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FACULTY OF AGRICULTURE AND ANIMAL SCIENCES

DEPARTMENT OF CROP PRODUCTION AND MANAGEMENT

EFFICACY OF SELECTED PLANT POWDERS ON BEAN WEEVIL (*Acanthoscelides obtectus*) MANAGEMENT IN COMMON BEANS

BY

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RESEARCH REPORT SUBMITTED TO THE DEPARTMENT OF CROP PRODUCTION AND MANAGEMENT IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE IN AGRICULTURE OF BUSITEMA UNIVERSITY

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DECLARATION

I MUZUSA MUHAMMED hereby declare that this research report is my own work to the best of my knowledge resulting from the implementation of an experimental study to provide solutions to the farming community in the management of *Acanthoscelides obtectus* in stored beans.

SIGN..... **DATE**.....14/11/2023.....

APPROVAL

This research report has been approved by the academic supervisor

SIGN..... **DATE**...14/11/2023.....

DR. OPIO PETER

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DEDICATION

To God almighty, for the power in His word and His able ability to keep me alive to see this accomplishment, He's granted me good health, cared and protected me through this entire period of my course. I truly believe that without Him I am nothing.

To my loving father and mother, Mr Muzusa Muhamodu Waiswa and Mrs Aseri Madina, for the moral standards you taught me, commitment, positive thinking, hard work and endurance at all times, for these are the elements that I will always employ for a successful life. Thank you very much.

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I would also like to thank my fellow course mates who have supported and encouraged me persistently. I am also forever grateful to my parents and to my entire family for their continued support materially and financially.

MAY ALMIGHTY GOD RICHLY BLESS YOU

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LIST OF ABBREVIATIONS

%	Percentage
ANOVA	Analysis of Variance
°C	Degrees Centigrade.
CRD	Completely Randomized Design
CV	Coefficient of Variation
E.g.	For example
Etc.	Et cetera
FAO	Food and Agriculture Organization
Ha	Hectare
I.e.	That is to say
ISTA	International Seed Testing Association
LSD	Least Significant difference
mm	millimetres
NLP	Neem leaf powder
Rh	Relative humidity

ABSTRACT

The common bean *Phaseolus vulgaris* an important source of plant protein in many parts of the world, Uganda inclusive. Among the major food crops, it has one of the highest levels of variations in seed characteristics (shape, size, and colour), growth habit, maturity and adaptation. In rural areas of Uganda, the losses caused by storage insect pests in stored bean grain is one of the major problems faced by smallholder farmers. The major pest of stored bean is the bean weevil (*Acanthoscelides obtectus*) which can lead to a total loss if left uncontrolled. To overcome these losses encountered, this laboratory study investigates the efficacy of the selected plant powders on bean weevil (*Acanthoscelides obtectus)* in common beans. The plant powders used included; Neem (*Azadirachta indica),* garlic (Allium sativum) and actellic dust was used as a positive control plus that without any powder treatment (negative control) onto NABE 16 bean variety under storage for 15 weeks . The experiment was arranged in completely randomized design in three replications and data collected include; Insect mortality, adult emergency, damage, weight loss and percentage germination the of stored bean grains. Data collected were subjected to analysis of variance (ANOVA) procedure using GenStat 15th edition and mean comparisons were conducted using Bonferroni test at 5% level of significance. The results from this study revealed that there were significant differences between plant powder treatments and the synthetic treatment over the control throughout the storage period of the experiment. Among the plant powders used, neem powder was found to be more effective than garlic powder in the parameters measured (mortality, adult emergency, grain damage, weight loss and germination). The increase of weevil mortality and adult emergency was directly proportional with the increase in duration of storage. However, the plant powders had no negative effect on percentage germination when compared to the synthetic insecticide. It was also observed that the actellic dust which is a synthetic insecticide revealed superiority over neem powder treatment though their results were more comparable with duration of storage. It can therefore be concluded that, the insecticidal plant powders such as neem powder can be used to protect stored bean grains against weevil damage hence contributing to food security and hunger alleviation.

Keywords; Neem, Garlic, Storage insect pests, Plant powders, Synthetic insecticide, *Acanthoscelides obtectus*

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

The common bean *(Phaseolus vulgaris L.)* is a major food legume grown worldwide (Luna-vital et al., 2014). The crop is produced for direct human consumption with a commercial value exceeding that of all other legume crops combined (Trott et al., 2016). Globally, common beans are grown on 23 million hectares and the global common bean production has now risen to 12 million tons per year (Mishra et al., 2017). According to FAO, the common bean is referred to as an essential food due to its high protein content and large amounts of fibre, carbohydrates and other dietary necessities (Celmeli & Sari, 2018). Dietary intake of beans has been associated with decreasing the risk for developing coronary heart disease, metabolic syndrome, stroke, hypertension, diabetes, obesity, gastrointestinal diseases etc. (Garden-Robinson & McNeal, 2016).

Latin America represents about 50% of world volume of common beans produced making it the region with the greatest production followed by Africa with 25% (Losa et al., 2022). In Sub-Saharan Africa, common beans are produced on more than 3.5 million ha with production taking place mainly in East Africa and the highlands of Southern Africa, with a combined production of almost 1 million tons (Jevremović et al., 2019). However, pre-and post-harvest damage caused by insect pests is a major limiting factor of bean production. Stored beans suffer heavy losses in terms of both quantity and quality mostly by bean weevils (Tegegne B, 2017). Acanthoscelides obtectus is the one of major bean weevil species attacking stored beans causing yield losses reaching up to 38% (Baldin et al., 2017). To reduce storage losses due to insect pests, synthetic insecticides have been recommended. The use of synthetic insecticides has been adopted to manage and reduce the losses caused by the insect pest. However, their use is limited under small scale farming due to high costs and infrequent supply. The development of cost-effective, highly biodegradable, environmentally-safe and sustainable plant made insecticides have gained significant importance in weevil management particularly for small scale farmers and these include neem (*Azadirachta indica*), garlic (*Allium sativum*) among others (Ogu & Ikehi, 2015). Different plant insecticides may act synergistically or singly to effectively inhibit insect pest

are promoted as part of a sustainable insect pest management techniques for farm level storage.

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