

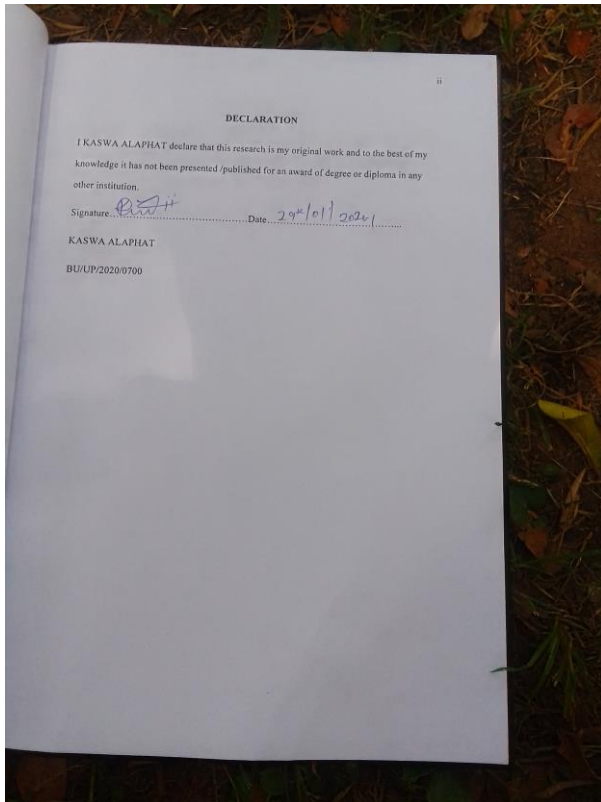
**EFFECT OF EARLY BLIGHT DISEASE ON TOMATO PRODUCTION IN
IBULANKU SUB-COUNTY BUGWERI DISTRICT.**

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RE GNO. BU/UP/2020/0700

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

DECEMBER 2023



DECLARATION

I KASWA ALAPHAT declare that this research is my original work and to the best of my knowledge it has not been presented /published for an award of degree or diploma in any other institution.

Signature: [Handwritten Signature] Date: 28/01/2021

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BU/UP/2020/0700

APPROVAL

This dissertation titled the effect of early blight disease on tomato production was written by KASWA ALAPHAT under my guidance and supervision and meets the requirement set by Busitema University for award of Bachelor of Science education. It has been submitted with approval of the university supervisor.

Signature..... Patrick Ben Emoi Date..... 29/01/2024

Mr. OTEMA PATRICK BEN EMOI

Supervisor

DEDICATION

I dedicate this research to my beloved supervisors, lecturers, father in the name of MuwabeShaban, brothers and sisters, my uncle for their support in terms of guidance and finance towards my research.

ACKNOWLEDGEMENT

I acknowledge my supervisor for accepting me to help in the conduction of research, am very grateful for all members that provided me information and advice in the process of developing this report

I would like also to express my deepest gratitude to my supervisor Mr. Otema Patrick Ben Emoi for his guidance, constructive criticisms and continuous follow-up in the entire process of this work without which this report could not have been possible. I also acknowledge the contributions made by my beloved father, Brothers, sisters and my uncle Kabibu for supporting me to pursue this course up to this level.

I would also like to use this opportunity to thank then actives of the study area who gave in their time to participate in this research in Bugweri District, Ibulanku Sub County.

Conclusively, am greatly indebted to my friends and course mates with whom we have struggled, exchanged views and ideas.

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ABSTRACT

The research study established the effect of early blight disease on tomato production in Ibulanku sub county Bugweri district. The research questions were: how is early blight is spread in tomatoes, what are the effects of early blight disease in tomato yield or production and what are the possible solutions to control the effect of early blight disease in tomato production. The scope of the study included Ibulanku parish and Nawansega parish. The study was conducted within period of two months. The researcher used a descriptive research design. The study population composed of 30 respondents. The research instruments were interview guide, questionnaire, and observation. The data was carefully sorted, analyzed and interpreted and put in tables. The study found out that the spread of the early blight disease were wind, waters, splash rain drops, natural openings, insects and airborne disease. The effect of early blight on tomatoes was reduced crop yield, rotting of tomatoes, poor quality of the tomatoes, stunted growth and weakening of plant structure. The possible solutions to control early blight were cultural practices, fungicide application, crop rotation, planting resistant varieties and biological control. The conclusions were that agricultural officers should have regular visitations to the grower's gardens to give technical advise on what kind of insecticides to apply at every stage of tomato growth, organize workshops and seminars to sensitize tomato growers on how to control early blight disease, use of biological methods, planting resistant varieties, use of crop rotation, regular fungicide application and use of cultural practices.

CHAPTER ONE

1.0 Introduction

This chapter includes the background, problem statement, justification of the study, purpose of the study, general objectives of the study, specific objectives of the study, significance of the study, limitations, and delimitations of the study and definition of the key concepts.

1.1 Background Statement

According to Martine Dorais (2016), the tomato is the edible berry of the plant *solanumlycopersicum* commonly known as the tomato plant. Globally, the species originated in the West SouthAmerica, Mexico, and Central America. In Africa, the cultivation of tomatoes dates back to the early 16th century. The first countries to grow tomatoes in Africa were South Africa, Egypt, Kenya, Nigeria and Uganda. These countries were instrumental in growing tomatoes in the continent (Food and Agricultural Organization, 1989). Today Africa is a home for vibrant tomato industry. It has suitable climatic condition and fertile soils for this crop (Food and agricultural organization). In Uganda tomato growing first took root in districts like Wakiso, Mukono and Kampala. These districts provide suitable climate for this crop (Ministry of agriculture, animal industry and fisherie, [www Maaf go. Ug](http://www.Maaf.go.Ug)). In Bugweri district, tomato growing is largely done in IbulankuSub County in the parishes of Ibulanku and Nawansiga. They cultivate tomatoes for both local markets and foreign exports to the neighboring countries like Kenya. However, in the process of cultivation they have come across many effects on their crops.

1.2 Statement of the Problem

The tomato yield production in Ibulanku parish, Nawansega parish in Ibulanku Sub County in Bugweri district is constantly declining. The tomato farmers have devised various methods like timely planting, proper garden preparation, regular spraying with pesticides and seeking advice from the agricultural crop officers with knowledge in tomato production. Despite of this, there is still declining crop yield in tomato production. Therefore, the research study is intended to establish the persistent cause for the decline in tomato production in Ibulanku and Nawansega parishes in Ibulanku Sub County, Bugweri district.

1.3 Justification of the study

There is much cultivation of tomatoes in the parishes of Ibulanku, Nawansega in Ibulanku Sub County in Bugweri district. First there was much crop yield (production). However, with time there is declining crop yield, poor quality products produced. This is as result of early blight which attack tomatoes. It has led to an alarming increase on the attack of the tomatoes causing much or low crop production.

1.4 Purpose of the Study

The purpose of the study was to establish how early blight disease is spread on tomatoes, effects of the spread and possible measures to prevent early blight in Ibulanku parish and Nawansega parish in Ibulanku Sub County in Bugweri district.

1.5 General Objective of the Study

The general objective of the study was to establish why there was persistent decline in tomato yield or production per acre.

1.6 Specific Objectives

- i. To establish how early blight is spread in tomatoes
- ii. To establish the effect of early blight in tomato yield or production
- iii. To suggest the possible measures to prevent early blight in tomato production

1.7 Research questions

The study was guided by the following research questions;

- (i) How is early blight spread in tomatoes?
- (ii) What are the effects of early blight in tomato yield or production?
- (iii) What are the possible measures to prevent early blight?

1.8 Scope of the study

1.8.1 Geographical scope.

The study was carried out at Ibulanku and Nawansega parishes at Ibulanku Sub County in Bugweri district. Ibulanku Sub County is found along Iganga- Bugiri high way 1 km² off Bugweri district head quarters on Ibulanku murram road.

1.8.2 Context scope.

The study was about the spread of early blight in tomatoes, effects of early blight on tomato yield and possible measures to prevent early blight in tomatoes.

1.8.3 Time scope

The study was conducted in two months. During that time the researcher was administering, analyzing, interpreting the data, computing using tables, discussing, drawing conclusions and recommendations.

1.9 Significance of the study

The research findings were significant in the following ways;

The tomato growers got to know how early blight is spread, the effects of early blight on tomatoes and the use of preventive measures so they get high yield.

The sub county agricultural officers got to know the effects of early blight disease on tomato production in Ibulanku and Nawansega parish and organize workshops and seminars to teach tomato growers on how to control the effects of early blight disease on tomato production.

Declining yield: To get fewer yields than what is expected

Chemical crop management: Control tomato early blight disease by application chemicals

Agricultural officer: An employer at the district level in crop husbandry.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.0 Introduction

The literature review was based on the text books of other authors, dissertation reports and internet. It was reviewed based on the sub themes below;

How is early blight spread in tomatoes?

Effects of early blight on tomato production

Possible measures to the effect of early blight on tomato production

2.1 How is early blight spread in tomatoes?

According to Shuman (1995), early blight is spread during splash rain drops. Heavy splash rain drops breaks the leaves of tomato or cause wounds on tomato stems. This makes it easy for *asolani* which is a polycyclic pathogen which enters the wounds of the stem causing to have stunted growth which leads to few flowers hence less fruits leading to low yield.

Pscheidt (1985), observed that pathogen over winters as mycelium in plant debris, soil, infected tubers or other host plants of the same family making the plant to weaken. This makes it not to bear many flowers that result into many tomato fruits thus low production.

According to Pelletier et al. (1988), suggests that cold temperatures in or on the soil makes early blight to survive causing *Chlamydo* spores which cause the tomato plant to have over wintering inoculum for early blight which cause rotting on the tomatoes.

Pscheidt (1985), observed that early blight fungus survives the winter on infected debris or which can be brought with infected seeds that initiate the disease in the spring and

this makes any fungal conidia spores surviving in the soil or debris to be splashed on the lower leaves during rainy season. This makes the tomatoes not to bear more flowers that result into fruits.

According to Rands RD (1997), points out that early blight is brought when germinated conidia infect tissues of the foliage if it remains wet for 5 to 10 hours. It makes it easy to penetrate and cause stem damage. This makes the plant to have stunted growth thus low yield.

ChaeraniandVoorrips (2006), noted that high humid and temperatures above 75⁰F favour disease development; it is scotched by much heat so it tends to multiply and spread very fast into tomatoes.

According to Prusia(1986), found out that wind has played a key role in the spread of early blight. As the strong wind blows, the infected plant will lean on the plant that is not infected. The result is that the disease will get attached to the tomato which is free from the early blight.

Christ (1989), experimented and came out with the findings that the early blight can stay in the soil for 3-5 years. The crop grower cannot wait until these years when the crop dies. He or she just plants which makes the spread of the disease easy.

Gleason (1995), revealed that failure to have crop rotation makes the disease to spread. It was noted that due to small pieces of land, some tomato growers do not practice crop rotation the result is before the early blight dies, the host is already in place which makes the continuous spread of the disease.

According to Holley (1985) noted that early blight is spread by wetness of leaves and low and humid temperatures. These are the optimum conditions for early blight which makes it to spread.

According to Oda (2006), the fungus responsible for early blight, *alternariaSolani* over winters in the soil on the plant debris. It can be spread through waters, wind or by splashing rain drops which is why the disease is commonly referred to as “early” blight. The fungus enter the plant through natural openings such as stomata or through wounds caused by insects or mechanical damage once the inside the plant, the fungus produces enzymes that break down cell walls and release nutrients for its growth.

Beckles, (2012) says that early blight can be introduced into the field through infected seeds. The pathogen can survive in seeds for several years, making it crucial to purchase seeds from a reputable source and to treat them with fungicides before planting.

Soil borne infection: Early blight can survive in the soil for several years, especially in warm, moist conditions. The fungus can enter the plant through wounds or natural opening such as stomata. Good soil management practices such as crop rotation can help to reduce the risk of early blight.

Air borne spread: Early blight can also spread through airborne spores which are produced by infected plants and can be carried by wind. Rain and high humidity can facilitate the spread of the disease by increasing the number of spores released into the air Oda,(2006).

2.3 Effects of early blight on tomato production

According to Gomes,(2010) variation of environmental condition such as soil, season, and climate make the tomato plants not to put on more fruits. This reduces the quality of the fruit.

Fooland M,(2007) says that lesions occurring on stem often sunken lease shaped with a life center and have typical concentric rings. This makes the stem weak thus fewer flowers will be put reducing the crop yield.

Rotem J,(1994) discovered that bull's eyes type lesion is highly characterized of early blight. They make leaves turn Chlorotic and cause leaf foliage thus less flowers that bear fruits.

According to Kummit J, (2010) observed that when the black/brown lesions and under conducive environmental conditions make lesions to enlarge and cause a yellow halo. These surround the plant and weaken it causing the foliage of leaves thus less flowers that bears fruit.

According to Kummit G,(2002) as the disease progresses, the affected leaves may die, leading reductionn the plant's ability to photosynthesis. This can cause the plant to produce fewer flowers and ultimately, fewer fruits reducing the crop yield.

Poor fruit quality: Infected fruits may develop sunken spots which can lead to rotting and decline in overall fruit quality causing reduction in the yield, (KummitG 2002).

According to RandsR.D, (1997) it weakens the plant structure: the loss of leaves due to early plant disease can weaken the overall structure of the plant making it more susceptible to other diseases and pests.

Slowed growth: The energy the plant uses to fight off the disease may come at the expense of its growth, causing delays in the ripening of fruits (Rand, 1997).

According to Rotem J,(1994) it leads to stunted plant growth in severe cases, the disease can the plant to become stunted and produce few or fruits.

Infected leaves will show characteristic brown circular lesions with a darker border, which may expand and merge overtime. As the disease progresses, the lesions may develop grayish white, velvety appearance due the growth of fungal spores: the stems of the infected plants may also develop cankers, which are sunken, discolored areas that can girdle the stems and cause it to die back: fruit infection can lead to the development of small, sunken, dark lesions, which can eventually rot and decay causing heavy loss in the harvest, (Pelletier, J R 1988).

2.4 Possible measures to prevent early blight on tomato production

According to Beckles,(2012) says that application of innocuous products on the surface of the tomatoes, decrease the temperature. This makes the early blight break the cycle thus increasing the tomato production.

Oda,(2006) observes that application of modified atmosphere packing makes the early blight weaken and eventually breaks. This is because it does not breed under dry temperature. It only lives in humid temperatures of 7°F.

According to Food and Agricultural Organization (1989), argued that adequate application of pesticides breaks the life cycle of early blight. It further noted that in rainy areas, high furrows should be used to avoid watering and flooding.

Oda, (2006) says that a careful and well planned management should be practiced. For example use of fatigation and proper watering and addition of auxin contribute to an increase in fruit production and size.

Food and Agricultural Organization,(1989) further says that use of green house production will help to satisfy the internal demand for fresh tomato consumption in off season. This will make the tomatoes to grow in to environment which is early blight free. Thus bearing more flowers leading to more fruits.

Backles (2012), observed that plastic tunnels can be used to control ripening during the low temperature season. This will make early blight break the cycle and quality tomatoes will be produced.

According to Holley, (1985) cultural practices can also help to prevent early blight. These include proper plant spacing, removing and destroying infected plants, avoiding overhead watering, and using mulches to keep moisture consistent.

Fungicide application: Application of fungicides can help to control early blight. It is essential to choose a fungicide that is effective against *alternariasolani* and to follow label instructions for proper application and timing, (Holley, 1985).

Gomes, (2010) observed that crop rotation can help to control early blight disease through breaking the life cycle of it by reducing the buildup of the fungus in the soil. Planting tomatoes in a different part of the field each year can help to minimize the risk of infection.

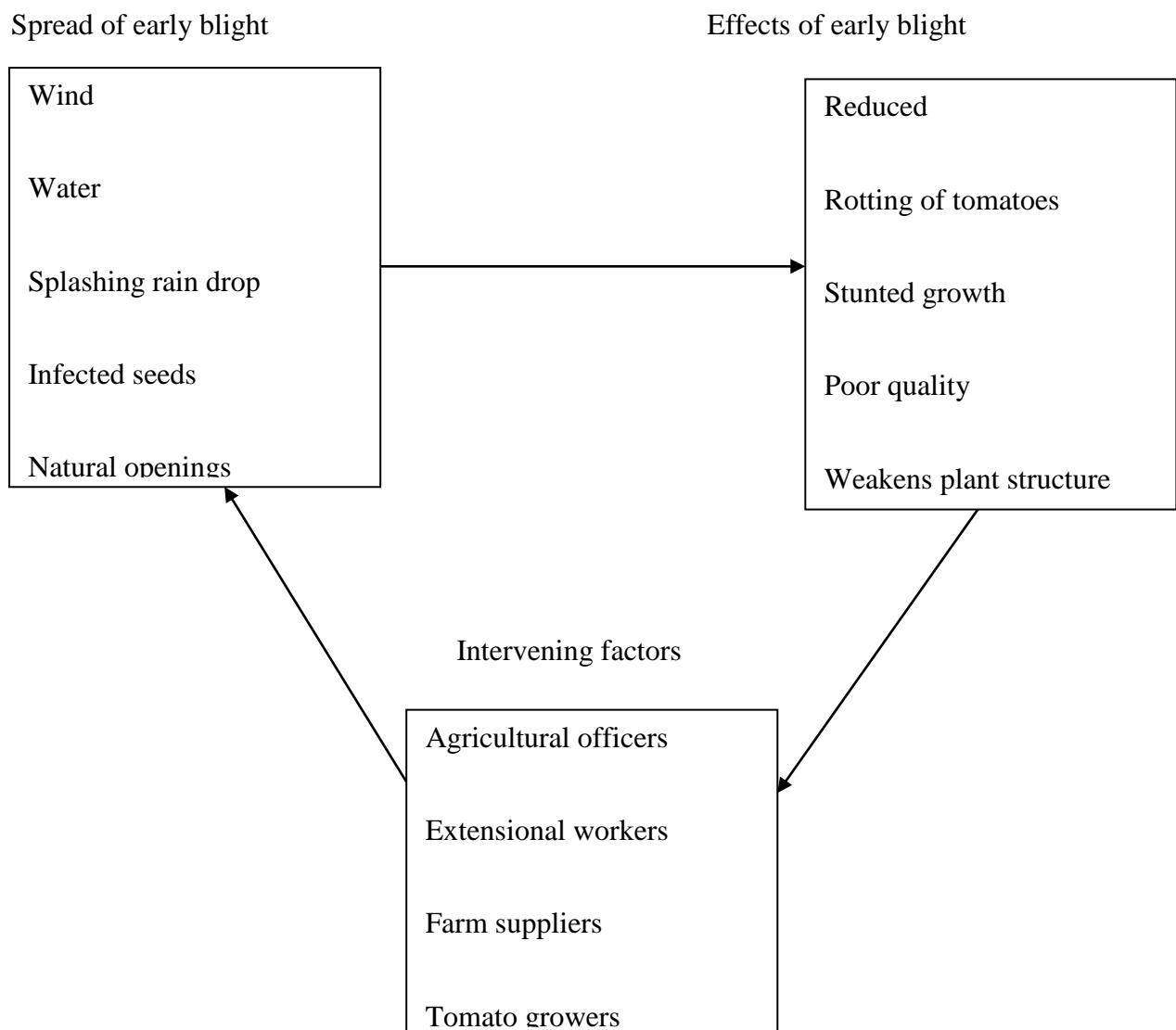
Resistant varieties: Growing tomato varieties that are resistant to early blight can help to minimize the impact of the disease. Breeding programs have developed several cultivars with improved resistance to early blight.

2.4 Conceptual frame work

It consists of the relationship between dependent variable, independent variable and intervening variables. Variables are characteristics that can take on different values such as height, age, temperature or test scores. Researchers often manipulate or measure independent or dependent variables in studies to test cause and effect relationships

Figure 2.1: Conceptual Framework

The relationship is that independent variables stand on their own to cause an effect(s) on dependent variables



In the table above, the independent variables like wind, water, splash rain drops, infected seeds, natural openings cause dependent variables like reduced crop yield, rotting of tomatoes, stunted growth, poor quality and weakening of the plant structures. Therefore to reduce the dependent variables there is need for intervening factors, like agricultural officers, extension workers, farm suppliers and tomato growers.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

Under this chapter, is the research design, study population, sampling procedure, research instruments, validity and reliability of data, data analysis and ethical consideration?

3.1 Research Design

The research adopted a descriptive research design. It was mainly concentrated on observation and description of situations as observed. It mainly depended on research questions. Data was analyzed using qualitative research methods of data analysis from which empirical data was used to make conclusions. Various responses were recorded, analyzed and then interpreted in the respect of conditions in which they existed.

3.2 Study population

The research had a study population of 30 respondents. That is 02 sub county agricultural officers and 28 tomato growers from Ibulanku and Nawansega in Ibulanku Sub County.

3.3 Sample size

The study was carried out in two parishes, Ibulanku and Nawansega parish. This is because these two parishes grow tomato on large scale.

3.4 Sampling technique

The researcher used purposeful sampling technique to select the respondents. This is because the respondents had specific required information.

3.5 Research instruments

The research used three research questionnaires and observation.

3.5.1 The questionnaire

Is a self-printed form that is designed to obtain information through written responses. “[http/wiki/questionnaire](http://wiki/questionnaire)” it was administered on ten respondents that is 02 agricultural officers and 08 agricultural input sellers? These respondents were elites so it was not to be supervised, it would make respondents feel free during filling. It also saved time for both respondents and the researcher.

3.5.2 The interview guide

It involved face to face interaction of the researcher with the respondents. It was good to those who cannot read and write. It also helped them to seek for clear information where had not understood.

3.5.3 Observation

This involved body sense that was seeing and I also participated in the observation.

3.6 Data collection

The researcher got an introduction letter from the university in charge to research department. It was taken to the officers where the research was carried out. It was mainly to request the officers to grant permission.

3.7 Validity and reliability of the data

3.7.1 Validity

This is the extent to which a test measure measures an intended attribute or subject scope efficiency. The instrument was tested and pre tested for consistence in one parish using ten respondents and the responses were captured for analyzing for consistence.

3.7.2 Reliability of data

It is the ability of the test to produce results that which are consistent and accurate on repeated administering after interval to some population. It was used to show that the result produced was consistent.

3.7.3 Data analysis

After the collection of the distributed instruments, the researcher checked their competency and put them in the tables. This aided the researcher to carry out more analysis and interpretation.

3.8 Ethical considerations

No any information given by the respondents was revealed out. It was used mainly for academic purposes only. There was respect and integrity of respondents. No embracing questions were asked.

CHAPTER FOUR

PRESENTATION, ANALYSIS AND INTERPRETATION OF DATA

4.0 Introduction

This chapter dealt with presentation, analysis and interpretation of data collected. The data was on how early blight was spread, effect of early blight on tomato production and the possible measures to prevent early blight.

The data analyzed was basically responses from the respondents. The analyzed responses were captured from extension workers, agricultural officers and farm suppliers and tomato growers.

4.1 Demographic data of participants

Table 4.1 Gender of the respondents

Sex	Number	Percentage
Male	20	67
Female	10	33
Total	30	100

Source: primary data

From the above table, it was revealed that the researcher revealed more males(67%) than the females(33%). This is because most tomato growers were males.

4.2 Presentation and analysis of section A

Table 4.2: Category of respondents for Ibulanku, Nawansega parishes

Title	Number	Percentage
Agricultural officer	2	7%
Extension worker	5	17%
Farm supplier	10	33%
Tomato growers	13	43%
Total	30	100

Source: Field data

(7%) reveals the agricultural workers at the sub county, (17%) is for the extension workers who visits the fields (tomato growers) while (33%) is for farm suppliers who provide agricultural pesticides and (43%) are the tomato growers.

Table 4.3: Farming experience in tomato growing

Years	Number	Percentages
1-2	10	33%
3-5	15	50%
7 and above	5	17%
Total	30	100

Source: Field data

(33%) of the respondents had a farming experience of (1-2) years, (50%) were the majority with the farming experience of (3-5) years while (17%) represented those with (7) years and above.

Table 4.4: Marital status of the respondents in Ibulanku and Nawansega Parish

Marital status	Number of respondents	Percentages
Married	20	67%
Single	7	23%
Divorced	3	10%
Total	30	100

Source: Field data

The above table indicates (67%) are married while 23% are not married and 10% divorced.

Table 4.5: How is early blight disease spread?

Responses	Agricultural officers(2)	Extension workers(10)	Farm suppliers(10)	Tomato growers(8)	Total(30)	Percentages
Wind	2	8	4	3	17	57%
Waters	2	6	5	4	17	57%
Splashing rain drops	2	4	3	4	13	43%
Natural openings e.g.stomata	1	3	4	5	13	43%
Insecticides	2	10	4	8	24	80%
Infected seeds	2	10	5	10	27	90%
Airborne spread	1	6	2	3	12	40%

Source: Field data

The responses revealed that, wind is one of the ways early blight is spread. (17%) of the respondents came up with this view. It spreads from the infected plant to the non infected plants.

(17%) also suggested that the disease is spread through water. When water is much in the nursery bed or garden enters the plant through sipping. It flows from infected to non infected plant.

While (13%) of the respondents noted splashing rain drops as one way the disease is spread. The rain drops can break off some tomato branches while leaving damages on plants making it easy for the disease to enter.

(43%) of the respondents came up with the view that natural openings like stomata where the wind can easily blow the early blight.

(80%) of the respondents argued that insects make wounds on leaves or plant itself where the early blight enters.

(90%) of respondents suggested that infected seeds. They said that the pathogen survives in seeds for several years making it crucial to purchase seeds from a reputable source causing the damage.

(40%) brought the view of the airborne disease. These are produced by affected plants and can be carried by wind.

Table 4.6: Effects of early blight on tomato production

Responses	Agricultural officers(2)	Extension workers(10)	Farm suppliers(10)	Tomato growers(8)	Total(30)	Percentages
Reduced yield	2	8	9	8	27	90%
Rotting of the tomato	2	7	8	8	25	83%
Poor quality yield	2	5	6	8	21	70%
Stunted growth	2	6	5	7	20	67%
Weakens plant structure	2	5	4	8	19	63%

Source: Field data

From the table above 90% revealed that the disease causes reduced crop yield. This is because the affected leaves may die leading to a reduction in the plant's ability to photosynthesis hence fewer flowers thus fewer fruits.

While 83% noted rotting of tomatoes. This is caused by the water that enters the tomato seed causing it to rot.

70% came up with the view that the poor quality yield is common, this is as a result of sunken spots which lead to rotting leading to low fruit quality.

67% noted that stunted growth lead to poor yield. This may cause the plant to produce fewer or no fruits and 63% revealed weakening of the plant structure. It is as a result of loss of leaves which aid in photosynthesis which help to manufacture plant food.

Table 4.7: Possible solutions to prevent early blight that lead to low tomato yield

Responses	Agricultural officers(2)	Extension workers(10)	Farm suppliers(10)	Tomato growers(8)	Total(30)	Percentages
Cultural practices	2	9	8	8	27	90%
Fungicide application	2	10	10	8	30	100%
Crop rotation	2	8	8	2	20	66%
Resistant varieties	2	9	5	5	19	63%
Biological control	2	5	4	4	15	50%

Source: Field data

From the table above 90% of the respondents noted cultural practices like burning and burying of infected crops reduce the spread of early blight.

100% of the respondents supported fungicide application; this is done by using recommended fungicides as guided by farm suppliers or extension workers to reduce the early blight.

66% of the respondents were of the view that crop rotation reduces the spread because it breaks the life cycle of the early blight disease by reducing the buildup of the fungus in the soil.

63% of the respondents suggested planting resistant plants help to reduce early blight. While 50% observed that having biological practices help to reduce early blight, this is done by introducing beneficial fungi which help to compete with pathogen which can suppress the disease.

CHAPTER FIVE

DISCUSSION OF THE FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This chapter covers summary of the findings, conclusions and recommendations of the study and ends with areas of further research.

5.1 Discussion of the findings

Based on the research findings the discussion is given below as per each objective.

5.1.1 How early blight disease is spread in tomatoes?

Early blight is spread with wind. Shuman (1995), agrees with view. Early blight is spread by water pscheidt (1985), is in line with this finding which says that the rain drops can splash the effected plant disease to safe one. He further says that the splashes of rain drop also make the water carry contaminated disease to a safe one. Early blight is also spread through natural openings. Pscheidt (1985), agrees with finding. Early is also spread by airborne disease germ, Prussian is also in line with this view. He says that the contaminated airborne disease gets spread on leaves and makes it infected.

5.1.2 Effects of early blight on tomatoes

The effect of early blight on tomatoes result into reduced crop yield. Fooland (2007), is also with this view he says that lesions occurring on stem often sunken and hence shaped with a life center reducing the number of flowers which results in to fruits. Another find is rotting of the tomatoes. This finding is in line with kummit J (2010). Poor quality of the tomatoes is another finding. Rotem J (1994), agrees with this. They cause leaf foliage affected with

disease germ to rotting of tomatoes. Stunted growth of tomatoes and weakening of the plant structures is another finding. Rands RD (1997), supports this view. It makes the plants not to stand and put on fruits which are affected with the disease germ and cause rotting.

5.1.3 The possible measures to prevent early blight

The possible measures to prevent early blight are: the use of cultural practices like burning infected plants help to prevent early blight disease. Food and agricultural organization (1989), had the same finding. Fungicide application is another possible measure. Oda (2006), agrees with this finding. He observes that application modified atmosphere packing breaks the spread of early blight. The use of crop rotation helps to break the early blight life cycle. Beckles et al (2012), found out the same view. Planting resistant tomatoes (varieties) is another measure. Beckles (2012), has the same observation. Another possible measure biological control. Gomes (2010), has the same support of the finding. He says this breaks the life cycle of the early blight disease germ

5.5 Conclusion

Early blight is spread by wind, wet conditions, and natural openings and airborne. It affects crop yield, leads to poor quality of tomatoes and stunted growth. The possible measures are cultural practices, fungicide application, crop rotation, planting resistant tomatoes and biological control.

5.6 Recommendations

The recommendation was made as per the possible measures;

Tomato growers should use cultural practices in controlling early blight disease.

Tomato growers should use regular application of fungicide from nursery, transplanting, during growing up to harvest time.

Tomato growers should use crop rotation to break the life cycle of early blight.

Tomato growers should select and resistant tomato varieties.

Tomato growers should use biological control methods.

Regular organization of workshops and seminars to sensitize should be carried out.

Agricultural officers should have regular check up the tomato growers' gardens to detect if there is early blight disease.

5.7 Areas for further study

Effects of timely planting and management on crop production.

The effects of use of recommended fungicide application on tomato production.

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Laval University, Quebec, Canada

An interview guide to the tomato growers

For how many consecutive years have you participated in tomato growing

Which sex participate more in tomato growing?

How is early blight spread on tomatoes?

What is the effect of early blight on tomato production?

What are the possible solutions to early blight that affect tomato production.

APPENDIX I: TIME FRAME

NUMBER	TASK	WEEK	KEY ACCOMPLISHMENT
1	Writing the proposal	2	Proposer writer
2	Constructing and presenting the instruments	1	Writing and typing research questions
3	Administering the research tools	1	Research tools administered
4	Collecting the research tools	1	Research tools collected
5	Data analysis, interpreting and sorting	2	Data analyzed, interpreted and sorted
6	Writing the research report	3	Research report written
7	Typing the research report	1	Research report typed
8	Proof reading the research report and editing	2	Research report proved, read and edited
9	Handing in the research report to the supervisor	1	Research report handed to the supervisor

APPENDIX II: BUDGET

NUMBER	ITEM	QUANTITY	AMOUNT
1	1 ream rot trim	1	30,000
2	Pens	5	2500
3	Pencils	5	500
4	Rulers	2	3000
5	Typing proposal	1	40,000
6	Binding proposal	1	1500
7	Administering the research tools		50,000
8	Transport		50,000
9	Lunch		50,000
TOTAL			227500shs

APPENDIX III: QUESTIONNAIRE

SECTION A

Bio Data:

1. Category A respondents

- (a) Agricultural officer (b) Extension worker (c) farm supplier

 (d) tomato grower

2. Marital status. (a) Male (b) female

3. Farming experience. (a) 1-2 years (b) 3-5 years (c) 7 and above

SECTION B

4. How is early blight spread in tomatoes?

- | | |
|----------|-----------|
| i. | iii. |
| ii. | iv. |

5. What is the effect of spread early blight on tomatoes?

- | | |
|----------|-----------|
| i. | iii. |
| ii. | iv. |

6. What are the possible measures to the spread of early blight in tomatoes?

- | | |
|----------|-----------|
| i. | iii. |
| ii. | iv. |