MAKERERE UNIVERSITY

COLLEGE OF AGRICULTURAL AND ENVIRONMENTAL SCIENCES

SCHOOL OF AGRICULTURAL SCIENCES

FACTORS THAT AFFECT THE PROFITABILITY OF SESAME PRODUCTION AMONG SMALLHOLDER FARMERS IN KITGUM-MATIDI SUB-COUNTY, KITGUM DISTRICT

BY

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A SPECIAL PROJECT TENDERED TO THE DEPARTMENT OF AGRIBUSINESS AND NATURAL RESOURCE ECONOMICS IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF A BACHELOR'S DEGREE IN AGRIBUSINESS MANAGEMENT OF MAKERERE UNIVERSITY

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DECLARATION

I, **Mutebi Ronald**, declared that this special project report is my work, completed in fulfillment of the requirements for my bachelor's degree in Agribusiness Management. To the best of my knowledge, it holds no material previously published by another person nor material accepted for the award of any other degree of Makerere University or any other University, except where due acknowledgment has been made in the text.

Signature..... Date..29th/09/2025.....

APPROVAL

This special project report is to be submitted to Makerere University, School of Agricultural Sciences, for consideration with my approval as his supervisor.

Signed..... Date..29/09/25.....

DR. PAUL ASSETE

Department of Agribusiness and Natural Resource Economics

DEDICATION

This special project report is dedicated to God Almighty, friends, and my parents for their care and support rendered during my studies at Makerere University.

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I extend my thanks to the faculty of the Agricultural and Environmental Sciences department of Agribusiness and Natural Resource Economics at Makerere University for their academic support and resources that facilitated the successful completion of this study.

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LIST OF ABBREVIATIONS

UGX	Ugandan Shilling (Currency of Uganda)
ha	Hectare (Unit of area measurement, equal to 10,000 square meters)
ac	Acres
TVC	Total Variable Cost
KII	Key Informant Interview
FGD	Focus Group Discussion
N	Number (used to represent sample size or frequency)
%	Percentage
USD	United States Dollar
NGO	Non-Governmental Organization
ROI	Return on Investment
SD	Standard Deviation
PPE	Personal Protective Equipment
RT	Regression Table / Regression Coefficient

ABSTRACT

This study examined the factors affecting the profitability of sesame production among smallholder farmers in Kitgum-Matidi Sub-County, Kitgum District, Northern Uganda. Employing a cross-sectional descriptive design, data were collected from 76 sesame farmers using structured questionnaires, complemented by key informant interviews and focus group discussions. The total variable costs revealed labor as the largest expense (54.6%), followed by transportation (19.3%) and land hiring (15.6%). The average yield was 326 kg per acre with a gross farm income of 1,500,000 UGX and a gross profit margin of 877,000 UGX, demonstrating the profitability of sesame cultivation in the area. Regression analysis revealed that farm size, educational level, and access to extension services were significant positive determinants of profitability, highlighting that inadequate extension services harmed returns. The major challenges reported included inadequate extension services, price fluctuations, limited access to improved seed, and market-related constraints. The study recommended strengthening extension delivery, improving input accessibility, and enhancing market information systems to boost profitability among smallholder sesame farmers in Kitgum-Matidi.

CHAPTER ONE:
INTRODUCTION

1.0 Background

Sesame (Sesamum indicum L.) belongs to the family Pedaliaceae. Although the origin of sesame remains controversial, most accept that sesame was first domesticated in India, as evidenced by morphological and cytological affinities that exist between the domesticated sesame and the South Indian species Sesamum malabaricum. It is a predominantly self-pollinating crop. Sesame cultivation dates back some 5500 years in the Harappa valley of India. It is called the 'Queen of oil seeds' due to its high-quality polyunsaturated stable fatty acid, which restrains oxidative rancidity. Sesame is widely cultivated in the tropical and subtropical agroecologies of the world. The major production regions are Africa, Asia, Latin America, and Europe, with production shares of 59.05%, 36.47%, 4.22%, and 0.26%, respectively, during 2020. The global production area increased from 7.72 to 14.24 million ha during the last 21 years.

The increased sesame production was mainly attributed to the expansion of farmlands and the market value of sesame products (Teklu et al., 2022). In Africa, Sudan is the major sesame producer, followed by Nigeria, Somalia, Uganda, and Ethiopia. Sesame is the second export crop next to coffee in annual export, indicating the highest 14% of the total world export of the crop (Girmay, 2018). Sesame is a significant crop farmed in almost all nations in West and Central Africa, with Nigeria and Burkina Faso being the top producers. It serves as an alternative cash crop that generates income for smallholders, especially women.

In Uganda, sesame is the second oilseed crop after groundnuts, and over 80% of the crop is cultivated in the Northern and Eastern parts of the country, where it plays an important role in the local diet. The seeds can be processed into paste and oil and used as confectionery and medicinal ingredients. Sesame is mostly produced by smallholder farmers who contribute to the country's export of sesame seeds. Sesame has been grown since 1910 and is well-adopted in the farming communities of Uganda (Wacal et al., 2021).

Sesame is widely traded in local, regional, and international markets. In 2020, 2.4 million tons of sesame grain were traded globally, with a monetary value of 3.2 trillion USD. Likewise, sesame consumption is steadily increasing due to high demands related to its unique nutritional values, such as its higher contents of vitamins (e.g., A and E), minerals, fiber, desirable fatty acids, carbohydrates (~13.5%), and protein (~24%). Furthermore, population pressure, urbanization, and

the changing lifestyle have increased the global demand for sesame products. About 70% of the world's sesame seeds are processed to produce food oil, while the seedcake left after oil processing is used to prepare livestock meals. The global annual human consumption of sesame is about 65% and 35% in the form of processed food oil and grain, respectively(Teklu et al., 2022).

Sesame seed is used for a wide array of edible products in raw or roasted form, and also for industrial uses such as soaps, lubricants, lamp oil, and an ingredient in cosmetics, pharmaceutical uses, and animal feed. It contains a considerable amount of oil, proteins, carbohydrates, and essential minerals, a high amount of methionine and tryptophan, fibers, as well as secondary metabolites such as lignans, saponins, flavonoids, and phenolic compounds. Moreover, seeds are a good source of calcium, phosphorus, and iron and are rich in vitamins B, E, and a small amount of trace elements. Sesame oil has a pleasant, mild taste and is remarkably stable. It has a high content of polyunsaturated fatty acids, oleic, and linoleic acid. Sesame oil has excellent stability due to natural antioxidants, i.e., sesame, sesamolin, and sesamin (Myint et al., 2020)

The major constraints to sesame production and productivity are a lack of high yielding and locally adapted varieties, capsule shattering and seed loss, uneven maturity, biotic stresses (insect pests and diseases), abiotic stresses (e.g., drought, waterlogging, salinity, and frost), the use of traditional production technologies, and poor pre- and post-harvest infrastructure. Field insect pests cause a yield loss of 25% in sesame. The major insect pests of the sesame crop are webworm (Antigastra catalaunalis), gall midge (Asphondylia sesame), and seed bug (Elasmolomussordidus). The seed bug is both a field and a storage insect pest that causes up to 50% yield loss at storage. Moreover, most sesame varieties are attacked by diseases caused by bacteria (e.g., blight caused by Xanthomonas campestris pv. sesame), fungi (e.g., charcoal rot caused by Macrophomina phaseolina, stem anthracnose caused by Colletotrichum spp.), mildew (Erysiphe cichoracearum), and Fusarium wilt caused by Fusarium oxysporum fsp. Sesame fos and root rot (Rhizoctonia solani), and viruses (e.g., phyllody, Orosius albicinctus). Among the fungal diseases, charcoal rot is the most devastating disease of sesame caused by the soil-borne necrotrophic fungus Macrophomina phaseolina. This fungus causes pre- and post-emergence damage in more than 500 plant families, including sesame. Furthermore, Fusarium wilt is one of the most economically important soil-borne diseases of sesame globally, causing 15–30% 1yield loss. For instance, root rot caused by Rhizoctonia solani is one of the most damaging fungal diseases in Egypt.

Drought stress is the main yield-limiting constraint in sesame during the vegetative and flowering growth stages. Habibullah, M. (2018) reported that sesame is sensitive to waterlogging, salinity, and low-temperature conditions. Waterlogging leads to reduced plant growth, leaf axils per plant, biomass, net photosynthesis, and seed yield. Cultivation of sesame using varieties with indeterminate growth habits and that are susceptible to capsule shattering leads to a yield penalty. Globally, 99% of sesame varieties are susceptible to capsule shattering. Langham and Wiemers reported a 50% pre-harvest yield loss owing to capsule shattering and seed loss.

Sesame seed loss is common during pre-harvest (e.g., field crop stand) and post-harvest (e.g., harvesting, stacking, drying, threshing, transporting, storage, seed cleaning, and packaging). Pre- and post-harvest losses are the confounding factors of reduced yield and high market price in sesame production. Lack of access to post-harvest infrastructure and low and variable mark pre- and during harvest are among the critical challenges in sesame value chains.

1.1 Problem statement.

Sesame (Sesamum indicum L.) is a key cash crop cultivated extensively by smallholder farmers in Kitgum-Matidi sub-county, Kitgum District, Northern Uganda. It serves as an important source of household income, food security, and livelihood diversification (CASA Uganda, 2020). Despite its significance and the favorable agro-climatic conditions in the region, the profitability of sesame production among smallholder farmers remains highly variable and generally suboptimal.

The reason for focusing on profitability analysis in Kitgum is due to the district's high potential for sesame cultivation driven by suitable soils, climatic advantages, and increasing local and cross-border market demand (Hudak, 2021). However, challenges such as limited access to improved seed varieties, inadequate production inputs, pest and disease incidences, poor agronomic practices, lack of mechanization, and limited market integration substantially constrain profitability (Munyua, 2013),(Wacal et al., 2021).

Previous research in Uganda has primarily concentrated on sesame production volumes, yield trends, and export potentials, with limited in-depth analysis on the specific factors influencing profitability at the smallholder farm level (Munyua, 2013), (Hudak, 2021). There is a significant gap in understanding how agronomic, socio-economic, input use, and market-related factors collectively impact profit margins in the Kitgum-Matidi sub-county context.

This study thus aims to fill this gap by examining the determinants of profitability among smallholder sesame farmers in Kitgum-Matidi, analyzing the interaction between production costs,

adoption of improved technologies, access to extension services, scale of operation, and market participation. The findings will provide critical evidence to guide policies and interventions that enhance smallholder incomes through optimized sesame production practices and value chain improvements.

1.2 Research objectives

The general objective of this study was to assess the factors that affect the profitability of sesame production among smallholder farmers in Kitgum-Matidi sub-county, Kitgum district.

1.2.1 Specific Objectives

i. To determine the profitability of sesame production in Kitgum-Matidi sub-county, Kitgum district
ii. To evaluate factors affecting the profitability of sesame production in the Kitgum-Matidi sub-county, Kitgum district

1.2.2 Research Hypotheses

i. Inadequate extension services to the farmers in the Kitgum-Matidi sub-county, Kitgum district, are associated with low profitability in sesame production
ii. There is no significant relationship between the selected independent variables (farm size, age, feed cost, experience, access, extension services access, market information, price, etc.) and the profitability of sesame production among smallholder farmers in Kitgum-Matidi.

1.3 Scope of the Study

The study will focus on the profitability of sesame production, the factors affecting sesame production, and the challenges faced by smallholder farmers in Kitgum-Matidi sub-county, Kitgum district. This area is selected because the majority of smallholder farmers carry out sesame production. The study will be conducted in Kitgum-Matidi sub-county, Kitgum district in Northern Uganda. The research will be conducted over the past five years to provide an understanding of the profitability of sesame production, the factors affecting sesame production, and the challenges faced over time. The duration allocated for the research will allow analysis of recent data on the profitability of sesame production.

1.4 Significance and Justification of the Study.

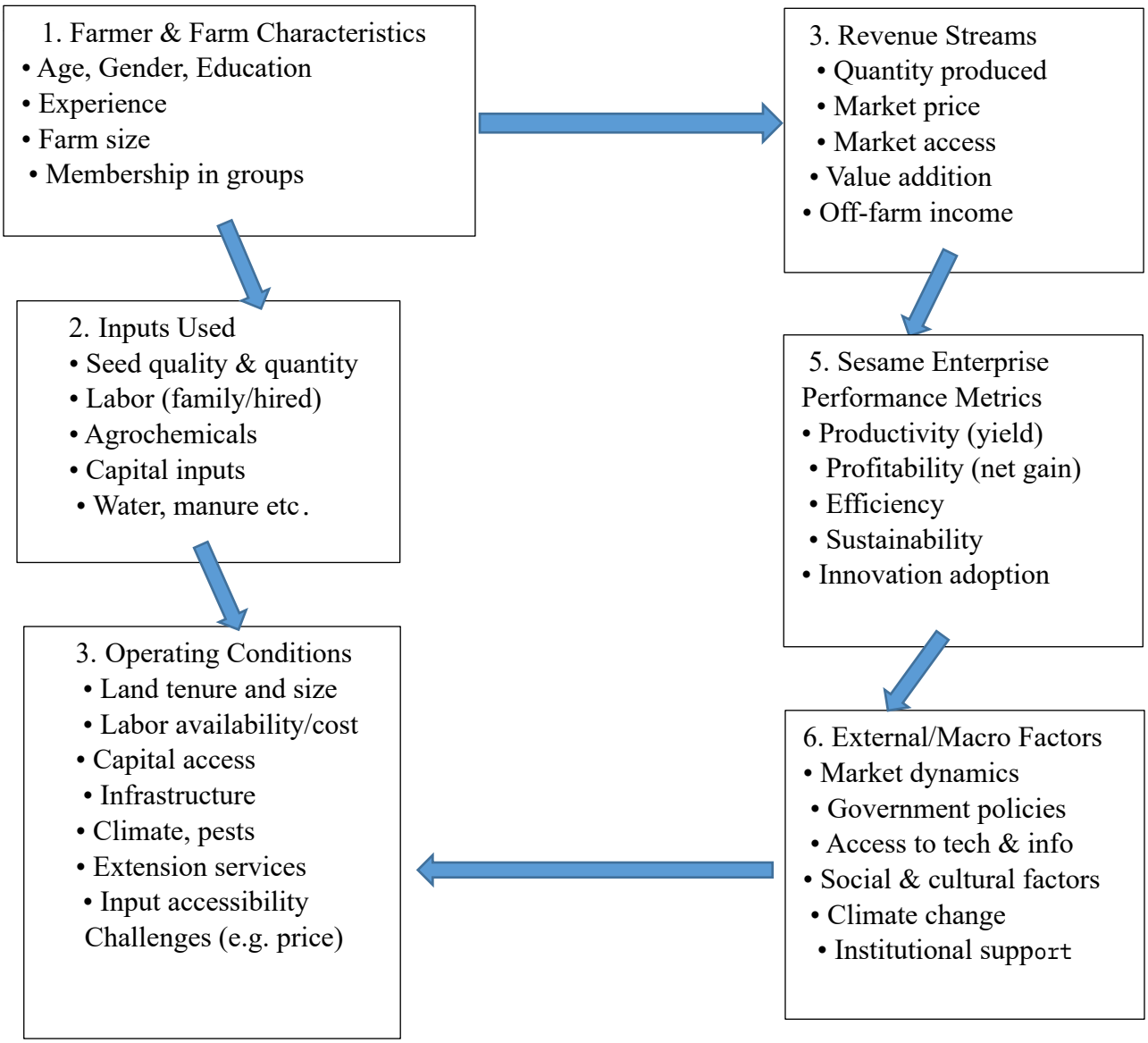
The information of the study will help smallholder farmers not only in Kitgum-Matidi sub-county but the whole Kitgum district in solving the problem that will exist in sesame production for a higher profit. When problems are addressed by planting high-yielding varieties and adopting new production technology, sesame farmers will realize higher returns from the production.

The local government and some development partners will use the study for correct decision-making, policies, and resource allocation to support the farmers in gaining stability in their production.

The study aims to provide the various ways through which profitability in sesame production can be increased not only within the Kitgum Matidi sub-county but also the whole Kitgum district to contribute to the achievement. With the restoration of peace in the region in 2006, initiatives to socially and economically stabilize the region were implemented. Considering that the majority of the households were engaged in agriculture, improved agricultural technologies, including seeds, pests, and disease control mechanisms, supported by training, have been provided to the populations. The collective bulking and marketing introduced in Kitgum district in 2012 was therefore aimed at supporting farmers to attain better markets for their products and enhance high incomes.

1.5 Conceptual framework

This illustrates the relationship between independent variables, mediating variables, and dependent variables of a research problem. This study investigates the profitability of sesame production in the Kitgum-Matidi sub-county and the whole Kitgum district. The study outlines the socioeconomic and institutional factors such as gender, education level, and income from the independent variables while institutional factors include training of farmers and financing of the farmer's production from the intervening variables while participation in the production from the dependent variables.



CHAPTER TWO:
LITERATURE REVIEW

2.0 Introduction

This chapter reviewed the literature on the profitability of sesame production among smallholder farmers.

2.1 Profitability of sesame production

Sesame is a significant crop farmed in almost all nations in West and Central Africa, with Nigeria and Burkina Faso being the top producers. It serves as an alternative cash crop that generates income for smallholders, especially women (UNCEF, 2016). Sesame seed demand is rising quickly worldwide, and West African sesame seed is particularly valued because it is produced largely without pesticides. Sesame has grown to be a significant agricultural export, affecting millions of farm households. Sesame cultivation has recently increased due to its drought resistance and easy growing circumstances, but most crucially due to farmers' need to diversify their sources of income. The need is brought on by climate change, which has worsened the agrarian environment, reduced the production of food crops (millet, sorghum, and maize), and decreased the production of the main cash crop (peanut).In addition to its economic, pharmaceutical, and food interests (Dossa et al., 2023).

Sesame is one of the most important commercial crops grown in Yobe State. It is reported that 85% of small-scale farmers in Yobe State are involved in sesame production, processing, and marketing in the area, which indicates the potential of the crop to uplift the living standard of all the actors involved in its production, marketing, and processing (Oladimeji et al., 2014). The international price of sesame has been on the rise as a result of the increasing demand for the product in most parts of the world. However, this increase in the price of the product is being upset by the ever-rising cost of the inputs in the nation, which in turn is reducing farmers' profits.

As a result of its high demand, any quantity of the product offered to the market is easily sold. This increasing demand for sesame seeds provides Nigeria with an opportunity to increase its production to meet the international demand for the commodity. The realization of the potential of sesame production in the acquisition of foreign currency for the country made crop production a prominent priority in Nigeria's agricultural sector(Jonah et al., 2020). Profitability measures the capability of farmers to cover their costs. It is defined as the total value of production less the total cost of production. The gross farm income is the total physical product per unit price of the product.

According to Olukosi and Erhabor (1988), the net farm income refers to the difference between the gross farm income and the total cost of production (fixed and variable costs).

Sesame is also an important element in crop rotation and intercropping for improved soil fertility and the potential for suppression of the parasitic weed (Wacal et al., 2024). Sesame has a high local demand, considering that it is a staple crop in Uganda. Small-scale dealers dominate the processing business. They produce pastes and press oil from sesame and sell it in local markets across Uganda, or sometimes sell seeds to bakeries in the confectionery industry. The growth of the livestock sector in Uganda presents a new market for sesame as animal feed (Hudak, T, 2021). Out of the 77% of sesame that reaches the market, 42% is exported, 10% is sold to urban consumers, and 25% to rural consumers.

2.2 Characteristics of Sesame Farmers

Sesame production in Uganda is highly undertaken in East and Northern Uganda, where 95% of the total sesame is produced. About 30,000 farmers cultivate the crop across numerous small plots (Fermont & Benson, 2011). The lack of improved varieties, poor agronomic practices, and severe weather conditions continue to affect sesame production (Umar, et al., 2020). Although the government attempts to improve its production through the provision of agricultural extension services and implementation of livelihood projects such as national agricultural advisory services, northern Uganda social action fund, and operation wealth creation, small-scale farmers also face considerable marketing problems, which are linked to both the quantity and quality of sesame produced. Middlemen have been linked with poor marketing outcomes for farmers. This consequently led to the integration of better marketing practices, including collective bulking and marketing (MAAIF, 2019).

Sesame farmers in Uganda are predominantly smallholder farmers who rely on traditional farming methods; that is, they operate on smaller plots of land, often less than 2 hectares, and usually use manual labor and basic tools like hand hoes and pangas, with limited access to mechanized equipment. Sesame is often intercropped with other crops like sorghum, millet, or groundnuts to maximize land use and reduce risks. Many farmers sell their produce to local traders or cooperatives, but they often struggle with fluctuating market prices and lack of direct access to larger markets. In most cases, women play a significant role in sesame farming, particularly in planting, weeding, and harvesting activities.

2.3 Factors that affect the profitability of Sesame production.

2.3.1 Limited access to prevailing market information: In terms of the Inability to strategically sell in time, that is, without up-to-date market information, sesame producers may sell their harvest during periods of low demand or when market prices are unfavorable. This results in reduced earnings, as they cannot capitalize on peak prices. It also leads to reduced bargaining power because they are more vulnerable to exploitation by buyers, middlemen, or brokers who may offer lower-than-market rates, eroding their potential income.

2.3.2 Poor infrastructure: For example, transportation Costs: Sesame is often grown in rural areas, and inadequate road networks make it difficult to transport sesame seeds to markets or processing facilities. Poor roads lead to higher transportation costs, delays, and even potential loss of produce during transit, reducing overall profits. Market accessibility is also limited or poorly maintained infrastructure that can restrict access to larger, more profitable markets. Farmers may be forced to sell their sesame locally at lower prices instead of reaching buyers who might pay more. In addition, the absence of proper storage infrastructure, such as warehouses or silos, can lead to post-harvest losses due to pests, spoilage, or poor weather conditions. This directly reduces the quantity of sesame available for sale.

2.3.3 Traditional production technology that lowers yields: Traditional farming methods often involve manual labor and limited use of improved seeds or fertilizers. This can result in lower crop yields than modern practices, directly affecting income potential. Post-Harvest Losses Due to the limited modern storage, drying, or processing technologies, traditional methods often result in significant post-harvest losses due to pests, spoilage, or contamination, reducing the amount of sesame available for sale. The reliance on manual labor for tasks such as planting, weeding, and harvesting can increase production costs. This is especially true if labor availability is scarce or expensive.

2.3.4 Limited Extension Services Lead to a Lack of Modern Techniques. Extension services play a vital role in training farmers on modern farming practices, such as the use of improved seed varieties, pest and disease management, and soil fertility enhancement. Without these services, sesame farmers may rely on outdated methods that result in lower yields and reduced profitability. It also reduces awareness of Market Trends; Extension services often provide farmers with information on current market trends, prices, and buyer preferences. In their absence, farmers may sell their sesame at unfavorable prices or miss opportunities to access more profitable markets.

2.4. Challenges faced by Sesame producers

2.4.1 Diseases and pests: The results showed that area harvested and sesame seed production significantly decreased between 2008 and 2018, basically due to several challenges in sesame production. One of the major production problems is pests and diseases. Sesame is prone to diseases and pests, which cause significant yield losses. Several diseases, such as Cercospora leaf spots, affect sesame yields in Uganda.

The decreasing seed production is also attributed to insect pests such as gall midge (Asphondylia sesami) and webworm (Antigastra catalaunalis), which have been noted to significantly reduce sesame seed yields. In the Northern part of Uganda, a total of 38 insect pest species were infesting sesame. Sesame webworm and sesame gall midge were noted as the major pests contributing to 62% and 98.8% of pest occurrences, respectively (Egonyu et al., 2005).

This indicates that the sesame yield could have been significantly decreased by pest damage, resulting in fewer harvestable seeds. For instance, the sesame webworm is responsible for an estimated 90% of yield losses due to pests in Uganda. In addition, there are postharvest pests, which decrease sesame seed quality during storage. The sesame seed bug (Elasmolomus sordidus) is a post-harvest pest that attacks the capsules and damages seeds during drying and storage by reducing the oil content.

2.4.2 Poor agronomic practices: The poor agronomic practices by farmers, such as late planting, broadcasting, lack of weeding, and lack of adoption of knowledge, lead to a decrease in sesame production. Although FAOSTAT showed average yields of 619 kg ha_1, the seed yield of sesame in Uganda is still far below the potential seed yield of 2000 kg ha_1 in sesame (Brigham, 1985). Nakyagaba et al. (2005) reported that the low sesame seed yield in Uganda is partly due to improper agronomic practices that include inappropriate fertilizer levels, poor planting methods involving broadcasting, and untimely weed management. For instance, a lack of weed control can result in low seed yield. The weeds compete with sesame for water, light, and nutrients.

However, when controlled at an early stage of sesame growth, yield is not affected. This is because weeds can be dangerous for sesame at seedling stages, but after sesame has formed a canopy, it tolerates and outcompetes weeds, which does not result in high yield losses (Langham, 2008)

2.4.3 Lack of access to affordable credit services: The low sesame production and yield are due to smallholders not being able to access and afford credit to implement farming activities. Credit is important for paying wages, hiring equipment, preparing land, and purchasing seeds and

fertilizers. This affects the timely implementation of agricultural farm operations. This has hindered most farmers from performing farming activities in time, thereby resulting into poor yields and low production.

For instance, the challenges of sesame production include a lack of equipment to prepare land, leading to late planting and inadequate labor for planting in rows, weeding, and harvesting (Munyua et al., 2013). If credit facilities to provide working capital and pay labor were available, these challenges would have been addressed to increase seed production.

2.4.4 Low-yielding varieties: Poor-yielding farmers' varieties could be another reason for poor production. These traditional varieties are characterized by low yield, late maturity, and a lack of resistance to pests and diseases. The low-yielding varieties from farmers could not meet the world sesame standard, and perhaps a varietal mixture of seeds rendered low quality, thereby affecting the export. However, the rise in the production of sesame could indicate that high-yielding varieties that are drought-tolerant and resistant to pests and diseases could have been adopted by sesame farmers in Uganda.

CHAPTER THREE:
METHODOLOGY

3.1 The study area

The study will be carried out in Kitgum-Matidi sub-county, Kitgum district. Kitgum District is located between Longitudes 320E and 340E and Latitudes 020N and 040N. The Republic of Southern Sudan borders it to the north, Karenga District to the east, Kotido District to the southeast, Agago District to the South, Pader District to the Southwest, and Lamwo District to the Northwest. Kitgum District has a total land area of 4,042 square kilometers.

3.2 Design of the study

This study employed a cross-sectional descriptive research design to investigate the factors influencing the profitability of sesame production among smallholder farmers in Kitgum-Matidi sub-county, Kitgum District. The research design was appropriate because it enabled the collection of data at a single point in time, providing an accurate snapshot of farmers' production practices, input use, revenues, challenges, and profitability outcomes. The study combined both quantitative and qualitative approaches to provide a comprehensive understanding of the profitability dynamics within the sesame farming enterprise.

3.3 Methods of data collection

A pre-tested structured questionnaire was administered to a sample of 76 smallholder sesame farming households drawn from Kitgum-Matidi sub-county. The questionnaire covered farmer demographics, farm characteristics, input utilization (such as seed, labor, agrochemicals), production practices, cost components, yields, access to extension services and market information, price realization, and perceived challenges. The use of a structured format ensured uniformity and comparability of response.

To complement the survey data, approximately 5 key informant interviews were conducted with agricultural extension officers, local leaders, and representatives of farmer organizations. These interviews provided qualitative insights into institutional support, prevalent challenges in sesame production, and market dynamics in the district

Relevant secondary data such as district agricultural reports, market price trends, and existing literature on sesame production in Northern Uganda were reviewed to contextualize and triangulate primary data findings.

3.4 Sample and sampling

Using the sample size formulation formula, a sample size of 76 farmers was captured. This was done by simple random selection in different villages like Pagwa Wilela within Kitgum Matidi sub-county, Kitgum district, to provide adequate and appropriate information concerning the factors that affect the profitability of sesame production. This is because the majority of households in Kitgum Matidi grow sesame for both consumption and sale.

$$n = N \div 1+N(e)^2$$

$$150 \div 1+150(e)^2$$

$$150 \div 1.96$$

$$n=76$$

Where N= population of sesame farmers in Kitgum Matidi sub-county, e= degree of precision, and n= expected sample size.

3.5 Data analysis

3.5.1 Determining the profitability of sesame production in Kitgum-Matidi sub-county, Kitgum district.

This was achieved with the use of Gross margin (GM) analysis

GM= TR-TVC…….. (1)

GPM= TR-TVC/TR*100

Where:

GM Gross Margin

GPM Gross Profit Margin (ugx/ac)

TR Total Revenue (ugx/ac)

TVC Total Variable Cost (ugx/ac)

3.5.2 Evaluating factors affecting the profitability of sesame production in Kitgum-Matidi sub-county, Kitgum district.

The study employed a multiple linear regression framework to analyze the determinants of sesame profitability among smallholder farmers in Kitgum-Matidi. The model is specified as:

$$Profit_i = \beta_0 + \beta_1 FarmSize_i + \beta_2 Age_i + \beta_3 inputCost_i + \beta_4 Experience_i + \beta_5 Org_i + \beta_6 ExtnAccess_i + \beta_7 MarketInfo_i + \beta_8 Price_i + \beta_9 ExtnInadequacy_i + \epsilon_i$$

Where $Profit_i$ (dependent variable) denotes the net profit of farmer i, and the explanatory variables(independent) represent farmer, production, and market characteristics hypothesized to influence profitability (e.g., farm size, age, input costs, experience, organizational membership, extension access, market information, price received, and extension service adequacy).

3.5.3 To examine the challenges smallholder farmers face in sesame production in Kitgum-Matidi sub-county, Kitgum district.

The analysis of challenges faced by smallholder sesame farmers in Kitgum-Matidi involved primarily descriptive statistical methods. After cleaning and coding the survey data, frequencies and percentages were calculated to determine the prevalence of each reported challenge, such as inadequate extension services, price fluctuations, limited access to improved seeds, and market information gaps. These were then ranked to identify the most critical constraints affecting sesame production in the study area. This overview provided a clear prioritization of production hurdles directly from farmer responses.

3.6 Research procedure

The research procedure is a systematic process that guides researchers through the various stages of conducting research.

The researcher began the research by developing a research concept note, which I then submitted to my allocated supervisor for approval of the topic. The letter from the project coordinator was then presented to the relevant authority seeking permission to conduct the study in their sub-county. During the research, the researcher provided them with clear information that all information collected through the questionnaires would be used solely for academic purposes and that the data obtained would be kept confidential. I got permission from the relevant authority, like Mr. Okeny Justine, the local councilor one 1 of Pagwa Wilela village, to allow me to get the data. I randomly gave out the questionnaires and sometimes interviewed them while making all the introductions and assured the respondents that the data collected would be treated with confidentiality and used only for academic purposes.

3.7 Ethical consideration

Ethical considerations are a set of principles that guide research designs and practices to ensure the protection of participants' rights, enhance research validity, and maintain scientific integrity. Participants were given awareness of the purpose of the study, after which those who were willing to participate were administered the questionnaires. The respondents were assured that all information and data collected from them are confidential material and will not be shared with any third party except for academic purposes of the study.

3.8 Limitations and delimitations

During this study, some respondents required an incentive inform of money or non-monetary to participate in the study. The researcher assured the respondents that the study is voluntary and that the researcher does not have the resources to provide them with what they desire. Limited literature review sources: The researcher faced problems in gathering relevant information about the study. This was due to a few studies that have been carried out about the findings of a researcher. However, the researcher solved this by looking for more secondary sources and supplementing it with the primary data to be collected from the field.

CHAPTER FOUR: RESULTS AND DISCUSSION

4.0 Introduction

This chapter presents and discusses the socio-demographic characteristics of sesame farmers, the profitability of sesame production, the factors that influenced profitability, and the challenges associated with sesame production in Kitgum-Matidi, Kitgum District.

Table 1: Socio-demographic information of sesame farmers.

Variable	Category	Frequency	Percentage (%)	Mean ± SD
Years of sesame production	-	-	-	8.7 ± 4.8
Acres of land cultivated last season	-	-	-	4.2 ± 3.0
Household members who can do farm work	-	-	-	6.3 ± 2.5
Age category	Youth	44	57.89	-
	Adults	32	42.11	-
Years spent at school	Primary	5	6.58	-
	Secondary	13	17.11	-
	Tertiary	58	76.32	-
Gender of respondent	Male	55	72.37	-
Source of funds	Personal savings	55	73.33	-
Secondary activities	Trading	45	59.21	-
Access to credit	None	43	56.58	-
Marital status	Married	46	60.53	-
Extension services	Attained	36	47.37	-
Association membership	Member	27	35.53	-

From **Table 1** above, farming experience showed that most of the respondents had a farming experience of 8.7years. Therefore, it could mean that sesame farmers in the study area are well experienced in sesame farming, and this depicts a good signal for higher profits. This finding agrees with that of (Abu et al., 2012a) in their analysis of costs and returns of sesame production in Nasarawa state: Implication for sustainable development in Nigeria, which reported that the average farming experience of sesame farmers was 12.8 and 15 years, respectively.

The average farm size cultivated in the study area was 4.2 acres. This implies that most of the farmers are on small-scale farming, leading to a hindrance to enjoying economies of scale. The larger the farm size of the household, the higher the expected level of output. According to Abu et al. (2012), in their analysis of the costs and returns of sesame production in Nasarawa State, small-scale farmers cultivate land ranging from 0.1 to 5.0 acres. Therefore, the majority of the respondents in the study area are classified as small-scale farmers. This may not encourage a mechanized system of farming and thus, production may continue to remain at a subsistent level.

Each household has, on average, 6.3 members capable of contributing to farm work, suggesting a potentially strong labor resource pool for their agricultural activities. It has been observed in the study area that the higher the number of household members who can do the farm work, the higher the amount of family labor as well as the size of land cultivated. These findings are in line with (Mekonnen et al., 2015), who researched the evaluation of the production efficiency and profitability of sesame production in Gwer East and Konshisha Local Government Areas of Benue State of Nigeria, and reported that an increase in household size increases the availability of family labor for farming operations.

The majority of respondents (57.89%) were classified as youth, while adults accounted for 42.11%, indicating higher involvement of younger individuals in sesame farming activities. This implies that they are predominantly economically productive young people. This findings agrees with those of (Abu et al. 2012) in their analysis of costs and returns of sesame production in Nasarawa state: implication for sustainable development in Nigeria reported that the most active farmers' age group engaged in agricultural production was within 21-60 years and are moved willing and able to take risk in expectation of profit more than the older ones.

Educational attainment was predominantly at the tertiary level (76.32%), with fewer respondents reporting primary (6.58%) or secondary (17.11%) education. This implies there is potential for increased sesame profit since education would enable farmers to have access to information on agricultural innovations. This finding aligns with the study by Kafando (2023), who investigated the impacts of Education and the Adoption of Improved Sesame Seeds on the Productivity of Sesame Farms in Burkina Faso. The study revealed that (78%) of the respondents had one form of education or another, which indicates that most of the respondents were literate. This high level of education may positively influence the adoption of improved agricultural practices.

The result on gender revealed that most of the respondents (72.37%) were male, implying that sesame production was dominated by males. This could be attributed partly to the fact that men have more physical strength compared to females; they engaged more in strenuous activities like ploughing, while females take part mostly in harrowing. This study coincides with(Christopher et al., 2024), who researched Male and Female Involvement in the Adoption of Improved Sesame Production Technologies in Ofu Local Government Area of Kogi State, Nigeria, reported that sesame farming was dominated by males rather than females.

Source of funds (Personal savings) at 73.33% indicates a high reliance on personal savings as capital. This aligns with data from Adole (2016), who studied the economic analysis of sesame production among the smallholder farmers in Benue state, Nigeria, and found that most of the sesame farmers get their source of income from savings, which carry 76% of the respondents in the study area. This shows that self-funding is the predominant source for small enterprises and farmers. The study also highlights the importance of savings for agricultural investment, although not always translating directly into increased yields, but enabling productive input use and smoothing consumption.

Secondary activities in the study area showed that trading was engaged in by most of the respondents (59.21%). This could mean that income from this activity could be used to supplement farm income to purchase inputs needed in the farming enterprise, which would lead to increased farmers' profits and support household income stability and investment capacity, as reported in surveys on informal sector livelihoods and rural smallholders.

The result indicates that 56.58% of the respondents in the study area had no access to credit to finance their sesame production activities. This implies that many smallholders and informal enterprises rely on personal savings or informal networks rather than formal credit, as formal credit access remains limited. The result is in line with (Dossa et al., 2023), who researched the economic analysis of sesame (Sesamum indicum L.) production in northern Benin, reported that 56.1% of the respondents had no access to credit in the study area.

Marital status of sesame farmers in the study area revealed that the majority (60.53%) of respondents were married. This is because married people have a lot of family responsibilities. The study is in line with Adole (2016), whose research on the economic analysis of sesame production among smallholder farmers in Benue state reported that 60% of the farming households were married.

The distribution of the sampled farmers based on the number of extension visits showed that 47.37% of sesame farmers in the study area had no access to extension services, indicating nearly half of the respondents had no access to extension services. This may have a negative influence on the adoption of improved sesame production technologies because contact with extension Agents exposes farmers to new technology and an improved variety of inputs, especially seed, which would help to increase farmers' output and hence higher profit. This is in line with (Fidelugwuowo et al, 2023), who reported that limited access to extension services to smallholder farmers was 78.9% in Benue state, leading them to the use of low-yielding crops and technology.

The result of membership in the association revealed that only 35.53% of respondents were in the association, meaning the majority of the sesame farmers do not participate in the cooperative association. This result implies that most of the sesame farmers in the study area did not enjoy the benefits of cooperative association, like pooling resources together for better expansion, management of resources, and profit maximization. This aligns (Dossa et al., 2023), whereby 34.5% of the respondents in Northern Uganda of the sesame farmers had participated in the association.

4.2 Profitability of sesame production

Table 2 presents the results of farm profitability analysis on various variable inputs employed in sesame production, such as seeds, labor, Cost of transport, pesticides, hiring land, and fertilizers.

Table 2: Factors of production

Factors	Mean	Standard deviation
Labor	335802.6	263568.9
Transport	119578.9	119511.3
Seeds per bag of 5kgs	22394.74	33727.57
Hiring land per acre	96585.66	131370.3
Pesticides per liter	38029.33	51341.04
Fertilizers per bag	5046.05	10772.24

Table 3: Gross Margin in Ugx per acre of sesame production

Items	Unit price (ugx)	Quantity per acre	Total Cost (ugx)	Percent
Gross income	4600		1500000	
Variable Cost				
Cost of labor	68000		340000	54.6
Cost of transport			120000	19.3
Cost of hiring land	97000		97000	15.6
Cost of seed	4600	5kgs	23000	3.7
Cost of pesticide	7600	5litres	38000	6.1
Cost of fertilizers			5000	0.8
Total Variable cost			623000	100
Net profit margin			877000	58.5
Average rate of return			1.4	

The analysis of variable costs for sesame production in Kitgum-Matidi revealed labor as the predominant expense, accounting for 54.6% of the total variable cost. This labor cost, estimated at 340,000 UGX per acre based on an average of 5 man-days valued at 68,000 UGX each, includes land preparation, planting, weeding, application of agrochemicals, harvesting, threshing, winnowing, and transportation. This finding aligns with Jonah et al. (2020), whose study in Yobe State, Nigeria, identified labor as constituting 45.1% of production costs, underscoring the labor-intensive nature of sesame farming in smallholder contexts.

Transportation costs in Kitgum-Matidi represented 19.3% of total variable costs (120,000 UGX per acre), substantially higher as a proportion compared to Jonah et al.'s (2020) Nigerian study, where transport only constituted 5.2% of costs. Similarly, the cost of hiring land was 97,000 UGX (15.6%), closely matching Jonah et al.'s report of 13.6%. The average pesticide use was five liters per acre, indicating potential overuse due to frequent pest incidences, contrasting with the 10 liters per acre reported by Jonah et al., who recorded a higher pesticide cost percentage (9.7%) compared to the lower proportion here. Fertilizer use was minimal (5,000 UGX, 0.8%), likely reflecting fertile soils in Kitgum-Matidi and underutilization, differing from Jonah et al.'s findings, where fertilizer application was substantially higher (100 kg/ac).

Regarding seed costs, Kitgum-Matidi farmers planted 5 kg/ac of sesame seed at 4,600 UGX per kg, totaling 23,000 UGX or about 3.7% of variable costs. This is considerably lower than the study by Abu et al. (2011) in Nasarawa State, Nigeria, where seed costs accounted for a larger share due to planting rates of approximately 15.78 kg/ac.

Yield analysis showed an average output of 326 kg per acre, with an average price of 4,600 UGX per kg, resulting in gross farm income of 1,500,000 UGX per acre. After accounting for the total variable cost of 623,000 UGX, the net profit margin stood at 877,000 UGX, indicating that sesame production in the area is profitable. The estimated average rate of return was 1.4times, meaning that for every Ugandan shilling invested, farmers receive a return of 1.4 times the total variable cost keeping other factors constant, which strongly supports the potential economic benefit of expanding sesame cultivation in Kitgum-Matidi. These results highlight significant differences in cost structure and profitability compared to similar studies, reflecting localized input practices, pest pressures, and market conditions.

4.3 Factors influencing the profitability of sesame production

Table 4 presents factors influencing sesame farmers in Kitgum-Matidi sub-county, Kitgum district.

The regression results showed that farm size had a positive and significant effect on income (p=0.002) at 95% confidence level, with each additional hectare associated with an increase of about 369,502 UGX, highlighting the need to promote access to land through leasing or cooperative ownership. However, this contradicts the findings by (Abu et al., 2012b)**,** who found that farm size had no significant relationship with profitability in sesame production. To address the positive impact of farm size on income, it is recommended to promote farmers' access to land through leasing arrangements or cooperative ownership, for example, by facilitating group land leasing, shared ownership schemes, or access to underutilized public land.

Access to extension services was also significant (p=0.027) at the 95% confidence level, where farmers having access to extension services earned more due to access to private advisory services by 1,906,333 UGX, indicating the importance of improving public extension delivery for all farmers. This finding corroborates the study by (Rukwe et al., 2020), which highlighted inadequate access to extension services as one of the constraints to profitability in sesame production. To address the positive impact of access to extension services on income, it is recommended to strengthen public extension delivery by increasing the number of extension officers, providing farmer training programs, and facilitating access to private advisory services.

Education level showed that farmers with informal education earned significantly more than those with formal education by 2,137,350 UGX (p=0.003), possibly reflecting the value of practical, hands-on skills and experience over classroom-based learning in this agricultural context. This is consistent with the findings by **(Gwandi et al.)** Who found out that education had a negative and statistically significant effect on the profitability of sesame production. To leverage the benefits of practical skills, it is recommended to promote hands-on training and farmer field schools, allowing farmers, regardless of formal education level to gain experience and improve productivity.

Table 4: Factors influencing the profitability of sesame production

Variables	Coefficient	Standard Error	p-value
Farm size (acres)	369,501.80	115,422.9	0.002
Age	46,368.21	27,054.0	0.091
Organization membership: Yes	448,185.70	658,329.7	0.498
Access to market information: Yes	394,088.40	650,728.9	0.547
Access to extension services: Yes	1,906,333.00	845,716.5	0.027
Education level: Informal education	2,137,350.00	687,273.5	0.003
Gender: Male	412,282.30	733,281.0	0.576
Poor infrastructure (storage): Yes	-1,221,415.00	763,479.8	0.114

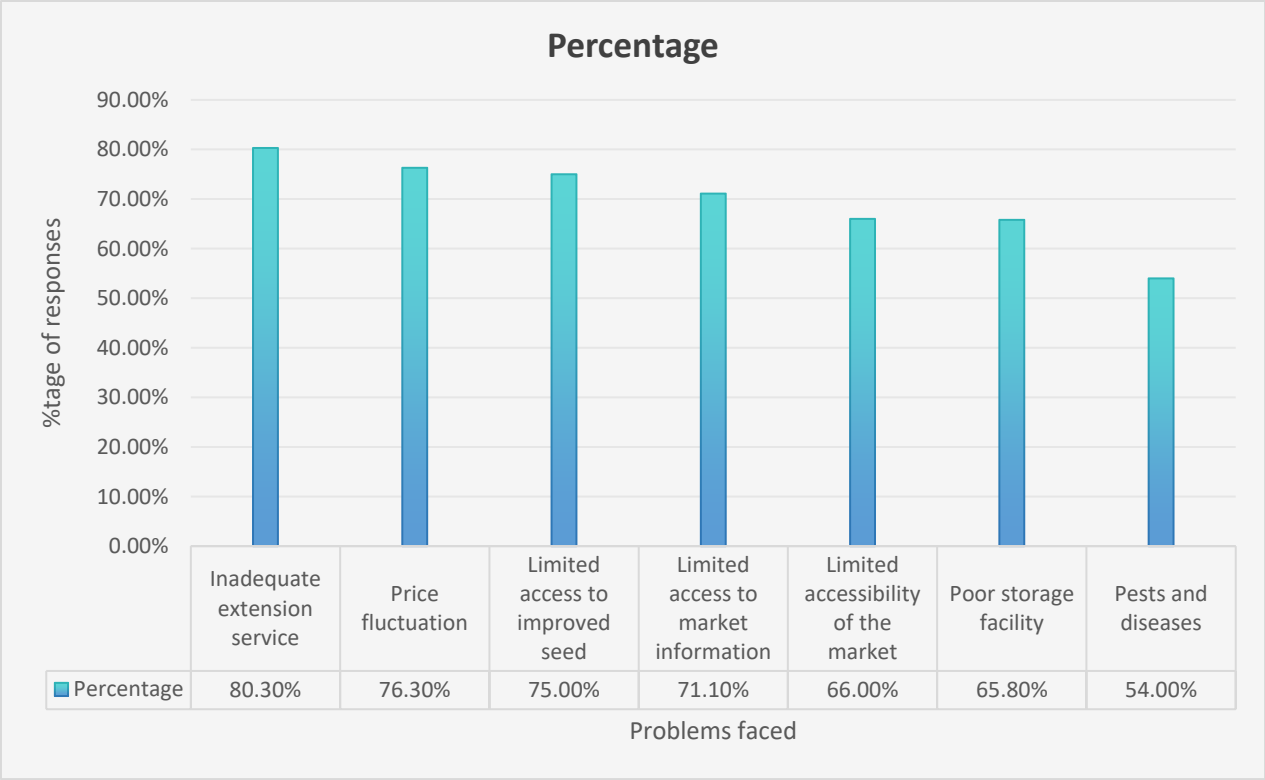
4.4 Challenges associated with sesame production in the study area.

Table 4 presents challenges faced by sesame farmers in Kitgum-Matidi sub-county, Kitgum district. The major challenges faced by sesame farmers were: limited access to credit facilities, low-yielding varieties, pests and diseases, price fluctuations, inadequate funding, inadequate extension services, and poor storage facilities.

Table 4: Challenges associated with sesame production

Variables	Frequency	Percentage	Rank
Inadequate extension service	61	80.30	1st
Price fluctuation	58	76.30	2nd
Limited access to improved seed	57	75.00	3rd
Limited access to market information	54	71.10	4th
Limited accessibility of the market	51	66.00	5th
Poor storage facility	50	65.80%	6th
Pests and diseases	41	54.00%	7th

Figure 2: The challenges facing sesame farmers.



According to the findings, 75% of the farmers in Kitgum-Matidi sub-county, Kitgum district, have limited access to improved seeds. Because of this, their sesame crops produce low yields. Using old or low-quality seeds leads to poor harvests, causing losses for the farmers. This finding is in line with (Ocholiet al 2015), who researched gross margin analysis and resource use efficiency in sesame production among smallholder farmers in Benue State, Nigeria. 40.9% of the sesame farmers had a scarcity of the improved seed as their problem in sesame production, which was ranked 8th out of numerous problems in the sesame production. These farmers mentioned that they plant seeds saved from their last harvest, which is not very reliable. Inadequately improved seed can lead to low farm produce, which in turn reduces the profit of the farmers in the study area.

About 76.3% of the respondents faced a challenge of price fluctuation in Kitgum-Matidi sub-county, Kitgum district. This led to a loss at the end of the year for the farmers, and it was ranked 2nd among the challenges in the study area. The result matches with(Magino et al., 2004), who researched the profitability of sorghum-legume cropping among households in eastern Uganda. The result found that poor market price was the problem faced, and it affected 46.8% of the farmers in the study area. This results in low profits for the farmers.

Poor storage is a significant challenge for sesame farmers in Kitgum-Matidi sub-county, with about 65.8% of farmers reporting it as a problem, ranking it as the 6th major issue in their farming activities. This means that more than half of the sesame farmers struggle to properly store their harvested sesame seeds, which leads to several difficulties. This is in line with (Koitilio et al 2022) conducted research on sesame production characteristics and challenges in western Kenya. The result shows that 43% of the sesame farmers had poor storage facilities in their sesame production. Poor storage facilities sometimes lead to post-harvest losses of farm produce, which reduces the profit of the farmers.

About 80.3% of the farmers agreed that inadequate extension services are their main problem in sesame production, which was ranked 1st. this means that the majority of sesame farmers in Kitgum-Matidi sub-county, Kitgum district lack adequate extension services, which makes them continue with the local technology and use poor-yielding variety crops, leading to low farm profit. This is in line with (Babu, 2018) researched the challenges and opportunities of sesame farmers in Tigray Regional State, Ethiopia, where the problem accounted for 60.5% of the sesame farmers' problems. This could be because of poor roads and accommodation, which make it hard for the extension service workers to reach different villages.

The problem of pests and diseases was also mentioned in the study area. This had 54% ranked, 7th among the challenges faced by sesame farmers in Kitgum-Matidi sub-county, Kitgum district. Farmers can control these pests and diseases by sowing disease-resistant varieties and the use of recommended agrochemicals for applications. This matches with the study by (Jonah et al., 2020) researched the analysis of profitability of sesame production in Yobe State, Nigeria. Pest and diseases was a challenge, constituting 66.1% of the overall problems of the sesame farmers. This implies that sesame farmers in the study area were faced with pest and disease infestation, which led to a reduction in the quantity and quality of sesame, thereby reducing farmers' profit.

Limited access to prevailing market information was also the major problem faced by farmers in the study area, with 71.1% of the farmers agreeing, ranked as 4th among the challenges. This implies that farmers have limited ideas of what is ongoing in the sesame market, especially about the pricing of sesame. This is in line with the study of (Siswasih, 2007), who researched on sesame market chain analysis: the case of Metema Woreda, North Gondar Zone, Amhara National Regional State, where about 64.5% of the respondents in the area were affected by inadequate

access to prevailing market information. This results in low profit for the farmers, which disorganizes the farmers' budgeting for the year.

According to the findings, 66% of the respondents had a challenge with accessibility to the market and ranked it as the 5th. This could be because of the poor marram road leading to high transport costs, causing the middlemen to over-exploit farmers, hence low profits to farmers. This is in line with (Wacal et al., 2021), who researched on Analysis of sesame seed production and export trends; challenges and strategies towards increasing production in Uganda, and the problem of accessibility to the market because of poor roads was rated at 68% among the challenges faced by sesame farmers in Uganda.

CHAPTER FIVE:
SUMMARY, CONCLUSION, AND RECOMMENDATION

5.0 Introduction

This chapter presents a summary of the key findings, a conclusion, and recommendations for the entire study and the area for further studies.

5.1 Summary of the study findings

According to the findings, males dominated the female respondents in Kitgum-Matidi sub-county, Kitgum district. The findings also indicate that most of the sesame farmers are between 29-46 years old, which gives a good significance to the farm output. The Study also indicates that most of the farmers are married. The study showed that most of the respondents were relatively educated since most of them attained the basic educational level.

Most of the sesame farmers had household members who could do farm work. Most sesame farmers had good experience in sesame production. Personal saving was the major source of funds for the sesame farmers in Kitgum-Matidi sub-county, Kitgum district. The primary occupation of the sesame farmers was found to be farming. The study also showed that farmers had low access to extension services, few were members of an association, and had limited access to credit. According to the study, the more acres of land, the more profit from the sesame, and they move relatively longer distances looking for the sesame market.

According to the findings on the profitability of sesame production in Kitgum-Matidi sub-county, Kitgum district, farmers incur more costs of production in paying for the workers in the garden, the high cost of transportation to the sesame market since they are not near the market, and the relatively high cost of hiring the land. They also incur relatively high costs in purchasing fertilizers and pesticides. Sesame production in the study area is profitable since they get profits at the end of the sesame production period. The main factors that influence farmers' participation in sesame production were better prices resulting in high revenue and relatively good roads. Gender also influences sesame production since the majority were physically strong males. Age also contributes to the sesame production since elderly people know the best time for planting and weeding better than the young ones. Good selling price and relatively higher educational level also influence sesame production.

According to the findings on the challenges facing the sesame farmers in Kitgum-Matidi sub-county, Kitgum district, limited access to extension services was the major challenge. Price fluctuation, relatively poor storage facilities, and exploitation by middlemen are among the challenges facing sesame farmers in Kitgum-Matidi sub-county, Kitgum district. Pests and diseases, and the use of low-yielding crop varieties, were also recorded as challenges in the study area.

5.2 Conclusion

Sesame production in Kitgum-Matidi sub-county, Kitgum district, is profitable since farmers realized more than what they invested in the sesame production. Thus, sesame farming helped in increasing the farm income of the farmers.

Variable cost of production carried the highest proportion of the total cost, whereby labor consumed the largest proportion of the expenses on variable inputs.

A lot of factors influenced the net farm income obtained from sesame production. Whereas limited access to extension services has a significantly negative influence, age, access to market information, price, farm size, and educational level had a significant influence and a positive relationship with the net farm income.

Numerous challenges, such as poor storage facilities, pests and diseases, price fluctuation, and inadequate extension services, harm sesame production in Kitgum-Matidi sub-county, Kitgum district of which, if it is addressed adequately, could help in improving sesame production, thereby increasing their incomes, hence leading to the improvement of the standard of living of the sesame farmers.

5.3 Recommendations

Enhancement of Farm Sizes and Land Management. Efforts should be made to facilitate access to more land or optimize the use of existing land parcels among smallholder farmers to increase scale economies and profitability.

Strengthening agricultural extension services. Given the pronounced negative effect of inadequate extension, government and development partners must prioritize improving the quality, frequency, and reach of extension programs focusing on best agronomic practices, pest and disease management, and input efficiency.

Improving market information systems. Establishing reliable, timely, and accessible platforms for disseminating market prices and demand trends, potentially leveraging mobile technology, can empower farmers to make informed sales decisions, yielding better profits.

Input cost management and efficiency. Programs targeting reduction and more efficient use of inputs, especially feed and pesticides, through subsidies, input supply chain improvements, or training on integrated pest management are critical.

Support price stability and market access. Mechanisms such as farmer cooperatives, contract farming, or market regulation could stabilize prices and facilitate better market access, protecting smallholders from price volatility.

Capacity building for older farmers. Given the negative association between age and profitability, targeted initiatives to update farming skills among older farmers could help bridge knowledge and technology adoption gaps.

5.4 Areas for further studies

More research should be conducted to further find ways of improving sesame production in Kitgum-Matidi sub-county, Kitgum district.

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APPENDICES

Appendix A: Research Questionnaire

My name is **MUTEBI RONALD**, and I am a bachelor's student of Agribusiness Management studying at Makerere University. I am researching "The profitability of Sesame (Simsim) production among the smallholder farmers in Kitgum-Matidi sub-county, Kitgum district as part of my academic requirement. The purpose of this study is to analyze the economic viability, challenges, and prospects in simsim farming towards improving decision-making and profitability among smallholder farmers. You have been randomly selected as a sesame farmer to provide information or knowledge regarding its profitability. Your support is much appreciated, and the responses will be kept confidential and for educational use only. Your time and cooperation are appreciated a lot.

SECTION A: Socio-demographic information

For this section, please tick the boxes beside and write where it is indicated for you to write where applicable.

1. Name of the respondent and contact (optional)…….

2. Gender of the respondent

☐ Male

☐ Female

3. Age of the respondent……..

4. What is the highest level of education completed by a respondent?

☐ Primary level

☐ Secondary level

☐ Diploma level

☐ Degree level

5. What is your marital status?

☐ Single

☐ Married

☐ Divorced

☐ Widowed

6. How long have you been involved in sesame production .....?

7. Are you a member of any Farmers' cooperative or farming group?

☐ Yes

☐ No

8. How many household members can provide labor in agricultural activities .....?

9. Do you have access to extension services?

☐ Yes

☐ No

10. Do you have access to credit?

☐ Yes

☐ No

11. How many hectares/acres did you cultivate last season…….

12. What is your average seasonal harvest for sesame in Kg?

13. What is the average selling price for the sesame in Ugx?

14. What is your source of income?

☐ Personal saving

☐ Credit

☐ Loan

☐ Gift

SECTION B: Profitability of Sesame Production last year

15. How much are your labor expenses on sesame production (Ugx)……...

16. How much are your transportation expenses on sesame production (Ugx)…….

17. How much did you spend on pesticides last season (Ugx)……

18. How much are your expenses on hiring land for sesame production (Ugx)…….

19. How much are your expenses on herbicide last season (Ugx)……...

20. How much are your expenses on seeds for sesame production last season (Ugx) ……

21. How much were your fertilizer expenses on sesame production last season (Ugx) …….

22. What do you use as the post-harvest handling equipment?

☐ Store

☐ Sacks

☐ Others (specify)

SECTION C: Sesame production challenges

23. What financial challenges do you face as a sesame farmer…….

24. What production challenges do you face as a sesame farmer?

☐ Pests and diseases

☐ Limited access to the prevailing market information

☐ Lack of access to affordable credit services

☐ Limited access to improved seed varieties

☐ Limited accessibility to the market

☐ Price fluctuations

☐ Limited access to good storage facilities

☐ Irregular extension services

25. Do you have any other type of activities apart from sesame farming?

☐ Yes

☐ No

26. What are your additional comments on sesame profitability …….

Appendix B: Analysis Output

Model	2.2639e+14	8	2.8299e+13	Prob > F	= 0.0005
Residual	4.5991e+14	67	6.8643e+12	R-squared	= 0.3299
				Adj R-squared	= 0.2499
Total	6.8630e+14	75	9.1506e+12	Root MSE	= 2.6e+06

Income	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
acres	369501.8	115422.9	3.20	0.002	139116.8	599886.8
age	46368.21	27054	1.71	0.091	-7631.812	100368.2
Organizationmembership						
Yes	448185.7	658329.7	0.68	0.498	-865845.9	1762217
Linformation						
Yes	394088.4	650728.9	0.61	0.547	-904771.9	1692949
services						
Yes	1906333	845716.5	2.25	0.027	218275.5	3594390
Educationallevel						
Informal education	2137350	687273.5	3.11	0.003	765546	3509153
gender						
Male	412282.3	733281	0.56	0.576	-1051353	1875917
storage						
Yes	-1221415	763479.8	-1.60	0.114	-2745327	302497.1
_cons	-2076077	1425085	-1.46	0.150	-4920558	768405

1.storage

	dy/dx	Delta-method Std. Err.	t	P>|t|	[95% Conf.	Interval]
acres	369501.8	115422.9	3.20	0.002	139116.8	599886.8
age	46368.21	27054	1.71	0.091	-7631.812	100368.2
Organizationmembership						
Yes	448185.7	658329.7	0.68	0.498	-865845.9	1762217
Linformation						
Yes	394088.4	650728.9	0.61	0.547	-904771.9	1692949
services						
Yes	1906333	845716.5	2.25	0.027	218275.5	3594390
Educationallevel						
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storage						
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