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# MANAGEMENT OF PESTS CAUSING POST HARVEST LOSSES IN BEANS STORES OF BULEGENI TOWN COUNCIL, BULAMBULI DISTRICT

**BY**

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**A RESEARCH REPORT SUBMITTED TO THE DEPARTMENT OF BIOLOGY IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF BACHELLORS OF SCIENCE EDUCATION IN THE FACULTY OF SCIENCE EDUCATION, BUSITEMA UNIVERSITY**

**SUPERVISOR: Asso. Prof. DR ANDAMA EDWARD**

## DECLARATION

I MAGOMU KENNETH ,hereby declare that this research report on the management of pests causing post-harvest losses in bean stores at bulegeni town council in Bulambuli district has been prepared and submitted to the department of Biology ,Faculty of Science Education in the partial fulfilment of the requirement for the award of Bachelors of Science Education degree is my work and has not been presented for award in any other institution of learning.

The contribution of other authors in addition to my work has been credited and fully included in the section of references.

MAGOMU KENNETH.

## APPROVAL

This research report on the management of pests causing post-harvest losses in beans in Bulegeni town council, Bulambuli district has been submitted with approval of my supervisor below.

Signature: .....

Date: 18/10/2024

(SUPERVISOR)

**Acronyms and abbreviations**

NAADA National Agricultural Advsisory Services

FAO Food and Agricultural Organizations

MAAIF Ministry of Agriculture, Animal Industry and Fisheries

PARM Platform for Agricultural Risk Management

UBOS Uganda National Bureau of Statistics

PHL Post- Harvest Losses

SSA Sub Saharan Africa

## TABLE OF CONTENTS

**ABSTRACT**

This research examined the various pest species that destroyed on these crops, the degree of harm they inflicted and the management strategies currently employed by farmers to keep them under controlled within the area.

In order to reduce losses and enhance food security, this research also assessed the efficacy of the pest management techniques already in use and pinpointed areas for improvement(O'Cathain, A., & Thomas, 2006), such as surveys, field observations, and interviews, in order to collect pertinent data and efficiently analyze the findings.

Questionnaires and interviews were used with the aim of identifying the management practices of the different pests that were identified to be causing the post-harvest loses during beans storage in these stores

Insect pest in particularly the beans weevils and the large legume borers were found to be the major pests causing post-harvest loses both at a percentage frequency of 100%.various biological, chemical, cultural and physical methods are used to manage the pests in these stores, these methods can also be used or integrated together in this pest management, physical methods such as sun drying was the mostly used form of pest management with a percentage frequency of 90%.

# CHAPTER ONE: INTRODUCTION

## 1.0 Background of the study

For farmers and other agriculture industry stake holders , post-harvest losses in storage of beans posed a serious challenge .These losses are caused by infestation of rats ,weevils , moths or other pest species that harm crops and lower their market value (Baldock, 2001).

Beans are the most important cultivated crops by most Ugandans .They are among the priority crops that the government support and promote under its new strategic policy (ASDP,2015/2016 -2019/2021).In most parts of the country beans are grown twice in a year utilizing the bimodal rainfall opportunity. Shortage of land has resulted in to continuous cropping which has led to decline in soil fertility(Shim & Striebel, 2003). Beans provide income close to two million households, primarily grown for income generation until recently they did not constitute the major part of the diet like in the neighboring countries ,in addition to food, beans have had a wide range of other uses including processing of livestock and poultry feeds and making of local brew .Farmers ranked pests and diseases as the main constraint to beans production followed by inadequate capital to invest in production with low and fluctuating prices(Simon, Karapetrovic, & Casadesús, 2012).

Storage of beans among small scale farmers and traders is mostly on the cob usually in traditional grain silos but shelled beans are put in to polypropylene sacks with or without chemical protection .This exposes the stored beans to attack by storage pests. In Sub-Saharan Africa, post-harvest losses due to arthropods have been estimated at 20% and therefore it is important to mitigate these and other post-harvest losses to ensure food security(Skarbøvik & Roseth, 2015).

The term post-harvest loss refers to measurable quantitative and qualitative food loss in the post-harvest system, this system comprises interconnected activities from the time of harvest through crop processing, marketing and food preparation to the final decision by the consumer to eat or discard the food(Treseder & Lennon, 2015).

In days interventions in post-harvest losses reduction such as the use of hermetic technology to control pests during storage are seen as an important component of the efforts of many agencies to reduce food insecurity(O'Cathain & Thomas, 2006).Therefore reducing post-harvest losses along with making more effective uses of today's crops , improving productivity on existing

farmlands and sustainably bringing additional acreage into production is critical to facing the challenge of feeding and increased world population .it is however evident that postharvest and value addition are integral components of strategies to improve agricultural productivity and linkages between farmers and markets which will help to contribute to food security and economic development of its target population (Baldock, 2001) .

### 1.1 Problem Statement

Beans post-harvest losses during storage is caused majorly by insect's pests that attacked the beans in stores where good pest management is not adhered to. In a study on agricultural productivity constraints in Uganda, farmers ranked pests as the main constraint to beans storage (Bahiigwa and Nabumba 2010).Suleiman (2015) reported that 40% of the beans losses is due to those caused by pests during storage and is therefore important to mitigate this losses .This research assessed the pest management practices of beans post-harvests losses in stores of Bulegeni town council, Bulambuli district.

### 1.2 Objectives of study

1 To document the type of pests that cause beans post-harvest loses in the stores.

2. To describe the damages caused by the pests to the beans in stores.

3. To access the management practices of reducing beans post-harvest loses in the stores of Bulegeni Town council

4 To recommend appropriate pest management practices for reduction of bean infestation in the stores of Bulegeni town council.

### 1.3 Research question

1 .Which pests cause beans post-harvest loses in the stores of Bulegeni Town council?

2. Which type of damage is caused by pests to the beans in the stores of Bulegeni town council?

3. How do store keepers manage pests that cause post-harvest loses in the stores of Bulegeni Town council?

### 1.4 Scope of the study

This research study has been conducted to identify pests, damages and post-harvest loses in the beans stores of Bulegeni town council on 10 /MARCH /2024 typically in magale ward and in kavule Parish. This research was done in one week and the report has been written for overall results of the research.

### 1.5 Significance of the study

Beans are of great value since they contributed to most of the food consumed by people and animals in bulegeni town council and this is important as it equips farmers with the necessary skills on how to manage pests in stores so as to eradicate the loses. .Pests form the major problem in the storage especially where good storage management practices are not adhered to.

# CHAPTER TWO: LITERATURE REVIEW

## 2.0 INTRODUCTION

Grain loss from the point of separation from the growth or production site to the point of grain preparation for consumption is referred to as post-harvest losses. Some authors characterize post-harvest loss as the quantifiable, qualitative, and economic loss of grain along the supply chain, or as the system that occurs after harvest and continues until it is consumed(Sigee, 2005). Post-harvest losses of beans in Sub-Saharan Africa (SSA) varied from 5–40%, costing approximately 4 billion (USD), according to data from the World Bank and the Food and Agriculture Organization of the United Nations. Post-harvest losses of maize and beans in Eastern and Southern Africa make almost 40% of all post-harvest losses, according to a recent joint FAO report.

## 2.1 TYPES OF LOSSES

Post-harvest loses are classified in to three main categories .quantitative loss, qualitative loss and economic or commercial loss .others classified as direct and indirect losses,quatitative loss indicate a reduction in physical weight and can be readily quantified and valued, example a portion of grain damage by pest or lost during transportation .a qualitative loss is contamination of grain by molds and includes loss in nutritional quality ,edibility, consumer acceptability of the product and calorific value.ecomomic loss is the reduction in monetary value of the product due to a reduction in quality or quantity of food(Buzby & Hyman, 2012)

## 2.2 storage pests

Insect pests are the principal causes of grain losses in the field and storage .in general, store keepers store beans for three main purposes, as food until next season, as seed and for selling when prices increase. However storage pests damages significant portions of their stored beans. The most serious insect pest that cause severe economic damage to beans in the storage are the beans weevils ,large grain borer(DEMIS & YENEWA, 2022)

### 2.2.1 Beans weevils

The beans weevils are small reddish brown to black snout beetle.it is described as one of the most destructive stored and primary grain pest of beans and grown in tropical and sub topical regions and it is so devastating and capable of multiplying to large populations causing tremendous damage to the stored legumes(Nilsson, 2004). It has been estimated that 5 to 30 percent of the total

legume weight of the stored product is lost due to infestation by the beans weevils .Other studies site as high as 80 percent loss may occur in untreated beans stored in traditional structures. Infestation by the weevil often begins in the field, but serious damage is done in storage conditions but normal range from 35 to 110 days, the adults emerge by eating their way towards the testa causing rugged exit holes resulting in to damaged and reduced weight(Sadiq, 2022)

### 2.2.2 The larger legume borer

The larger legume borer is the most destructive pest of farm stored beans and dried cassava roots causing weight loss of 9 to 45 percent after 5 to 8 month of storage ,it is native to mesa America where it is found infecting beans and woodland it is described as dual existence insect as both in storage pests and forest insect(Nguvu, 2015). The adult has a cylindrical bostriched shape ,the body is 3 to 4.5 mm long and dark brown in color (Uchechukwu-Agua, Caleb, & Opara, 2015). It has become a serious threat to stored beans and dried cassava reducing storage period of these commodities in stores of small scale farmers .It has spread to most of the countries in sub Saharan Africa and more recently it has been identified in 17 countries in Africa. This pest can also infest and cause damage to bamboo, plastic ,soap, stored timber and timber products(Mabberley, 2023). The control strategies include good store hygiene, clean the ware house or store between harvest and burning infested beans .others include harvest beans soon after mature ,the use of resistant varieties and traps-chemical attractants (pheromones)produced by the male beetle to attract females .other methods include immerse used sacks in boiling water to eliminate residual infestations, addition of inert dust (ash and clay),store the legume in hermetic seal container and removing any wood materials from stores .in addition fumigation with phosphine and application of synthetic parathyroid insecticides such as permethrin and deltamethrin shows positive result against the pest(Sadiq, 2022)

## 2.3 Management practices of pests that cause post-harvest losses in stores

Multidisciplinary approaches and several technologies have been developed to reduce post-harvest losses in developing countries. However the potential gain from adopting these technologies have challenged particularly in rural areas(Ulusoy, 2022). The main constraints of the post-harvest loss reduction in developing countries are mostly small holder farmers are reluctant to changes unless the losses are considerably higher than average(demis and yenewa) ,in addition ,these technologies turn up to be inappropriate for small holder farmers and unavailable at the right price and right

time .also inadequate knowledge of the biological and environmental factors on product detoriation and adopt technology only when are offered free of charge .further quoted by Mena et al(2009)the main set back of post-harvest loss reduction in less developed countries is a huge gap between agricultural technologies developed at research institutions and its adoption by small holder farmers. The limited adoption of technologies in rural areas is due to lack of disseminating information .he continued and adds most of the technologies offered or developed by researches and development patterns are unsuited and perceived as irrelevant by most small holder farmers.morever the factors such as social economic status, education background,ecomomic motivation and training received have a positive correction with technology adoption, never the less hermetic storage technology is considered the best solution to combat the post-harvest losses in developing countries(Kiaya, 2014)

### 2.3.1 Hermetic storage technology

Hermetic storage is an ancient method to control insect infestation and preserve the quality of products .hermetic storage also termed as hermetic silo storage, sealed storage, air tight storage, sacrificial sealed storage has emerged as an alternative and cost efficient methods for minimizing post-harvest losses and increases food security in developing countries. The basic principle of hermetic storage based on the simultaneous depletion of oxygen and accumulation of carbon dioxide in the storage container. This is achieved by the aerobic respiration of the beans, insects and molds. The lack of oxygen inside the containers causes insects to suffocate, become inactive and eventually die of asphyxiation or desiccation. The main advantages of hermetic storage are simple,feasible,eliminate the need of toxic chemical(insecticides)or fumigations ,climate control and environmentally friendly .hermetic storage is a technology that help farmers to store their beans with negligible loss of quality(Odjo, Burgueño, Rivers, & Verhulst, 2020) .

### 2.3.2 Purdue improved crop storage

Purdue improved crop storage bag also known as the triple layer bag consisting of three plastic liners two 80 micron high density polyethylene plastic bags, one surrounded by the second; both are enclosed by a third bag of woven poly propylene bag for reinforcement .this technology was created in the late 1980 under the USAID project for the preservation of cowpea grain in sub Saharan Africa. The technology was named Purdue improved cowpea storage bags and served as protection against callosobruchus maculates a destructive cowpea seed beetle(Jones Jr & Case,

1990). Purdue improved storage is based on the principal of bio generated modified atmosphere, where oxygen environment low inhibits the growth and development of insect pest.it takes advantage of an airtight seal where oxygen concentration dramatically decreases while carbon dioxide levels propositionally increases within few days after sealing through respiration of insects, fungal and seed(Mendes, Nascimento, Picoloto, Flores, & Mello, 2020). Further the to store their seed with minimal loss unlike other technologies it has been easily accepted by farmers and many studies prove to be effective storage systems for a variety of crops, including cowpeas, maize, sorghum, peanuts, wheat against insect infestation, fungal growth and aflatoxyn accumulation(Yoshimoto, 2010). However the effectiveness of hermetic technology depends on several factors Purdue improved crop storage technology has been considered low cost non chemical technology that enables small holder farmers such as air tightness of the seal, the commodity stored, agro climate conditions type and prevalence of insect pests and mechanical strength of the barrier materials(Harris et al., 2001).

### 2.3.3 Metals silo technology

The metal silo technology is an effective method of reducing beans post-harvest loss for small and medium scale farmers in developing countries. This technology provides beans protection for both short and long time storage against insect pest, pathogens, birds, molds, rodents, theft and other domestic animals(Brown, Skougstad, & Fishman, 1970). The metal silo is a cylindrical square or rectangular prism structure, constructed from a high quality galvanized iron sheets and hermetically sealed with a top inlet and a smaller bottom lateral outlet. The main advantage of metal silo is hermetically sealed .thus eliminates or reduces oxygen and increases carbon dioxide concentration inside.consequetly suffocates and killing any insect pest inside .the metal silo is a key and a promising technology for effective post-harvest management of beans for small scale farmers in developing countries.in addition metal silo improved food security ,maintained legume quality, reduced women workload ,improved family health and reduced usage of storage pesticides .also improved hygiene and welfare and creates jobs for artisans or metal workers(Langat, 2020).

### 2.3.4 Silo bags

The silo bags or legume bag was originally developed as temporary storage system for chopped legume sillage.now days has emerged as the best alternative for bulk legume storage in Argentina, Australia, Canada and us. Silo bags are hermetically sealed to prevent the growth and development

of insect pests and molds, consequently reduce post-harvest losses, storage cost and maintain quality of beans .Typically silo bags consist of three –ply of 0.25mm thick polyethylene films. The outer layer is painted white to reflect solar radiations while the inner layer is black to block sunlight .it is about 60m by 3m length to diameter and can store up to 200 tons of beans ,soya beans or wheat. The silo bags can play an important role as temporary on-farm bean storage during bumper harvest in mid-west and mid-south US, and eliminates the immediate need to transport beans to the elevator as well as increase harvesting efficiency and reduce farming costs .like other hermetic bags when proper air tight the silo is water resistant and achieves a high degree of oxygen and carbon dioxide level that attain hermetic storage environment. Moreover, the main short comings of silo bags are vulnerable to damage from birds ,wild animals ,insect pests and rodents ,and silo bags can only be used once(Okolo, Chukwu, Adejumo, & Haruna, 2017) .**in** addition ,it is difficult to monitor temperature and moisture movement within a bean mass, the beans conditions are influenced by external climatic conditions and moisture migration can occur within the bags .likewise ,an over load of silo bag can result in bag breaking ,needs special loading and unloading equipment and the bag should be inspected regularly for leaks or damage by vermin(Okolo et al., 2017).

# CHAPTER THREE. METHODOLOGY

## 3.0 Introduction

This research employed a qualitative approach to collect data from various respondents .Qualitative research involved a descriptive and exploratory research where data collected cannot be transformed in to numbers but a thorough analysis of phenomena within the research area is done to help find facts and understand them(Chelangat, 2023).

## 3.1 Area of study

This research was carried on the beans stores located in different trading centers found in two parishes of Magale ward and Kavule in Bulegeni town council, Elgon constituency Bulambuli district.

## 3.2 Research Design

The research study was conducted using a case study design where the beans stores selected were used to analyze the topic of study in two parishes of Bulegeni town council(Brody, 2005). The number of stores selected from different parishes were based on the total number of stores in that parish.

## 3.3 Sampling Methods

Purposive sampling technique was used to select the stores from different trading centers that were grouped according to their location in different parishes of Bulegeni town council(Pattiarachchige, 2014) .This method of sampling included the quota method where the stores were grouped in to different parishes that make up the Bulegeni town council and the stores were selected basing on the convenience of the researcher to access the stores(Baillargeon & Mace, 2023).

## 3.4 Data Collection Methods.

Data was collected using various data collection methods with the aim of achieving the objectives of the research study. The data collected was mainly primary; primary data was collected through field interviews and questionnaires(Ajayi, 2017)

### 3.4.1 Interviews

This research instrument involved face to face discussions and interactions between the researcher and the respondents and it yielded descriptive data. Structured and unstructured questions were involved in interviews(Ajayi, 2017), Under the structured interview, open ended questions were

asked to respondents in the same way. For the unstructured, the researcher probed respondents and guided them according to their answering. During the interviews, the researcher asked questions to the respondents to identify the different types of pests that affect beans in the stores, to describe the type of damages caused by the different pests to beans in stores and to examine the pest management practices(Ghosh).

### 3.4.2 Questionnaires

This involved a series of questions designed to elicit information from the respondents about the topic of the study and was filled by the store keepers(Cuong, 2019). The questions used were brief and related to the objectives of the study.

## 3.5 Procedure for Data Collection

Busitema University administration granted introductory letters to go ahead with the data collection from the community of Bulegeni town council by issuing me an introductory letter. This letter was presented to the local chairperson visited so as to obtain permission to interact with the people of the target group(Sigee, 2005). Before data collection, voluntary verbal prior informed consent of each of the informants was obtained since knowledge is a natural wealth of the local people, they were assured that the data will be used only for academic purposes. After explaining the purpose of study for each respondents, personal information was recorded on gender, age, marital status, and also information on the respondents' location, level of education and how they acquired knowledge about management of pests in stores was recorded. The data was obtained by use of semi structured interviews, open interviews and questionnaires(Cuong, 2019) ,

The information of the respondents was captured during the process of collecting data so as to avoid bias in the reporting of the data and the information was entered in the table.

## 3.6 Data analysis

Data from the questionnaires and the interviews which were in the form of notes ,audio recordings and images were used in analyzing the findings on the management practices of the pests causing post-harvest losses in the stores (Emana et al., 2017)

This was done through putting the data in to themes in relationship to beans post-harvest losses in Bulegeni town council(Sharifi-Rad et al., 2017).

# CHAPTER FOUR: RESULTS ANALYSIS AND INTERPRETATION

## 4.0 Introduction

The researcher in this research used percentages in analysis and interpretation of results, these helped to simplify the results in its interpretation and analysis

## 4.1 Respondents information

This is the information captured about the respondents in the course of collecting data, this was necessary so as to avoid bias in the reporting of data

Table 1 showing respondents information

| Variable | Attributes | Frequency | Percentage frequency |
|---|---|---|---|
| Marital status | Married | 9 | 90 |
| | Single | 1 | 10 |
| Sex | Female | 3 | 30 |
| | Male | 7 | 70 |
| Age | Below 18 | 0 | 0 |
| | 18-50 | 6 | 60 |
| | 51-80 | 4 | 40 |
| Period of beans storage | 0-4 month | 2 | 20 |
| | 5-8 month | 5 | 50 |
| Source of manufacturers | Farmers | 10 | 100 |
| | Other producers | 3 | 30 |
| Level of education | Primary level | 3 | 30 |
| | Ordinary level | 5 | 50 |
| | Advanced level | 0 | 0 |

Source, primary source 2024

In table 1 above most store keepers are found to be mostly males at 70% with only 30% females; it also shows that 60% of the store attendants are in the age category of 18 to 50 and 40% in the category of 51 to 80.

Looking at the marital status of store keepers most of them are married at 90% and 10% being single .according to the data in the table above none of the stores is attended to by a divorced person(Hemati, Nazari, Asgari Lajayer, Smith, & Astatkie, 2022).

The store keepers were also asked to state their highest level of education and most of them according to data in table 1 above are as follows; primary level 30%, ordinary level 50% , advanced level 0%.this shows that most of the store keepers are those that acquired the basic education of primary and also ordinary level who have not acquired a profession or skill.

The period of storage of beans in the various stores varies as seen in the table above, those that store beans for a period of four months were found at 20% and those for a period of about 5 to 8 month were found at 50%.

According to the table it further shows that most of the produce (100%) is got from the farmers and a few stores get there produce from other traders (30%).

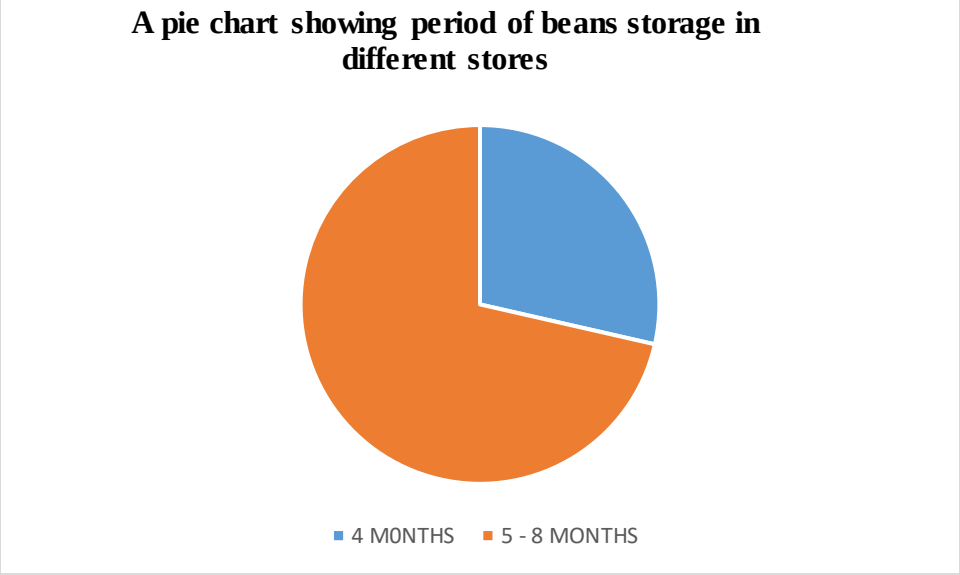



Figure 1 showing bean storage in different stores

## 4.2 Identifying the pest

This table shows the various pests identified or reported in different stores in terms of their frequency and percentage frequency .It also shows the characteristics of different pests that were used in there identification

Table 2 showing different pests

| Pest | Frequency | Percentage frequency | Characteristic of the pest | frequency | Percentage frequency |
|---|---|---|---|---|---|
| Bean weevils | 10 | 100% | Dark brown in color | 2 | 20% |
| | | | Black in color | 8 | 80% |
| | | | Sharp straight mouth | 7 | 70% |
| | | | Very small in size | 5 | 50% |
| | | | Fly when exposed | 6 | 60% |
| | | | Also feed on other substances | 1 | 10% |
| Large legume borers | 6 | 60% | Have a hard black cover | 6 | 60% |
| | | | Long in appearance | 3 | 30% |

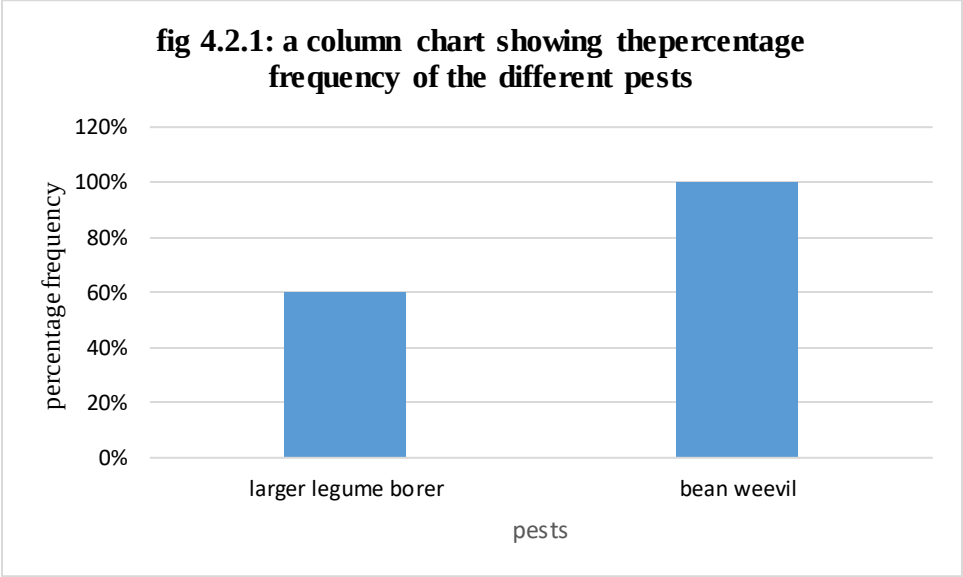
| | | | | | |
|---|---|---|---|---|---|
| | | | Feed on other substances like wood | 3 | 30% |

Source primary source; 2024

According to table 2 above on the pest identification, it was found that among the pests that affect beans in the stores are bean weevils and large legume borers; beans weevils were found to affect beans in all stores (100%) visited during data collection, large legume borers were found in 60% of the stores

Mostly identified features of these pests are ;bean weevils include black in color 80% and sharp straight mouth 70% and the larger legume borers include those that had a hard black cover 60%,those longer in appearance 30% and those that feed on other substances like wood were 30%

**fig 4.2.1: a column chart showing thepercentage frequency of the different pests**




### 4.3 Type of damage caused by pests

This table shows data collected on the kind of damage that the various pests identified in table 2 above cause to the stored beans

Table 3 showing different pests

| Pest | Damage caused | Frequency | Percentage frequency |
|---|---|---|---|
| Bean weevils | Make holes in the beans | 10 | 100% |
| | Grind the beans in to small particles | 4 | 40% |
| | Inhabit the beans hence contaminating | 3 | 30% |
| Large legume borers | Make holes in the legumes | 4 | 40% |
| | Eat the legumes grinding them into smaller particles | 3 | 30% |
| | There large number in the legumes cause contamination | 1 | 10% |

Source; primary source; 2024

This table gives various damages caused by various pests in the stores as below; bean weevils cause damage such as making holes in the beans and eating up the embryo 100%, grinding it producing powder 40%, and inhabiting the beans hence contaminating them 30%.the large legume borers also make holes in the beans 40%, eating the embryo 30% and also there large number cause contamination of the beans 10%.

### 4.4 Methods of pest management

This table shows the various methods used by different store keepers in controlling pests in the stores of Bulegeni town council.

Table 4 showing management practices

| Pest | Method of management | Frequency | Percentage frequency |
|---|---|---|---|
| Bean weevils | Cultural methods | | |
| | Avoid linkages in the store | 2 | 20% |
| Large legume borers | Cleaning the store | 5 | 50% |
| | Smoothening the store floor | 3 | 30% |
| Bean weevils | Chemical methods | | |
| | Use of chemicals that are packed together with the beans during packing | 3 | 30% |
| Large legume borers | Fumigation with pesticides | 2 | 20% |
| Bean weevils | Biological method | | |

| | | | |
|---|---|---|---|
| Large legume borers | Rearing chicken to feed on the weevils and large legume borers | 3 | 30% |
| Bean weevils | Physical method | | |
| Large legume borers | Sun drying at intervals of two weeks or one month | 9 | 90% |

Source; primary source 2024

This table gives the pest control measures practiced in the various stores, these pest control methods have been grouped into;

Cultural methods which include avoiding linkages in the store mainly through the roof and the walls 20%'cleaning the store 50%,smoothening the store floor 30%.these methods are mostly good store management practices that also help to control the effect of different pests in the stores.

Chemical methods including fumigation with pesticides 20% and use of chemicals that are packed together with the beans 30%.

Biological methods including rearing of chicken to eat weevils and large legume borers

Physical methods which include sun drying which forms the major control method 90% to bean weevils and the large legume borers.

### 4.5 Other methods of bean pest management in the stores of Bulegeni town council

These are the methods of pest control that some of the store keepers also in addition to the above are useful in controlling pests and they stem from their personal experience of bean storage

1. Using red pepper and tick berry leaves that are crushed in to powder like substance that is packed together with the beans that have been dried well. This is done to control bean weevils and large legume borers from attacking the stored beans(Mabberley, 2023).

2. Laying a hard polythene bag on the ground before pilling sacs to avoid the beans from absorbing moisture from the ground
3. Living light on in the store or avoiding dark corners in the store to reduce the effect of bean weevils and large legume borers
4. Storing beans in double layered sacs one being water proof to avoid beans absorbing moisture
5. Storing beans in space i.e. supporting sacs off ground using timbers

### 4.6 Other challenges of beans storage

These in addition to pests are also some of the challenges that were spelt out as affecting the storage of beans in Bulegeni town council

1. Inadequate storage space to adopt better storage methods
2. Reduction in weight of stored beans due to over drying to avoid the effect of pests
3. Inadequate capital to buy beans in large quantity and also invest in better beans storage practices
4. Price fluctuations
5. Weak storage bags that break easily during handling in store
6. High cost of labor during storage like labor cost during drying

# CHAPTER FIVE: DISCUSSION OF RESULTS AND CONCLUSION

## 5.0 Introduction

According to the study, pests such as beans weevils and large legume borers cause post-harvest losses in the stores of Bulegeni town council. This is in agreement with the study of MAAIF (2015) and Suleiman (2015) which says that beans weevils and large legume borers cause post-harvest loses in beans storage.

Also out of the pests causing post-harvest loses in beans storage according to results on table 1, bean weevils are the major pests found in all stores at 100%. This is both in agreement with the study of Suleiman et all (2015) which says the major pests are bean weevils and large legume borers.

Physical methods of pest management such as sun drying was the mostly used method of pest, management followed by cultural method including cleaning the stores(Nguvu, 2015).

Observations made during data collection saw beans being stored in ordinary bags which are low in managing pest infestations.

## 5.1 CONCLUSION

There is a wide variety of storage technologies available that if adopted would enable management of pests that cause post-harvest losses in stores and also for store keepers with few options to invest in improved post-harvest practice and storage technologies should improve on the basic storage hygiene and good storage management.

## 5.2 RECCOMENDATIONS

Store keepers of bulegeni town council adopt better storage technologies such as hermetic storage technologies which include silo bags ,metal silos and triplet pic bags in managing these pests in there stores.

Practicing good store management practices such as cleaning the store and keeping record of beans quantity in and out of the stores.

More research should be done on the same topic of management of pests causing post-harvest losses with a larger sample area and the pests be monitored for longer time period of about six month or more.

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**MANAGEMENT OF PESTS CAUSING POST HARVEST LOSES IN STORES OF BULEGENI TOWN COUNCIL BULAMBULI DISTRICT**

**Dealers in buying and selling high quality beans**

**QUESTIONNAIRE FOR CAUSES OF POST HARVEST LOSSES IN BEANS STORES**

Greetings from MAGOMU KENNETH a student of Busitema University, faculty of science and education Nagongera campus .am here to request you fill for me with some information on my questionnaire to help me in answering my research questions so as to achieve the objectives of my study

Name of the respondent …KIBET ENOCK….sex…MALE……..marital status……MARRIED……tribe……SABINYI……..location ……BULEGENI……occupation……PEASANT…… ……income level……MODERATE……age…32……..

1 which are the major pests that damage beans in your stores?

(a) Bean weevils……YES……., (b)…rats……..

2 How do you manage pests in your stores?

(a) Spraying……., (b) proper sun drying of harvested beans before storage …YES……

3 How often do you bring in new stock of beans in this stores?

(a) Two month …… (b) after 6 months……YES……...

4 HOW often do you clean the store?

(a) After one week…… (b) In two days ……..,(c) After one month……YES……

In conclusion I thank you all for your time may the almighty bless you with more customers in your business wish you all the best.