	Participatory Development Local Government (Maracha District)
NARO	National Agricultural Research Organization
FAO	Food and Agriculture Organization
MSG	Monosodium Glutamate
CNp	Cyanogenic Potential
OR	Odds Ratio

ABSTRACT

This study assessed the adoption of improved cassava varieties, specifically the NASE and NAROCASS series, among smallholder farmers in Alikua Sub-County, Maracha District. The research study aimed to characterize the cassava production system, determine adoption levels, and identify factors influencing adoption. A cross-sectional survey was conducted with 75 farmers selected through purposive and random sampling. Data were collected using structured questionnaires and face-to-face interviews. Descriptive statistics summarized farmer demographics, farm characteristics, and adoption patterns, while Chi-square tests, correlation analysis, and binary logistic regression were used to examine relationships between adoption and socio-economic factors.

The findings revealed that 64.8% of farmers had adopted improved cassava varieties. Adopters were generally younger, more educated, and engaged in diversified income activities compared to non-adopters. On average, adopters cultivated more land (2.65 acres vs 2.14 acres), allocated more land to cassava (1.55 acres vs 1.03 acres), and achieved higher yields (395.87 kg vs 198.97 kg) with shorter maturity periods (11 months vs 12.1 months). Adoption was significantly associated with household size, landholding, cooperative membership, and access to extension services, while age had a marginal negative effect. Sex, marital status, education level, and farming experience were not significant determinants.

Farmers faced major challenges including pests and diseases, limited access to quality planting materials, land shortages, and poor agronomic knowledge, with additional constraints such as limited extension services, high input costs, and inadequate storage facilities.

The study concluded that household size, landholding, and access to institutional support strongly influenced adoption. It recommended strengthening cooperatives, improving access to quality planting materials, promoting labor management strategies, and addressing

sing land and economic constraints to enhance adoption and productivity.

CHAPTER ONE

INTRODUCTION

1.1 Background

Agriculture is important for achieving the development goals of alleviating poverty and improving food security. Stimulating agricultural growth, and thus reducing poverty and improving food security, primarily depends on the adoption of improved agricultural technologies, including improved cassava varieties (Khonje et al., 2015). Cassava is one of the most important food crops in Uganda (Abele, 2007). It is also the major root crop and is grown and consumed throughout the country (Zone et al., 2021). The production of the crop rank amongst the top eight in the continent (Abele, 2007). Consequently, the crop has graduated to constitute part of the 16 major food crops grown in the country according to the Uganda Census of Agriculture (UCA) 2008/09 (Zone et al., 2021). It is primarily grown as a subsistence crop although it is increasingly being transformed into a semi-commercial crop (Abele, 2007).

The northern region is the second largest producer of the crop accounting for 34% after the eastern region (Zone et al., 2021). However, its production in the region has been constrained by the two decades of civil war, poor weather, lack of quality planting material, poor management practices and pests and diseases (Zone et al., 2021). Most notable was the decline in production from 1988 to 1998, which was caused by a severe outbreak of the Cassava Mosaic Disease (CMD) in most parts of the country (Abele, 2007). To increase productivity, technology must be adopted in the production process and the rate of adoption of a new technology is subject to its profitability, degree of risk associated with it, capital requirements, agricultural policies and socioeconomic characteristics of farmers (Afolami et al., 2015). Therefore, in an effort to improve the livelihoods of rural households, the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF), through the National agricultural research organizational (NARO) and the National Crop Resources Research Institute (NaCRRI) released improved cassava varieties with several desirable attributes to boost the production of the small holder farmers. Among the varieties adapted and promo

ted were NASE14, NASE19 and NAROCAS1 (Zone et al., 2021).

However, the level of profitability the smallholder farmers attain from the improved cassava varieties varies from region to region. The Namulonge selected series (NASE 1-19) and the NAROCASS series are the focus of this study while some varieties within these series, such as, NASE 1 and NASE 3 have been in use for decades. Newer varieties like NASE 14, NASE 19, NAROCASS 1, reflect ongoing breeding efforts to respond to emerging challenges in cassava production. This study specifically emphasizes both the older, more established varieties and the newer introduction within these two series, to assess their adoption level, productivity, and impact among small holder farmers in Alikua sub county. The focus on both long standing and recent varieties is intended to provide a clearer understanding of how farmers perceive, adopt and benefit from improved cassava innovations over time.

1.2 Problem Statement

Despite the release and adoption of improved cassava varieties, the adoption level among small holder farmers in Alikua sub county remains inconsistent and relatively low. Many farmers continue to rely on traditional cassava varieties that are vulnerable to pests, diseases and low yields contributing to persistent income instability and food security. Although improved varieties are designed to provide higher resistance and better productivity, their actual performance and acceptance under smallholder conditions in the sub-county have not been sufficiently evaluated.

Adoption decisions are often influenced by farmers' perceptions of profitability, risk, and suitability to local conditions. Recent research indicates that factors such as access to extension services can improve adoption (Ssajjabbi et al., 2023), yet skepticism regarding the economic benefits and adaptability of these varieties continues to hinder widespread uptake.

Consequently, there is a lack of empirical evidence on the level of adoption, productivity, and constraints associated with improved cassava varieties in Alikua Sub County. This k

knowledge gap limits the design of effective interventions to enhance adoption, productivity, and ultimately the livelihoods and food security of smallholder farmers in the region.

1.3 Objectives of study

1.3.1 Main Objective

To assess the adoption of the improved cassava varieties (NASE and NAROCASS series) among small farmers in Alikua sub county, Maracha district.

1.3.2 Specific Objectives

1. To characterize cassava production system in Alikua sub county.
2. To determine the adoption of improved cassava varieties within Alikua sub county.
3. To determine the factors influencing adoption of improved cassava varieties by smallholder farmers in Alikua sub county.

1.4 Research hypotheses

1. There is a significant difference in the adoption rates of improved cassava varieties , farmers within Alikua sub county.
2. The improved cassava varieties generate a significantly higher proportion of produce compared to the traditional varieties.

1.5 Significance of the study

The study will provide baseline information about the importance of Nase and Narocass cassava varieties in the subcounty, the level of adoption and productivity of these improved cassava varieties, and the challenges affecting the adoption of this crop and the economic value of these improved varieties so that the information can be used by the farmers, local leaders, policy makers and the government at large to make decisions as well research institutions to disseminate suitable varieties and hence increasing the economic productivity of cassava.

1.6 Justification of the study

Cassava is a major staple and income crop in northern Uganda and West Nile region, yet adoption of improved varieties in Alikua sub county remains low and inconsistent. Identifying

ifying the production systems, adoption levels, and key factors influencing uptake will provide evidence-based insights for designing effective interventions.

The findings will help farmers improve productivity, guide policymakers in promoting appropriate technologies, and support research institutions in refining cassava breeding and dissemination strategies. Ultimately, the study contributes to food security, income generation, and improved rural livelihoods.

CHAPTER TWO

LITERATURE REVIEW

This chapter reviews the literature which is relevant to this study. The role of agricultural extension in rural development, and is important in terms of technological development, the adoption rates of improved cassava varieties, the productivity farmers attain from the improved varieties and the problems faced by farmers in the adoption are outlined in the final sections.

2.1 Production of cassava

The performance of smallholder farmers, especially in cassava commercialization, has been observed to be unsatisfactory with many opportunities still remaining untapped (Karuri et al., 2001). Smallholder farmers have been known to produce mainly food crops such as cereal, tubers and root crops largely associated with low level technology, inefficient use of resources and low level of commercialization. (Opondo, 2018). Cassava (*Manihot esculenta*, Cranz) is an important root crop for food security and income generation in Sub Saharan Africa (SSA) whose potential suits the poor and marginalized farming communities (Abaca et al., 2021). It is dominated by small holder farmers. The term smallholder farming has been extensively used by different researchers with different meanings. For example, Dixon et al. (2003), FAO (2004) and Wiggling (2009) summarized the concept as production based on small volumes, application of few resources and predominated by family labor. Traditional cash crops (cotton, coffee and tea) which were formerly the main source of income for the rural farmers of Uganda have declined in status in recent years because of a poor marketing system and unattractive prices. This has led to the emergence of cassava as the main source of income for over 60 percent of rural farmers who regard it as a 'new' cash crop in their farming systems (Opolot et al., 2022).

New high yielding varieties were released on the basis that they are relatively high yielding, resistant to Cassava Mosaic Disease (CMD) and low in Cyanogenic potential (CNp). It is also noteworthy that these varieties were found to be adaptable to various farming systems (Abele, 2007). In order to monitor the adoption of these varieties, Bua et al. (1999)

conducted a study, whose main objective was to evaluate the diffusion patterns and adoption levels of these varieties and to assess their impact on production and consumption of cassava and their study revealed that there is an increase in the adoption of the improved cassava varieties (Abele, 2007). However the yields from these varieties varies with different factors being advanced for these variations which could be attributed to both genetic and environmental factors (Abaca et al., 2021). Cassava production according to Uganda Bureau of Statistics report in 2020, has grown on 941,000 hectares across the country with an estimated annual production of 4.4million tonnes. It is mainly cultivated in the Eastern, Northern, western and central regions of Uganda. However, the largest production is concentrated in the Eastern and Northern regions, where cassava thrives due to the favourable climatic conditions (UBOS,2020). The Northern and west Nile region areas of the country are the major cassava producing area in Uganda.

2.2 Consumption of cassava

Cassava is consumed worldwide in several ways, both in unprocessed and processed forms. It is commonly consumed as fresh roots and flour for human consumption. Cassava is also consumed as dry chips and pellets for animal feeds, and it is used industrially for making alcohol, starch-based sweeteners, hydrogenated sweeteners, organic acids, and degradable plastics (Prakash, 2016; Olaiya et al., 2017). In addition, cassava leaves, which are rich in protein, are eaten as vegetables in many African countries, contributing to nutrition and food security. The crop is known for its ability to grow in poor soils and survive drought conditions, making it a vital food security crop in many developing countries.

Cassava plays an important role in the national diet and contributes a substantial proportion of the caloric requirements of the population. Peeled sweet cassava roots are eaten raw, boiled, fried, roasted or after drying and pounding, they are turned into a paste. Peeled bitter cassava are turned into flour after a solid-state fermentation process, or after steeping in water (wet fermentation) and subsequent sun-drying. Also boiling the whole pieces, immediately after soaking, occurs. Especially bitter cassava is preferred for brewing

local beer and distilling Waragi (a local gin) (Strategy, n.d.).

2.3 Adoption of improved cassava varieties

According to Ali, (2013) and Genius et al. (2014), access to extension services to positive ly impact on technological adoption and its diffusion (Genius et al., 2014). However, acc ess to agricultural extension alone may not fully explain the choices made by farmers to adopt improved cassava varieties and that there are other factors which include educatio n, experience and occupation of the farmers. (Ssajjabbi et al., 2023). A number of varieti es that were released and adopted by the farmers before 2015 including TME14, TME20 4 and NASE13 among others succumbed to Cassava mosaic disease and Cassava brow n streak disease (Okao-Okuja et al., 2017). (Ssajjabbi et al., 2023). Although yields from t hese varieties were high, the biggest challenge beforehand was limited knowledge on the extent to which these varieties were translating into improvement in farmers' income (Zo ne et al., 2021).

2.4 Economic benefits of cassava

Cassava comprises of several benefits which include the following: it is a Renewable En ergy Source; These carbohydrates can be used to produce ethanol. For example, Brazil h as vast areas of acidic, infertile soils that are currently underutilized. It is in these areas t hat very small amounts of cassava are grown as a substrate for grain alcohol productio n. Locally grown tree crops are used to fire the boilers for anhydrous ethanol production. With this system, net energy ratios (NER) are positive. This suggests that where liquid fu el is in short supply and where sources of non-liquid energy such as coal are available, c assava may indeed have a role to play. With currently available technology, 70% of the e nergy used in alcohol production from cassava is used in the industrial process, mainly i n the separation of alcohol from water (UWAOMA, 2017). As human food, cassava is co nsumed as a food directly as fresh cassava, or as moist cassava products based on fres h cassava, or as a series of dry cassava products. With the current increases in food pric es, particularly starchy cereal grains, there is an opportunity for cassava to gain importa nce as a food. It is likely that the opportunities will be greatest in those areas that current

ly import cereal grains, with emphasis on Africa, where cassava is well accepted as a food crop. Cassava is known as a famine reserve crop and rural food staple (Prakash, 2016). In terms of Industrial raw material, The rapid development and increased incomes in much of the developing world have been accompanied by an increased demand for starch for food and industrial use. Once again, the high prices of many other sources of starch suggest a major opportunity for marketing cassava starch. Some of these industrial products include Starch-based sweeteners, Hydrogenated sweeteners, Organic acids, Degradable plastics, Monosodium glutamate (MSG) and lysine (Fuglie et al., 2016).

2.5 Constraints of cassava production

Cassava production in sub-Saharan Africa, including Uganda faces multiple interlinked challenges that constrain both productivity and profitability. One of the most critical issues is the prevalence of cassava mosaic disease and brown streak disease both of which are viral infections transmitted by whiteflies and through infected planting Materials, causing leaf distortion, root necrosis, and significant yield reduction (Legg et al., 2011). The severity of these diseases is often exacerbated by the use of low-quality planting materials, as most small holder farmers continue to recycle diseased cuttings or rely on informal seed systems that do not guarantee clean or improved varieties (Okonya & Maass, 2014).

Compounding this issue is the lack of access to timely and adequate extension services, which limits farmers knowledge of disease management, improved agronomic practices and new technologies, thereby creating a gap between research innovations and field-level application (Adebayo, & Sangosina, 2005). In addition, soil fertility depletion due to continuous cultivation without replenishment, coupled with limited use of fertilizers and soil amendments, significantly reduces cassava productivity, especially on small plots of land that are already degraded (Ezui et al., 2016)

