FACTORS INFLUENCING ONION PRODUCTION IN BUWABWALA SUB- COUNTY, NAMISINDWA DISTRICT

BY

WAKOLI ANTHONY

BU/UP/2021/3578

A RESEARCH REPORT SUBMITTED TO THE FACULTY OF SCIENCE AND EDUCATION IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE IN SCIENCE EDUCATION AGRICULTURE DOUBLE MAIN OF BUSITEMA UNIVERSITY

AUGUST, 2024

DECLARATION

I Wakoli Anthony, hereby declare that this research report is my own original work and it has never been submitted to any university or institution of higher learning for any academic award of a degree or diploma.

Signature..... **Date**.5/09/2024.....

APPROVAL

This is to certify that this research report was written under my supervision and it's now ready for submission with my approval.

Signature ..... Date 5/9/2024

Dr. JOHN JAMES OKIROR

Supervisor

DEDICATION

I dedicate this research report to my beloved parents Mr. Patrick Lutukayi, Mrs. Kibone Robinah and brother Kutosi Rogers. s

ACKNOWLEDGEMENT

I acknowledge my supervisor Mr. Okirori for his advice, and encouragement towards the writing of this research report.

I also acknowledge my beloved parents Mr. Patrick Lutukayi, Mrs. Kibone Robinah and brother Kutosi Rogers for their encouragement.

I also acknowledge the respondents of Buwabwala Sub- County, Namisindwa District who provided me with the necessary information which has led to completion of this research report.

I would like to thank my lovely friends for their support and care while at the institute.

TABLE OF CONTENTS

LIST OF TABLES

ABSTRACT

The study sought to establish the challenges that farmers are facing in onion production in Buwabwala Sub- County, Namisindwa District. The study was guided by specific research objectives which included describing the state of onion production, finding out the factors limiting production and determining the factors that facilitate production in Buwabwala Sub-County, Namisindwa District.

The study used descriptive survey design and a case study was Buwabwala Sub- County, Namisindwa District. The study used simple random sampling and purposive sampling during research study. The study used a sample size of 50 respondents in the research. The study used both quantitative and qualitative design. It employed questionnaires and data was analysed using statistical package for social sciences (SPSS).

The findings revealed that onion production has generally increased over time due to advancements in agricultural technologies, improved crop varieties, and expanding global demand, onion production is influenced by various factors, including soil fertility, water availability, temperature, sunlight, and pest management, onion producers often face challenges such as unpredictable weather conditions, pests, and diseases that can impact crop yields. Besides, the study showed that shortage of skilled labor impact production capabilities, limited access to raw materials directly affects onion production output, technological limitations play a significant role in restricting production capacity, inadequate infrastructure hinder the production process, environmental regulations limit onion production activities and market demand is a limiting factor in onion production. In addition, the findings show that efficient resource allocation important for facilitating production, technological advancements help in improving production processes, skilled labor contribute to increased production output, maintaining good infrastructure play a crucial role in facilitating production, and stable economic conditions encourage.

The researcher recommends that educating farmers on proper harvesting techniques, curing, and storage practices to minimize losses and maintain onion quality.

CHAPTER ONE: INTRODUCTION

1.1. Introduction

The study was carried out Buwabwala Sub-County is a local government administrative unit in Namisindwa District, Eastern Uganda. It is located approximately 20 kilometers (12 mi), by road, north-east of Namisindwa Town Council, where the district headquarters are located. The coordinates of the sub-county are: 01°03'24.0"N, 34°22'30.0"E (Latitude: 1.056667; Longitude: 34.375000).

1.2. Background

Islam et.al (2017) revealed that the origin of onions can be traced back to Central Asia and the Middle East, where they have been cultivated for thousands of years. The oldest known evidence of onion cultivation comes from archaeological site in the Kopet Dag region of Turkmenistan, which dates back around 7000 years. From there, onions spread throughout the ancient world, being grown by the Egyptians, Greeks, Romans, and other civilizations. onion is widely used as a condiment to enhance the flavor of food. Almost all spicy dishes contain onion as one of the important ingredient used for culinary purposes. People consider it as an indispensable part of human diet. It is a rich source of several minerals and vitamins. Onion is also considerably important in the daily Ethiopian diet for the preparation of traditional foods. Some of the plant parts are edible, the bulbs and the lower section of stem are the most popular as a seasoning or a vegetable in stews.

Mamiro et.al (2018) stated that in the United States, onions were first introduced by early European settlers, who brought them over from their homelands. Onions quickly became an important crop, with the first commercial onion farm established in New York State in the late 1800s. Today, the United States is one of the largest producers of onions in the world, with California, Texas, and Washington State being the top three onion-producing states.

Miruts, Beshir, and Ejersa (2021) stated that worldwide, bulb onion is the third most important vegetable crop after tomato and watermelon. The world leading onion producing countries in

order of importance are China, India, U.S., Turkey, Russia, Japan, Iran, Netherlands, Mexico and Spain. The main onion producing countries in Africa include Egypt, Morocco, Niger, Kenya, Tanzania and Ghana in that order. The world leading onion exporting countries in order of importance are India, Netherlands, China, Egypt and U.S. Among the main onion exporting countries in Africa are Egypt, Tanzania, Morocco and Niger.

Necola (2020) said that the use of appropriate agronomic management has an undoubted contribution to increased crop yields. One of the major problems to onion production is improper agronomic practice used by farmers. The optimum level of any agronomic practice such as plant population, planting date, harvesting date, and fertilizer of the crop varies with environment, purpose of the crop and cultivar. Optimum plant spacing and nitrogen recommendations have been formulated for onion particularly in the Rift Valley region of Ethiopia, which is double row spacing of 10 cm between plants and 20 cm between rows and application of 46 kg N ha and 92 kg PO ha. However, these recommendations cannot be directly adopted for the soil and growing conditions of the Central Zone of Tigray, which are different from the conditions in the Rift Valley region. This means that, it is very difficult to give general recommendations that can be applicable to the different agro-ecological zone.

Ravichandra (2019) Onion was introduced to the agricultural community of Ethiopia in the early 1970s when foreigners brought it in. Though shallots are traditional crop in Ethiopia, onions are becoming more widely grown in recent years. Currently, the crop is produced in different parts of the country for local consumption and for export of flowers to European markets. The average annual sale of dry bulb and cut flowers from Ethiopian Fruit enterprise alone was estimated to be about 6.2 million birr. In the year 2001 the crop shared one fourth of the vegetable export quantities and stood third following green beans and peas contributing about 20% of the total vegetable export value which is about 244,000 US dollar of export earnings. In addition to dry bulb, onion cut flower also constitutes significant proportion of foreign export values. In between the years 1999-2001 alone, about 1.75 million birr worth cut flower stems were exported. This indicates that Ethiopia has high potential to benefit from onion production. In recent years the demand for onion increased for its high bulb yield, seed and flower production potential. The establishment of state owned enterprises contributed substantially to the increase in the production and expansion of area under onion in the country with limited amount of seed

production experiences. Onion seed production depends on the cultivar, location, growing season and adequate plant protection measures (Lemma and Shimelis, 2022:3).

Mishra et.al (2018) indicated that in Africa, Onion was introduced to the agricultural community of Ethiopia in the early 1970s when foreigners brought it in. Currently, the crop is produced in different countries for local consumption and for export of flowers to European markets. The average annual sale of dry bulb and cut flowers from Ethiopian Fruit enterprise alone was estimated to be about 6.2 millions (Ethiopian fruit and vegetable marketing , 1998). In the year 2001 the crop shared one fourth of the vegetable export quantities and stood third following green beans and peas contributing about 20% of the total vegetable export value which is about 244,000 US dollar of export earnings. In addition to dry bulb, onion cut flower also constitutes significant proportion of foreign export values. In between the years 1999-2001 alone, about 1.75 millions worth cut flower stems were exported.

In Kenya, dry onion is the third most important vegetable crop for the domestic market, after brassicas and tomato. It is also an important source of income for small holder farmers and business community involved in the local and cross border trade (Kimani et al., 1990). They are grown in a wide range of agro-ecological zones, ranging from sea level to the upper highland areas below 2,000 m above sea level (USAID-Kenya, 2020). The main growing areas include Central, Rift valley, Western and Eastern Provinces of Kenya (Kimani et al., 1990).

Tanzania is another major producer of onions in East Africa, with an annual production of around 150,000 metric tons. Like Kenya, most onions produced in Tanzania are consumed domestically, but some are also exported to other regional markets. Onion production in Tanzania is primarily carried out by small-scale farmers, who often face challenges such as limited access to credit, inputs, and technology. The main onion-producing regions in Tanzania include the northern regions of Dar Es Salaam, Tanga, and Kilimanjaro. Tanzanian farmers produce onions in the midst of various pests and with few varieties which their reaction to pests of economic importance is not understood. In this regard, a baseline survey was carried out to establish the information known to farmers on onion production, pests and pest management. Onions are one of the most widely cultivated crops in Uganda, with a total area of 120,000 hectares under cultivation. The crop is grown mainly for local consumption and export to

neighboring countries. In this report, we will provide an overview of the current status of onion production in Uganda, including its history, climate requirements, varieties, planting seasons, pests and diseases, harvesting, processing, marketing, and future prospects.

Bua, Owiny, and Akasairi, (2017) stated that data from the Ugandan Ministry of Agriculture, Animal Industry and Fisheries (MAAIF), onion production in the country has been steadily increasing over the years. In 2019, Uganda produced approximately 345,000 metric tons of onions, up from around 268,000 metric tons in 2015. This represents an increase of about 29% within five years. Uganda produces around 100,000 metric tons of onions per year, with the majority being consumed within the country. Onion production in Uganda is largely done by small-scale farmers, who often struggle with issues such as low yields, poor post-harvest handling, and limited market access. The main onion-producing areas in Uganda are located in the eastern part of the country, particularly in the districts of Mbale, Soroti, and Jinja.

Buwabwala Sub-County, located in Namisindwa District, is known for its favorable climate and fertile soils that support various agricultural activities. One of the crops that thrive well in this area is onions, which are grown by many smallholder farmers. However, the production of onions in Buwabwala faces several challenges that affect the quantity and quality of the crop. This report highlights the current status of onion production in Buwabwala Sub-County and identifies the major constraints faced by farmers. Onion production in Buwabwala Sub-County has been increasing over the past few years due to the growing demand for the crop both locally and regionally. According to data from the Namisindwa District Agricultural Office, the total acreage under onion cultivation has increased from 500 acres in 2018 to 700 acres in 2022. The majority of the farmers who grow onions in Buwabwala are smallholders who cultivate less than two acres of land each. It’s upon this background that the researcher intends to investigate the the challenges that farmers are facing in onion production in Buwabwala Sub- County, Namisindwa District.

1.3. Problem Statement

Dessalegn and Akliu (2022) indicated that Onion production has the potential to contribute significantly to the economic development of Namisindwa district. Onions are a high-value crop, and their cultivation can provide a stable source of income for farmers. Successful onion production can attract investments, create job opportunities, and improve the overall economic well-being of the district, important food crop and a staple in many cuisines, benefit from established trade routes and transport networks, making it easier to distribute onions to local, regional, and international markets, contribute to soil improvement, nutrient-rich and offer various health benefits. Amang the farmers little is known that onion production can improve there well being and also bring development in the area

Despite this growth, Onion farmers in Buwabwala Sub- County, Namisindwa District struggle with limited access to quality seeds, inadequate irrigation infrastructure, pests and diseases, insufficient knowledge of modern farming techniques, and a lack of organized market linkages. These challenges collectively result in low yields, inconsistent quality, and limited profitability for onion producers in the district, limited use of improved seedlings, lack of proper storage facilities, leading to post-harvest losses.

1.4. General Objective of the Study

The general objective of the study was to determine the challenges that farmers are facing in onion production in Buwabwala Sub- County, Namisindwa District.

1.5. Objectives of the Study

i. To describe the state of onion production in Buwabwala Sub- County, Namisindwa District
ii. To find out the factors limiting production in Buwabwala Sub- County, Namisindwa District
iii. To determine the factors that facilitates production in Buwabwala Sub- County, Namisindwa District

1.6. Research Questions

i. Describe the state of onion production in Buwabwala Sub- County, Namisindwa District?
ii. What are the factors limiting production in Buwabwala Sub- County, Namisindwa District?
iii. What are the factors that facilitate production in Buwabwala Sub- County, Namisindwa District?

1.7. Scope of the Study

This section covered content scope, geographical scope and time scope as explained below;

1.7.1. Content Scope

The study generally focused on assessing the Challenges that farmers face in Onion Production in Buwabwala Sub- County, Namisindwa District, with specific focus describing the state of onion production, finding out the factors limiting and determining the factors that facilitates production.

1.7.2. Geographical scope

The study was conducted in Buwabwala Sub County; it is one of the six (15) sub counties which make Namisindwa district. Buwabwala Sub County comprise of 9 parishes and 49 villages with an estimated population of 7,379 people with a total number of households 1,343 (UBOS, 2018). Buwabwala Sub County is bordered by Magale Sub County on the East and North, while on the West and South is bordered by Bukiabi Sub county and Lwakhakha town council respectively. It is located about a distance of 43 km from Mbale town by road. The study was conducted in selected maize gardens across the 9 parishes of Buwabwala Sub County. The main economic activities in Buwabwala Sub County in general include crop and livestock farming and trade. Maize is the leading crop enterprises produced by the farmers in Buwabwala Sub County. The rationale for choosing this area is based on the researcher's three (3) years field experience in this Sub County working with farmers besides being one of the sub-counties that was seriously hit by the fall armyworm in the year 2017.

1.7.3. Time Scope

The study will determine the information about the topic under study for a period of three (3) years from 2021-2023.

1.8. Significance of the Study

Farmers' are not always adopting the newly introduced technologies that come to them from any extension organization as it is. They try to evaluate according to its match with their social, environment and economic importance. So understanding these factors is important for the scientists to develop and generate agricultural technologies, which suits to the current conditions of farmers. Policy makers too will benefit from the research output since they require micro level information to formulate and revise policies and strategies.

Thus the study assumed to produce very important information related to farmers' variety evaluation criteria and factors influencing adoption of improved onion production package in the study area. Finally, the information produced from this study is expected to be of some value for technology generators, extension agents and policy makers.

A study on onion production can help identify factors that affect yield and quality, such as soil type, climate, irrigation methods, and fertilizer application. This knowledge can be used to optimize growing conditions, improve yields, and enhance the quality of onions produced.

Studying different varieties, farmers can choose the most suitable ones for their region, soil, and market requirements, ultimately leading to better profitability and customer satisfaction.

A study on onion production can focus on identifying ways to minimize these losses through improved storage facilities, handling practices, and logistics management.

The study may emphasize sustainable agricultural practices, such as organic farming, conservation agriculture, or precision agriculture, which can reduce environmental impact while maintaining productivity and profitability.

The findings from a study on onion production can inform policy decisions related to agriculture, trade, and food security. Policymakers can use this information to create conducive environments

for onion production, processing, and trade, ultimately benefiting farmers, consumers, and the overall economy.

CHAPTER TWO: LITERATURE REVIEW

2.0. Introduction

This chapter covered literature in relation to research objectives and topics as explained below;

2.1. The state of onion production

Onions grow well in well-drained, friable silty or sandy loam soils with high level of organic matter and good water holding capacity (KARI, 2006). A soil pH range of 6.0 to 6.5 is ideal. Periodic soil fertility evaluation through soil sampling and testing is usually an important practice as the results are used as a guide in the application of manures and fertilizers.

Land preparation is an important initial operation in growing of any crop. During land preparation it is important to eradicate all the weeds. Effective weed control often has been more difficult to obtain in onions than in many other crops because the crop grows more slowly and therefore is less competitive than weeds. Herbicide options are also more limited in onions compared with other row crops (Culpepper, 2002).

Onions are grown either by broadcasting, which is the easiest way (Hassan and Malik, 2002) or by transplanting, which results in good yield (Hassan and Malik, 2001 b). In Kenya onions are mainly propagated by transplants raised in nursery beds (KARI, 2006). Transplanting is usually done in rows. The cultivation of onions in rows has a positive impact on yields up to certain limits (Malik, 2005)

The spacing of a crop is determined by many factors including the fertility levels of a given soil. It is important to use the recommended spacing of a crop in order to have the correct plant density or population. In Kenya, the recommended optimum inter-row and intra-row spacing of onions is 30 cm and 8-10 cm respectively (KARI, 2006). Malik (2005) reported that an inter-row spacing of 25-30cm with 20 cm between plants was the best combination for transplanted onion for minimizing thrips densities and for the highest yield in the Balochistan province of Pakistan.

Onions grow best in fertile well drained soils. Use of inorganic fertilizers and organic manures is a recommended practice in crop production. Fertilizers boost the growing of crops by providing essential plant nutrients and also improving the physical and chemical conditions of a given soil (KARI, 2006; USAID-Kenya, 2020). Onions are heavy feeders and require more fertilizer than is used in most vegetable crops (Boyhan et al., 2002). However, indiscriminate use of inorganic fertilizers may lead to soil infertility by immobilizing certain essential plant nutrients and also altering the pH of the soil thus affecting the availability and proportion of beneficial soil micro-flora and micro-fauna. Fertilizer application should, therefore, always be guided by recent soil sampling and testing (KARI, 2006; USAID-Kenya, 2020).

Weed control is an unavoidable operation for successful production of vegetable crops including onions. Weed control is one of the most important production practices in farm management (Aness, 1994). Production losses increase with weeds infestation. Such losses may arise mainly from the competition between crops and weeds for light, water, space and nutrients. Weeds compete with crop plants more at very early growth stages (Jilani et al., 2022). Usually, farmers do not weed early enough to prevent major damages due to this competition (Defoer and Nieuwkoop, 1991). The weed problem is becoming worse in irrigated areas where cropping intensity is rapidly increasing and weed management through cultivation practices has become a challenge. The fixed crop rotation has encouraged the establishment of permanent weed flora, with large seed reserves in the soil (Anonymous, 1998). Because of slow growth, small stature, shallow roots, and lack of dense foliage cover, onion seedlings cannot withstand competition with weeds (Appleby, 1996).

Onion crop has a shallow root system and needs frequent irrigation after short intervals especially during the first three months after transplanting. The crop cannot, therefore, withstand any prolonged drought without sacrificing yield and quality. Field experiments carried out to evaluate the effects of irrigation intervals on growth and yield of onion varieties Swat-1 and Phulkara indicated that five days irrigation interval was appropriate for proper survival and growth of onion seedlings (Khan et al., 2005). Prolonged frequent irrigation during the maturation stage of the crop may promote the formation of double bulbs which are of low marketable quality. It may also lower shelf-life of onion bulbs in storage (Culpepper, 2002).

Thrips are the major pests of onion, garlic and leek in Kenya (Singh, 1983). The stage of growth when an infestation occurs seems to determine the extent of yield loss. In onions, it appears that early and late-season infestations diminish yields less than those occurring in mid-season during the bulbing stage (Fournier et al., 1995). In a survey conducted in onion growing areas in Kenya, many farmers perceived onion pests and diseases as the most serious production impendiments (Waiganjo, 2004). Some of common diseases attacking onions include: Downy mildew, Purple blotch, fungal and bacterial bulb rot and Damping off disease (Boyhan et al., 2002; Regina Seeds, 2004; Waiganjo, 2004; KARI, 2006; USAID-Kenya, 2020). Some of the chemicals registered in Kenya for the control of onion diseases include Dithane M45 (Mancozeb), Equation PRO (Famoxadine and Cymoxanil), Alietle 80 WP (Fosetyl- Aluminium), Milraz WP 76 (Propineb and Cymoxanil), Milthane Super (Mancozeb), Penncozeb (Mancozeb) and Vondozeb 75 DG (Mancozeb) (KARI- Thika, 2006).

Quality is the most important factor when producing a marketable product. Onion quality is greatly influenced by the practices adopted during and after harvesting. Careful handling of onions to avoid external and internal damage during post-harvest activities is necessary (Boyhan et al., 2002). Onions should be harvested at optimum maturity. Harvest maturity is reached when 20-50% of pseudo-stems lodge. Harvesting may be carried out manually or by use of machines in mechanized farms (Boyhan et al., 2002). To ensure maximum quality and extend their shelf-life, onions should be properly cured. Curing may be done naturally or artificially. Artificial curing is better since man is able to control conditions that promote the process (Boyhan et al., 2002).

2.2. The factors limiting onion production

The onion (Allium cepa L.) is a globally cultivated vegetable crop belonging to the Amaryllidaceae family. It is widely used as a flavoring agent and plays a significant role in culinary practices across various cultures. However, onion production faces several challenges due to a range of limiting factors. Understanding these constraints is crucial for farmers, researchers, and policymakers to implement effective strategies for sustainable onion production. This literature review aims to provide an overview of the key factors that limit onion production and suggest potential approaches to overcome these challenges.

Drought stress is one of the major constraints on onion production worldwide. Onions are sensitive to water deficits during the bulb initiation and bulbing stages, which can lead to reduced bulb size and quality (Singh et al., 2020). Drought conditions can also increase the incidence of onion bulb diseases, such as pink root and Fusarium basal rot (El-Sawy et al., 2021). To mitigate drought stress, farmers can adopt water-saving irrigation techniques, such as drip irrigation or sprinkler systems, which deliver water directly to the root zone of the plants (Farzadfar et al., 2020). Additionally, the use of drought-tolerant onion varieties, such as those with deeper root systems, can enhance the crop's resilience to water scarcity (Singh et al., 2020).

Soil salinity is another significant challenge in onion production, particularly in arid and semi-arid regions where irrigation is common. High salt concentrations in the soil can impair onion growth, reduce bulb yield, and affect the crop's quality (Yuan et al., 2022). To address salinity stress, strategies such as leaching excess salts from the root zone, using salt-tolerant onion varieties, and implementing proper soil management practices can be employed (Yuan et al., 2022).

Onions are considered a cool-season crop and perform optimally within a specific temperature range. Extreme temperatures, including heat stress and freezing temperatures, can negatively impact onion growth and bulb development (Kaya et al., 2019). Heat stress can cause premature bulbing, reduced bulb size, and increased pungency (Kaya et al., 2019). On the other hand, freezing temperatures can damage onion plants, leading to reduced yields (Ekinci and Efe, 2016). To mitigate temperature stress, farmers can adjust planting dates, use row covers or shade nets, and select temperature-resistant onion varieties (Kaya et al., 2019).

Onions have specific nutrient requirements, and deficiencies in essential elements such as nitrogen, phosphorus, potassium, sulfur, and calcium can limit onion production (Kader and Ali, 2021). For instance, nitrogen deficiency can result in reduced bulb size and lower yields, while sulfur deficiency can affect the flavor and pungency of the onions (Kader and Ali, 2021). To overcome nutrient deficiencies, farmers should conduct regular soil tests and apply appropriate fertilizers based on the specific needs of the onion crop (Kader and Ali, 2021).

Onion pests, such as thrips, onion maggots, and bulb mites, can cause significant damage to the crop, leading to reduced yields and decreased marketability *(Kumar et al.*, 2020). Thrips are a

major concern as they transmit viruses that can severely affect onion plants (Kumar et al., 2020). Integrated pest management (IPM) strategies, including biological control, cultural practices, and the use of resistant varieties, are crucial for effective pest management (Kumar et al., 2020).

Onion crops are susceptible to various diseases caused by fungi, bacteria, and viruses. Some of the most common onion diseases include pink root, Fusarium basal rot, downy mildew, and bacterial rot (El-Sawy et al., 2021). These diseases can result in significant yield losses and affect the quality of the harvested onions. To manage onion diseases, farmers should implement cultural practices such as crop rotation, use disease-resistant varieties, and apply appropriate fungicides or bactericides when necessary (El-Sawy et al., 2021).

Weed competition is a significant challenge in onion production, as weeds can reduce onion growth, bulb size, and yield (Kaya et al., 2020). Effective weed management strategies include the use of mulch, mechanical weeding, and the application of selective herbicides (Kaya et al., 2020).

Smallholder farmers, particularly in developing countries, often lack access to improved onion varieties that are high-yielding, disease-resistant, and adapted to local growing conditions (Hailu et al., 2019). This limits their ability to maximize onion production and can contribute to food insecurity. Efforts to improve the availability and accessibility of improved onion varieties, through breeding programs and seed distribution networks, are essential to address this constraint.

In many onion-producing regions, inadequate infrastructure, such as poor road networks, limited storage facilities, and insufficient access to irrigation systems, hinders the efficient production and marketing of onions (Hailu et al., 2019). These challenges increase production costs, reduce the quality of the harvested onions, and limit farmers' access to markets. Investments in rural infrastructure development are necessary to overcome these constraints and support sustainable onion production.

Fluctuating market prices, lack of market information, and limited access to markets are additional factors that can discourage farmers from investing in onion production (Hailu et al.,

2019). Establishing stable markets, providing timely market information, and improving transportation networks can help address these challenges.

The enhancement of onion production and productivity can be related to different growth factors. Onion dry bulb production depends on nutrient requirements, location of production, variety, soil type, agronomic practices etc. Thus, research should be undertaken to determine specific application rates for individual fields since it is important to avoid over fertilization with nitrogen or phosphorus, as this will contribute to increased pest attacks and stimulation of succulent growth that may predispose the plant to damage by field or storage pathogens Ware and McCollum (1980). On the other hand, under fertilization should also be avoided lest low yield and quality of the crop are obtained.

The use of appropriate agronomic management has an undoubted contribution to increased crop yields. One of the major problems to onion production is improper agronomic practice used by farmers. The optimum level of any agronomic practice such as plant population, planting date, harvesting date, and fertilizer of the crop varies with environment, purpose of the crop and cultivar. Optimum plant spacing and nitrogen recommendations have been formulated for onion particularly in the Rift Valley region of Ethiopia, which is double row spacing of 10 cm between plants and 20 cm between rows and application of 46 kg N ha-1 and 92 kg P2O5 ha-1 (Lemma and Shimeles, 2022; Nikus and Mulugeta, 2010). However, these recommendations cannot be directly adopted for the soil and growing conditions of the Central Zone of Tigray, which are different from the conditions in the Rift Valley region. This means that, it is very difficult to give general recommendations that can be applicable to the different agro-ecological zone (Upper Awash Agro-Industry Enterprise, 2001). Therefore, to optimize onion productivity in the study area, a specific package of recommendation of nitrogen fertilizer and plant spacing is required (Gupta et al., 1994; Lemma and Shimeles, 2022).

2.3. The factors that facilitates onion production

The management of insect pests usually utilizes integrated strategies to maintain pests at acceptable levels. Integrated Pest Management (IPM) is an ecologically based pest control strategy that relies heavily on natural mortality factors and seeks out controls that disrupt these factors as little as possible. The aim of integrated pest management is not to eliminate all pests since some are tolerable and essential so that their natural enemies remain in the crop. Rather, the goal is to maintain pest populations below levels that can cause economic damage. Economic damage is the amount of injury which will justify the cost of artificial control measures (Stern et al, 1959).

Integrated pest management programmes are based on a number of principles. These include: the biology of the thrips and the damage caused, the spatial distribution of the pest within and between plants, the influence of host plant resistance on thrips biology, the importance of natural enemies in regulating thrips populations, the importance of cultural and physical control options and the utility of chemical control options (Parrella and Lewis, 1997).

Biological control is the use of any biological agent to reduce insect pest populations. Natural enemies of insect pests also referred to as biological control agents include predators, parasitoids and pathogens. Predators are free-living organisms that consume a large number of preys during their life time. Parasitoids are organisms whose immature stages develop on or within a single insect host, finally killing it. Pathogens are disease-causing organisms including bacteria, fungi and viruses (Hoffmann and Frodsham, 2019)

Records have shown that cultural practices adopted against T. tabaci have played a key role in suppressing thrips population in onions and other crops. Crop rotation is useful against soil-borne species or those on crop residues. In warm areas, T. tabaci may survive in plant remains left in fields, and new crop should not be planted on or near the sites of old ones (Parrella and Lewis, 1997). Soil- dwelling stages of thrips are vulnerable to mechanical cultivations (Parrellla and Lewis, 1997).

Cultural practices are a manipulation of the cropping environment to increase pest mortality or reduce rates of pest increase and damage ((Hoffman and Frodshem, 1993). There are many agricultural practices that make the environment less conducive to insect pests. Common cultural

practices for thrips control include croprotation, cultivations, irrigation, trap crops, time of planting and harvesting, mulching and intercropping (Parella and Lewis, 1997, Alston and Drost, 2008).

Adjusting the timing of planting or harvest is another control tactic. Onion cultivars transplanted early were reported to escape from high onion thrips population densities and delayed transplanting enhanced pest infestation and yield losses (Gonclaves, 1996; 1997). Late transplanting of onions was shown to result in higher levels of infestation by 1. *Tabaci* (Dawood and Haydar, 1996). Straw or other mulch materials have been reported to reduce thrips population and improve growth of onion crop. The benefits of mulch include weed suppression, soil and water conservation and enhanced soil organic matter

In Egypt, intercropping onion and garlic with tomato reduced infestations of T. tabaci by about 80%, but the yield from both crops decreased (Afifi and Haydar, 1990). In England, infestation of T. tabaci on onions was reduced to 50% when intercropped with carrots (Uvah and Coaker, 1984). The effects were probably as a result of shading of the lower crop by the taller intercrop, which influences the abundance and activity of the thrips (Kyamanywa and Ampofo, 1988). Full field undersowing of leeks with clover, Trifolium fragiferum resulted in significant onion thrips population suppression and good yield. Reduced thrips feeding symptoms was also recorded in the intercropped leeks (Theunissen and Schelling, 1998). A mixed cropping system was shown to encourage a major thrips predator, Orius tristicolor (White), compared with monocultures (Letourneau and Altieri, 1983).

Insecticides are the most common strategy for onion thrips management (Alston and Drost, 2008). Several insecticides have been reported to significantly reduce onion thrips populations but their effects on yield have shown mixed results. In Slovenia, spinosad and abamectin were found to exhibit the highest efficiency against T. tabaci (Zezlina and Blazic, 2022). Trials conducted in Egypt to test the effects of some insecticides against T. tabaci indicated that carbofuran was the most effective, followed by profenofos, methomyl and pirimiphos-methyl, while mineral oil was the least effective in controlling the pest (Sailam and Hosseny, 2022). An experiment conducted to evaluate different insecticides (talstar, bifenthion, tamaron, methamidophos, bulldock, beta-cyfluthrin, talstar + tamaron) for the management of onion thrips

in the agroclimatic conditions of Pakistan indicated that all the insecticides were equally effective in controlling the pest between one and seven days after application and all resulted in higher onion yields compared to the control (Khan et al., 2001).

Field trials carried out in Gujarat, India revealed that emulfifiable concentrate (EC) insecticide formulations were more efficacious and economic to use compared to granular formulations (Butani and Kapadia, 1999). Studies using insecticides methyl parathion, carbofuran, trichlorfon, chlorfenvinphos, endosulfan, dimethoate, beta-cypermethrin, methamidophos, chlorpyrifos and tetradifon indicated that all the insecticides suppressed thrips populations at varying degrees and slightly increased seed and bulb yield compared to untreated plots (Gul et al., 1999).

In Brazil, lambda-cyhalothrin, pirimiphos-methyl, deltamethrin and cypermethrin insecticides were effective in suppressing onion thrips population but only cypermethrin increased yield (Souza-Goncalves, 1996). In Pakistan, monocrotophos scw and cypermethrin were reported as the most effective insecticides for controlling infestations of T. tabaci on onions, followed by cyhalothrin, triazophos, methamidophos and fenvalerate (Khan et al., 1995). Field studies carried out in Harvana, India using 10 foliar insecticides indicated deltamethrin and cypermethrin were the most effective against infestation of T. tabaci in onions and endosulfan, fenitrothion, dichrorvos, malathion and fenvalerate were less effective. The maximum bulb yield was recorded for cypermethrin (Saini et al., 1989). In Kenya, the pesticides which have been registered for thrips management include acephate (Asetaf), beta-cyfuthrin and chlorpyrifos (Bullock star), lambda-cyhalothrin (Lambdex), methomyl (Lannate 25 WP), spinosad (Tracer 480 sc) and Chlorpyrifos-methyl (Reldan 40 EC) (KARI-Thika, 2006).

CHAPTER THREE

RESEARCH METHODOLOGY

3.0. Introduction

In this chapter looked at the Research Methods which was used to solve the research problem. Research Methodology was understood as the detailed procedure used to answer the research question. Thus this chapter looks in detail, the description of what research design will be in area of study, population and sampling, instruments and methods to be used in data collection, quality control methods, data processing and analysis techniques, ethical considerations.

3.1. Research Design

Saunders, (2015) defines a research design as the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure. The study employed a descriptive research design. Descriptive survey design according to Kothari (2020) is a powerful form of quantitative analysis. This design was preferred because it enabled the researcher describe the area of research and explained the collected data in order to investigate the differences and similarities with our frame of reference within a given period of time. In addition, the method permits gathering of data from the respondents in natural settings resulting in a description of the data, whether in words, pictures, charts, or tables. Moreover, the data collected was both qualitative and quantitative in nature.

William, et.al (2015), defined qualitative research is a scientific method of observation to gather non-numerical data. This type of research "refers to the meanings, concepts definitions, characteristics, metaphors, symbols, and description of things" and not to their "counts or measures. This research answers how and when a certain phenomenon occurs. Qualitative research approaches are employed across many academic disciplines, focusing particularly on the human elements of the social and natural sciences; in less academic contexts, areas of application include qualitative market research, business, service demonstrations by non-profits, and journalism. While Friedman, Milton (2019), stated that quantitative research is the systematic empirical investigation of observable phenomena via statistical, mathematical, or computational techniques. The objective of quantitative research is to develop and employ

mathematical models, theories, and hypotheses pertaining to phenomena. The process of measurement is central to quantitative research because it provides the fundamental connection between empirical observation and mathematical expression of quantitative relationships.

3.2. Study Population

This study shall involve; that the two (2) the onion farmers Onion Producers. While the farmers included in this study to help the researcher understand the different types of chemicals they use in controlling pests, spraying intervals as well as the precautions taken in regard to safe handling of the chemicals. This study population was chosen because it composed of people who believed to have credible information and hands on experience as far as Onion Production is concerned.

3.3. Sampling Technique and Sample Size

Sampling technique is a description of strategies which are employed by the researcher to select or choose representative elements or respondents from the target population (Yuko; Onen 2009). The two types of sampling technique are probability and non-probability sampling techniques.

The researcher used both probability and non-probability sampling techniques. Probability sampling technique was employed in the simple random sampling to select the local community respondents who were Onion Production farmers; while non-probability sampling technique was used in purposive selection of the respondents from the district local government production staff.

A sample is a subset of a population (Sekaran, 2022), it comprises of some selected members of the population who are referred to as elements/subjects or respondents. The researcher targeted a sample population of eight (8) respondents as indicated in Table 03. A total of four (2) district local government officials and six (6) Onion Production farmers as representatives.

3.4. Data Collection Methods and Instruments

Data refer to anything given or admitted as a fact on which a research conclusion is based, while instruments are tools that are used for data collection and how they (tools) are developed (Yuko: Wills, 2002).

This study employed primary data collection methods which included observation, interviews and the tools to collect data were interview guide and observation guide as indicated in table 03.

3.4.1 Observation

According to (Wills et al, 2009), observation refers to the use of all senses to perceive and understand the experiences of interest to the researcher. This technique of data collection was applied so as to allow the researcher see what actually is the response and state of onion fields after application of selected chemicals. This technique and tool was more suitable during data collection as it enable the researcher to feel the reality of the situation on farms.

The researcher used observation guide as an instrument to collect data from the selected six (6) cowpea farms of the respondents as shown in Table 03. This technique was opted for in the study because of the following reasons: The researcher wanted to gain firsthand information and experience without use of any informants, (2) there was need to obtain information especially that which is so technical in nature such that mixing rates of the selected chemicals, seed quality, and soil coordination.

3.4.2 Interviews

Interviews were person to person verbal communication in which one person (or group of persons) asked the other the questions intended to elicit information or opinions (Wills et al, 2009). The purpose of this technique was to collect information that was not directly observed or to put down in writing.

The researcher used unstructured interview guide as a tool to guide for face to face discussion with the respondents who included the Agricultural Officer and Entomologists, and the six (6) farmers as shown in table 03.

This technical tool is very useful as it shall enable the researcher to obtain some historical and current information regarding the quality of cowpeas supplied which cannot be obtained from other sources. It shall also enable the researcher to have control on discussion while allowing the respondents to speak out freely any information which the researcher may be beneficial to this study.

Table 3: Showing the Population, Sampling Techniques, Size and Data Collection Methods

Population	**Sampling Techniques**	**Size**	**Data Collection Methods**
Local Government Production Officials	Purposive	3	Interviews
Onion Production farmers	Simple Random Sampling	47	Interviews
Total		**50**	

Source: Researcher, (2024)

3.5 Quality Control Methods

Quality control refers to a measure put in place to eliminate any form of diversions from the primary objectives of the study (Wills et al, 2009). This was done through validity and reliability. The researcher applied these control measures to ensure that only valid and reliable data is collected and presented from the study.

3.5.1 Reliability

According to Michael and Fiona (2006) reliability is the extent to which research produces the same results when replicated. It is the extent to which the research produces an accurate version of the world.

To ensure reliability of data collection tools, the researcher was first pre-test and discusses the questionnaire, observation guide and interview guide with the supervisor among the colleagues at work place who have completed their first degree. The researcher piloted same questionnaires to onion farmers in his community before applying them to the respondents in the study area.

3.5.2 Validity

Validity is the extent to which research results can be accurately interpreted and generalized to other populations. It is the extent to which research instruments measure what they are intended

to measure (Oso and Onen, 2008). To ensure valid study results, the researcher administered similar questions to all the respondents in their respective categories without biasness or personalization of the interview guide or observation guide.

3.6. Data processing and Data Analysis

Data analysis is the separation of data into constituent parts or elements, and examination of the data to distinguish its component parts or elements separately and in relation to the whole (Oso and Onen, 2008). There are mainly two approaches of data analysis; qualitative and quantitative data analysis. The researcher used both (qualitative and quantitative approach) to analyze the data.

The researcher used both statistical and narrative technique to analyze data. In statistical analysis, all responses were quantified and expressed as frequencies using descriptive statistics. While in narrative analysis, the researcher presented literal description of the observations from the field.

3.7. Ethical Considerations

Ethics are guidelines or principles that a researcher must adhere to in the course of his/her profession.

The following research ethical considerations observed by the researcher throughout the research process:

Respect for Persons: the participants were treated as autonomous persons and by all means their decisions will be respected, including the decision not to participate. The researcher was give special attention to less powerful groups of participants such as children, and the mentally ill whom he came across some homesteads.

Beneficence: It was the obliged to cause no harm to the respondent. He was concerned about the welfare of the respondent including mental, physical health, safety, and took all the precautions to avoid any injury. He avoided questions or issues that resulted into embarrassment, guilt, discomfort or risks.

Anonymity and Confidentiality: All individuals who participated in this study knew that all information about them was treated in a responsible manner. Therefore the researcher ensured that data was handled in a way that did not harm the participants.

The researcher fully explained to the respondents the purpose of the study and how it benefited them before they made their choice of either or not to participate in the study.

3.8. Limitations of the Study

The researcher is given very limited time coupled with busy schedule as this kind of wok ordinarily requires an extensive study of the issue and cases. The researcher utilized his time efficiently by engaging the management in distributing questionnaires and as a guide to different offices.

The Attitude of respondents as some of them at times were not ready to let out vital information as they were afraid of revealing official secret. The researcher persuaded the respondents and informed them that the purpose of the study is for academic purpose only.

CHAPTER FOUR
PRESENTATION, ANALYSIS AND DISCUSSION OF FINDINGS

4.0. Introduction

The chapter highlighted the back ground information of the respondents of Buwabwala Sub-County, Namisindwa District. Discussion and analysis of the different responses to some key questions was also done in this chapter following t h e research objectives as seen below;

4.1. Back ground information of respondents

This section shows the gender of the respondents, marital status, age bracket, highest level of education attained, and the duration spent in service at Buwabwala Sub- County, Namisindwa District as explained below;

4.1.1. Gender of the respondents

The respondents were asked to state their gender and the response obtained is explained below

Table 4.1: Showing the number of respondents and their gender.

Response	**Frequency**	**Percent**
Male	15	30
Female	35	70
Total	**50**	**100**

Source: Primary Data, (2024)

From the table 4.1, above showed that 70% of the respondents were female as being the highest and 30% respondents as male came least.

4.1.2. Age of the respondents

These section respondents were asked to stated or tick their appropriate years from birth to today.

Table 4.2: Showing the age of the respondents

Response	**Frequency**	**Percent**
18- 24 years	9	18
25–34 years	16	32
35-44 years	10	20
45-54 years	9	18

Above 54 years	06	12
Total	**50**	**100**

Source: Primary Data, (2024)

From the field research in table 4.2., 32% of the respondents ranked highest as being between the age of 25-34 years, 20% respondents as second were between 35-44 years, 18% of the respondents were between 18-24 years, 18% of the respondents were between 45-54 years and 12% of the respondents were between above 58 years, and. Therefore majority of the respondents were between the age of 25-34 years who are still strong and had love for work in order to achieve better results.

4.3. Marital status of the respondents

In this section respondents were asked to state their marital status as explained below

Table 4.3: Showing the marital status of the respondents

Response	**Frequency**	**Percent**
Single	14	28
Married	23	46
Divorced	8	16
Separated	5	10
Total	**50**	**100.0**

Source: Primary Data, (2024)

In the above table 4.3, 46% of the respondents being the majority were married, 28% of the respondents were single as second, 16% of the respondents ranked third as divorced and 10% respondents came least as being separated. .

4.4. Academic qualification of the respondents

The respondents were asked about their academic qualification and analysis

Table 4.4: Showing the academic qualifications of the respondents

Response	**Frequency**	**Percent**
Certificate	13	26
Diploma	21	42
Degree	16	32
Masters	0	0
Total	**50**	**100**

Source: Primary Data, (2024)

From the table 4.4, 42% of the respondents were diploma holders, 32% of the respondents were degree holders, 26% of the respondents were certificate holders and masters had no response.

4.2.5. Work experience of the respondents

This section covered the experience of the respondents

Table 4.5: The work experience of the respondents

Response	**Frequency**	**Percent**
less than one year	4	8
1-2 years	15	30
3-4 years	23	46
5-10 years	8	16
Total	**50**	**100**

Source: Primary Data, (2024)

From the field research in table 4.5, 46% of the respondents as the majority had worked for a period between 3-4 years, 30% of the respondents worked for the period of between 1-2 years, 16% respondents had worked for a period of between 5-10 years, and 8% of the respondents had worked for a period of 5-10 years. This was an indication that most respondents had worked for a period of between 3-4 years.

4.2. The state of onion production in Buwabwala Sub- County, Namisindwa District

Under this objective the responses obtained are explained below;

Table 4.6: The state of onion production in Buwabwala Sub- County, Namisindwa District

Response	**SA**	**A**	**U**	**D**	**SD**
Onion production has generally increased over time due to advancements in agricultural technologies, improved crop	50.0	38.3	8.3	0	3.3

varieties, and expanding global demand					
Onion production is influenced by various factors, including soil fertility, water availability, temperature, sunlight, and pest management	28.3	51.7	10.0	0	10.0
Onion producers often face challenges such as unpredictable weather conditions, pests, and diseases that can impact crop yields	13.3	23.3	13.3	16.7	33.3
Onion producers stay updated with market trends and consumer preferences by conducting market research and staying connected with buyers and consumers	20.0	8.3	11.7	40.0	20.0
Red onions are valued for their color and are often used in gourmet dishes	15.0	26	28	7	23

Source: Primary Data, (2024)

From the table 4.6 above, about Onion production has generally increased over time due to advancements in agricultural technologies, improved crop varieties, and expanding global demand indicate that 50.0% of the respondents strongly agreed, 38.3% of the respondents agreed, 8.3% of the respondents were undecided with the statement, and 3.3% of the respondents strongly disagreed.

On the other hand on onion production is influenced by various factors, including soil fertility, water availability, temperature, sunlight, and pest management 28.3% of the respondents strongly agreed, 51.7% of the respondents agreed, 10.0% of the respondents strongly disagreed as well as undecided, and disagree had no response.

Furthermore, about onion producers often face challenges such as unpredictable weather conditions, pests, and diseases that can impact crop yields 13.3% of the respondents strongly agreed, 23.3% agreed, 13.3% were undecided, 16.7% disagreed and 33.3% strongly disagreed.

In addition, onion producers stay updated with market trends and consumer preferences by conducting market research and staying connected with buyers and consumers 20.0% of the respondents strongly agreed, 8.3% of the respondents agreed, 11.7% of the respondents were undecided, 40.0% of the respondents disagreed, and 20.0% of the respondents strongly disagreed.

Lastly red onions are valued for their color and are often used in gourmet dishes 15% of the respondents strongly agreed, 26% of the respondents agreed, 28% of the respondents were undecided, 7% of the respondents disagreed, and 23% of the respondents strongly disagreed.

4.3. The factors limiting production in Buwabwala Sub- County, Namisindwa District

This was the second objective understudy and response obtained is explained

Table 4.7: the factors limiting production in Buwabwala Sub- County, Namisindwa District

Response	SA	A	U	D	SD
Shortage of skilled labor impact production capabilities	20.0	50.0	22.5	7.5	0
Limited access to raw materials directly affects onion production output	32.5	45.0	0	12.5	10.0
Technological limitations play a significant role in restricting production capacity	25.0	32.5	22.5	20.0	0.0
Inadequate infrastructure hinder the production process	52.5	32.5	2.5	0.0	12.5
Environmental regulations limit onion production activities	30.0	55.0	7.5	7.5	0

Source: Primary Data, (2024)

The findings in table 4.7 below, about shortage of skilled labor impact production capabilities 20.0% of the respondents strongly agreed, 50% agreed, 22.5% were undecided, 7.5% disagreed, and strongly disagree had no response.

In addition, limited access to raw materials directly affects onion production output 32.5% of the respondents strongly agreed, 45.0% of the respondents agreed, undecided had no response, 12.5% of the respondents disagreed, and 10.0% of the respondents strongly disagreed.

Furthermore, technological limitations play a significant role in restricting production capacity 25.0% of the respondents strongly agreed, 32.5% of the respondents agreed, 22.5% of the respondents were undecided, 20.0% of the respondents disagreed and strongly disagreed had no response.

About inadequate infrastructure hinder the production process the loan, 52.5% of the respondents strongly agreed, 32.5% of the respondents agreed, 2.5% of the respondents were undecided, disagree had no response and 12.5% of the respondents strongly disagreed.

Lastly about, environmental regulations limit onion production activities, 30.0% of the respondents strongly agreed, 55.0% of the respondents agreed, 7.5% of the respondents were undecided, 7.5% of the respondents disagreed, and strongly disagreed had no response.

4.4: The factors that facilitates production in Buwabwala Sub- County, Namisindwa District

This was the third objective under study

Table 4.8: The factors that facilitates production in Buwabwala Sub- County, Namisindwa District

Response	SA	A	U	D	SD
Efficient resource allocation important for facilitating production	50.0	45.0	0.0	5.0	0.0
Technological advancements help in improving production processes	40.0	32.5	7.5	20.0	0.0
Skilled labor contribute to increased production output	22.5	45.0	27.5	0.0	5.0
Maintaining good infrastructure play a crucial role in facilitating production	22.5	60.0	2	0.0	25.0
Stable economic conditions encourage production activities	11.7	55.0	25.0	8.3	0.0
Access to capital and financial resources facilitate production processes	30.0	55.0	7.5	7.5	0.0
Efficient transportation networks positively impact production capabilities	35.0	47.5	10.5	7.5	0.0

Source: Primary Data, (2024)

The findings revealed information on efficient resource allocation important for facilitating production, the study showed that 50% of the respondents strongly agreed, 45.0% of the respondents agreed, undecided had no response, 5.0% of the respondents disagreed, and strongly disagreed had no response.

On the other hand, about technological advancements help in improving production processes, the findings indicated that 40.0% of the respondents strongly agreed, 32.5% of the respondents agreed, 7.5% of the respondents were undecided, 20.0% of the respondents disagreed, and strongly disagreed had no response.

Furthermore, skilled labor contribute to increased production output 22.5% of the respondents strongly agreed, 45.0% of the respondents agreed, 27.5% of the respondents were undecided, disagreed had no response and 10.0% of the respondents strongly disagreed.

On the other hand on maintaining good infrastructure play a crucial role in facilitating production 38.3% of the respondents strongly agreed, 25.0% of the respondents strongly disagreed, 20.0% of the respondents agreed, 16.7% of the respondents undecided, and strongly disagreed had response.

Furthermore, stable economic conditions encourage production activities 11.7% of the respondents strongly agreed, 55.0% of the respondents agreed, 25.0% of the respondents were undecided, 8.3% of the respondents disagreed and strongly disagreed had no response.

The findings revealed information on access to capital and financial resources facilitate production processes, the study showed that 30% of the respondents strongly agreed, 55% of the respondents agreed, 7.5% of the respondents were undecided, 7.5% of the respondents disagreed, and strongly disagreed had no response.

On the other hand on efficient transportation networks positively impact production capabilities 35.0% of the respondents strongly agreed, 47.5% of the respondents strongly disagreed, 10.5% of the respondents agreed, 7.5% of the respondents undecided, and strongly disagreed had response.

CHAPTER IVE
SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This chapter covers the summary of the findings, conclusions based on the findings, and recommendations based on the conclusions.

5.1 Summary of Findings

5.1.1. The state of onion production in Buwabwala Sub- County, Namisindwa District

The findings revealed that onion production has generally increased over time due to advancements in agricultural technologies, improved crop varieties, and expanding global demand, onion production is influenced by various factors, including soil fertility, water availability, temperature, sunlight, and pest management, onion producers often face challenges such as unpredictable weather conditions, pests, and diseases that can impact crop yields.

5.1.2. The factors limiting production in Buwabwala Sub- County, Namisindwa District

The study indicated that shortage of skilled labor impact production capabilities, limited access to raw materials directly affects onion production output, technological limitations play a significant role in restricting production capacity, inadequate infrastructure hinder the production process, environmental regulations limit onion production activities and market demand is a limiting factor in onion production.

5.1.3. The factors that facilitates production in Buwabwala Sub- County, Namisindwa District

The findings show that efficient resource allocation important for facilitating production, technological advancements help in improving production processes, skilled labor contribute to increased production output, maintaining good infrastructure play a crucial role in facilitating production, stable economic conditions encourage production activities, access to capital and financial resources facilitate production processes, and efficient transportation networks positively impact production capabilities.

5.2. Conclusion

5.2.1. The state of onion production in Buwabwala Sub- County, Namisindwa District

In conclusion, the findings revealed that onion production has generally increased over time due to advancements in agricultural technologies, improved crop varieties, and expanding global demand, onion production is influenced by various factors, including soil fertility, water availability, temperature, sunlight, and pest management.

5.2.2. The factors limiting production in Buwabwala Sub- County, Namisindwa District

It can be concluded that shortage of skilled labor impact production capabilities, limited access to raw materials directly affects onion production output, technological limitations play a significant role in restricting production capacity, inadequate infrastructure hinder the production process, environmental regulations limit onion production activities and market demand is a limiting factor in onion production.

5.2.3. The factors that facilitates production in Buwabwala Sub- County, Namisindwa District

In conclusion therefore, the findings show that efficient resource allocation important for facilitating production, technological advancements help in improving production processes, skilled labor contribute to increased production output, maintaining good infrastructure play a crucial role in facilitating production, stable economic conditions encourage production activities, access to capital and financial resources facilitate production processes, and efficient transportation networks positively impact production capabilities.

5.3. Recommendations

The researcher recommends the following; According to the poly markers for farmers and extension practitioners for further research.

Conduct soil testing to determine the pH, nutrient levels, and organic matter content. Based on the test results, apply the necessary amendments such as lime to adjust the pH and organic fertilizers to improve soil fertility.

Practice crop rotation by alternating onion cultivation with other crops to help manage pests and diseases, and improve soil health.

Incorporate compost or green manure crops into the soil to increase organic matter content, enhance water retention, and provide a slow release of nutrients.

Ensure adequate and timely irrigation by investing in efficient irrigation systems such as drip irrigation. This will help maintain optimal soil moisture levels and reduce water wastage.

Implement water-saving practices such as mulching to reduce evaporation and conserve moisture in the soil.

Construct water storage structures such as ponds or reservoirs to store rainwater during the wet season for use during dry periods.

Promote integrated pest management (IPM) practices such as crop rotation, intercropping, and biological control methods to reduce the reliance on chemical pesticides.

Train farmers on identifying and managing common onion pests and diseases, such as thrips, onion fly, and pink root rot. Provide access to appropriate and safe pesticides when necessary.

Encourage the use of disease-free seeds and transplants to reduce the risk of introducing pathogens into the field.

REFERENCE

Abdel, H.S., Kamal, A.M., Abo-Elysour, I.R., & Abdel, R. (2013). Effects of certain plant extracts to control purple blotch disease of onion plants (Allium cepa). Journal of Plant Physiology and Pathology, 1(4), 2-4.

Agegnehu, S., Zegeye, W., Belay, B., Asaregew, F., Worku, A., Belay, D., Mehretu, E., &Alemayehu, G. (2013). Diseases, insect pests and parasitic weeds of common crops and their importance under irrigation conditions of Rib areas. Curr. Res. Microbiol. Biotechnology, 1(6), 262-265.

Aklilu, N., Yitagesu, K., Abiy, A., Tigist, A., &Kidane, D. (2015). Onion Production for Income Generation in Small Scale Irrigation Users Agro Pastoral Households of Ethiopia. Journal of Horticulture 2(3), 4.

Baliyan, S. P. (2018). Evaluation of Onion Varieties for Productivity Performance in Botswana. World J. Agric. Res., 2(3), 129-135.

Black, L., Conn, K., Gabor, B., Kao, J., & Lutton, J. (2019). Purple blotch In K. E. Conn, J, Rusenberger Sit, (Eds). Onion disease guide. Seminis vegetable seeds Inc., St Louis, MO, USA: 29pp.

Bua, B., Owiny, R., & Akasairi, O. (2017). Response of onion to different organic amendments in central Uganda. Journal of Agricultural Science and Technology, 7(2), 79-85.

CABI. (1985). Distribution maps of plant diseases. CABI, UK.

Chethana, B.S., Ganeshan, G., Rao, A.S., & Bellishree, K. (2019). In vitro evaluation of plant extracts, bioagents and fungicides against Alternaria porri (Ellis) Cif., causing purple blotch disease of onion. Pest Manag. Hortic. Ecosyst, 18(2), 194-198.

Diaz-Montano, J., Fuchs, M., Nault, B.A., Fail, J., & Shelton, A.M. (2011). Onion thrips (Thysanoptera thripidae): A global pest of increasing concern in onion. Journal of Economic Entomology, 104(1), 1-13.

Dessalegn L., & Akliu, S. (2022). Research Experiences in Onion Production. Research Report No. 55. Ethiopian Agricultural Research Institute, Ethiopia.

FAO. (2004). State of Food Insecurity in the World. Monitory progress Towards the World Food Summit and Millwood Organnium Development Goals. Rome.

FAO. (2013). Food and Agricultural Organization Statistical Database. www.fao.org/publications.

FAO. (2020). Food and Agricultural Organization Statistical Database. www.fao.org/publications.

Fatideh, M.M., &Asil, M.H. (2019). Onion yield, quality and storability as affected with different soil moisture and nitrogen regimes. Southwest J. HorticBiol Environ, 3(2), 145-165.

Griffiths, G., Trueman, L., Crowther, T., Thomas, B., & Smith, B. (2002). Onions a global benefit to health. Phytotherapy research, 16 (7), 603- 615. https://knoema.com/data/ agriculture-indicators- production+ Uganda+ onions.

International Food Policy Research Institute (IFPRI). (2010). Engendering Agriculture, IFPRI Discussion Paper, 00973.

Islam, M.A., Islam, S., Ayasha, A., Rahman, H., & Nandwani, D. (2017). Effect of organic and inorganic fertilisers on soil properties and the growth, yield, and quality of tomato in Mymensingh, Bangladesh. Agriculture, 7(3), 18.

Islam, M., Akter, N., Chowdhury, S., Ali, M., & Ahamed, K. (2001). Evaluation of fungicides against Alternaria porri causing purple blotch of onion. J. Agric. Sci. Tech, 2(1), 27-30.

International Food Policy Research Institute (IFPRI). (2010). Engendering agriculture IFPRI discussion Paper 00973.

Jhala, P., Mali, B.L., &Meena, M.K. (2017). Effective management of purple blotch of onion caused by Alternaria porri (Ellis) through host resistance, fungicides, and botanicals. International Journal of Current Microbiology and Applied Sciences, 6 (5), 1737-1745.

Kareem, M.A., Murthy, K.V.M.K., Nadaf, H.A., &Waseem, M.A. (2019). Effect of temperature, relative humidity, and light on lesion length due to Alternaria porri in onion. Asian J. Environ Sci. 7, 47–49.

Kimani, B.M., Kariuki, J. W., Peters, R., & Niguthi, F.N. (1991). Breeding short term onions with improved quality and long shelf life. Technology No. 1, Onion breeding project, Nairobi Kenya. 1-14 pp.

Mamiro, D. P., Maerere, A. P., Sibuga, K. P., Ebaugh, M.J., Miller, S. A., Mtui, H.D., Mgembe, E. C., Msuya-Bengesi, P., & Aloyce, A. (2018). Local Community's Knowledge on Onion Production, Pests and Pests Management in Kilosa and Kilolo Districts, Tanzania. Tanzania Journal of Agricultural Sciences, 13(2), 18-26.

Marmath, K.K., Giri, P., Sharma, S., Taj, G., & Kumar, A. (2013). In-silico interaction studies of Alternaria brassica toxin destruxin B and potential partners of MAPK4 cascade. Int. J. Agric Environ Biotechnology, 6(2): 23-210.

MoARD. (2005). Ministry of Agriculture and Rural Development, Irrigation Development Package Manual. Published in Amharic Language.

McCallum, J., Grant, D., McCartney, E., Scheffer, J., Shaw, M., & Butler, R. (2001). Genotypic and environmental variation in bulb composition of New Zealand adapted onion (Allium cepa) germplasm. New Zealand Journal of Crop and Horticultural Science, 29(3), 149-158.

Mesfin, A. (2005). Analysis of factors Influencing Adoption of Triticale and its Impact: The Case Farta Wereda. Msc. Thesis (Unpublished). Presented to School of Graduate Studies of Alemaya University, Ethiopia.

Miruts, F., Beshir, B., & Ejersa, G. (2021). Farmer Preferred and Financially Feasible Onion Varieties for Scaling: Evidence from the Central Rift Valley in Ethiopia. Ethiop. J. Agric. Sci. 31(4), 45-56.

Mishra, R. K., Jaiswal, R.K., Kumar, D., Saabale, P.R., &Singh, A. (2018). Management of major diseases and insect pests of onion and garlic: A comprehensive review. Journal of Plant Breeding and Crop Science, 6(11), 160-170. https://doi.org/10.5897/JPBCS2018.0467.

Musokya, D. (2019). Getting the best from your jamba f1, Seed Time News Letters. http://www.monsantoafrica.com/pdfs/newsletters/seed time 2019 Oct dec.pdf.

Necola, S. (2020). Allium cepa variety evaluation for organic farming. Paper presented at the 5th International Symposium on Edible Alliaceae, Dronten Netherlands.

Priya, R.U., Sataraddi, A., & Darshan, S. (2015). Efficacy of non-systemic and systemic fungicides against purple blotch of onion (Allium cepa L.) caused by Alternaria porri (Ellis) Cif. Int. J. Recent Scientific Res. 6(9), 6519-6521.

Rahimeto, N. (2020). Determinants of improved haricot bean production package in Alaba special wored, Southern Ethiopia. M.Sc. Thesis (Unpublished) Presented to the School of Graduate Studies of Haramaya University, Ethiopia.

Ramert, B.M., &Lennartsson, D.G. (2002). The use of mixed species cropping to manage pests and diseases-theory and practice. Proceedings of the COR Conference, March 26-28, Aberystwyth, pp. 207-210.

Ravichandra, S. (2019). Epidemiology and Management of Purple Blotch of onion caused by Alternaria porri. UAS, Dharwad publisher.

Sandborn, D. (2019). Plan now for spring color in your gardens. https://www.canr.msu.edu/news/plan-now-for-spring-color-in-your-gardens.

Schwartz, H.F., & Mohan, S.K. (2008). Compendium of Onion and Garlic Diseases and Pests. American Phytopathological Society, pp 38-41.

Smith, C., Lombard, K.A., Peffley, E. B., & Liu, W. (2016). Genetic analysis of quercetin in onion (Allium cepa l.) 'Lady Raider'. Texas Journal of Agriculture and Natural Resources, 16, 24-28. https://txjanr.agintexas.org/index.php/txjanr/ article/view/136.

Teshome A., Derbew, B., Sentayehu, A., & Yehenew, G. (2018). Effects of planting time and mother bulb size on onion (Allium cepa L) seed yield and quality at Kobo Woreda, Northern Ethiopia. Int J AgricRes. htts://doi.org/10.3923/ijar.

Yadav, P.M., Rakholiya, K.B., & Pawar, D.M. (2013). Evaluation of Different Systemic Fungicides against Alternaria porri from in vitro. Trends in Biosciences, 6(4), 382-383.

Yadav, P.M., Rakholiya, K., & Pawar, D. (2013b). Evaluation of bioagents for management of theonion purple blotch and bulb yield loss assessment under field conditions. The Bioscan, 8(4), 1295-1298.

Yeboah, M., Nyarko, G., Bayor, H., Bonaventure, B., & Kanton, R. (2022). A survey on onion production in the Bawku east district of Ghana. Ghana Journal of Horticulture, 2, 101.

APPENDIX 1
QUESTIONNAIRE

Dear respondent,

My name is **WAKOLI ANTHONY, Reg No. BU/UP/2020/3578**, I am a student of Busitema University pursuing a Bachelor's Degree in Science Education Agriculture, I am currently carrying out a study for the purpose of writing a dissertation as a requirement by the university on the topic "**Factors influencing Onion Production in Buwabwala Sub- County, Namisindwa District**". The importance of your information in the study and the information obtained will be treated with confidentiality.

SECTION A: Demographic Information of Respondents

INSTRUCTIONS:

Please tick where applicable:

Gender of respondents	Male	
	Female	
Age of respondents	18- 24 years	
	25–34 years	
	35-44 years	
	45-54 years	
	Above 54 years	
Marital status of respondents	Single	
	Married	
	Divorced	
	Separated	

	Single	
Level of Academic qualification of the respondents	Certificate	
	Diploma	
	Degree	
	Masters	

SECTION B: The state of onion production in Buwabwala Sub- County, Namisindwa District

For each of the following statements, please indicate (by ticking) the extent to which you agree with, using the following scale: (Strongly Agree,(**SA**) Agree**,(A)**Not sure(NS), Disagree(**D**) and Strongly disagree(**SD)**.

	Statement	**SA**	**A**	**NS**	**D**	**SD**
1	Onion production has generally increased over time due to advancements in agricultural technologies, improved crop varieties, and expanding global demand					
2	Onion production is influenced by various factors, including soil fertility, water availability, temperature, sunlight, and pest management					
3	Onion producers often face challenges such as unpredictable weather conditions, pests, and diseases that can impact crop yields					
4	Onion producers stay updated with market trends and consumer preferences by conducting market research and staying connected with buyers and consumers					
5	Red onions are valued for their color and are often used in gourmet dishes					

SECTION C: The factors limiting production in Buwabwala Sub- County, Namisindwa District

For each of the following statements, please indicate (by ticking) the extent to which you agree with, using the following scale: (Strongly Agree,(**SA**) Agree **(A),** Not sure **(NS),**Disagree(**D**) and Strongly disagree(**SD)**.

	Statement	**SA**	**A**	**UD**	**D**	**SD**

1	Shortage of skilled labor impact production capabilities					
2	Limited access to raw materials directly affects onion production output					
3	Technological limitations play a significant role in restricting production capacity					
4	Inadequate infrastructure hinder the production process					
5	Environmental regulations limit onion production activities					
6	Market demand is a limiting factor in onion production					

SECTION D: The factors that facilitates production in Buwabwala Sub- County, Namisindwa District

For each of the following statements, please indicate (by ticking) the extent to which you agree with, using the following scale: (Strongly Agree,(**SA**) Agree **(A),** Not sure **(NS),**Disagree(**D**) and Strongly disagree(**SD)**.

	Statement	**SA**	**A**	**NS**	**D**	**SD**
1	Efficient resource allocation important for facilitating production					
2	Technological advancements help in improving production processes					
3	Skilled labor contribute to increased production output					
4	Maintaining good infrastructure play a crucial role in facilitating production					
5	Stable economic conditions encourage production activities					
`6	Access to capital and financial resources facilitate production processes					
7	Efficient transportation networks positively impact production capabilities					