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FACULTY OF AGRICULTURE AND ANIMAL SCIENCES

DEPARTMENT OF CROP PRODUCTION AND MANANAGENT

FIELD EVALUATION OF SOIL -BORNE FUNGAL ENTOMOPATHOGENS FOR MANAGEMENT OF SWEETPOTATO WEEVILS ON TANZANIA SWEETPOTATO VARIETY IN UGANDA

BY

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

MAY, 2023

DECLARATION

I Ayapo Dorothy Grace do solemnly declare that this research report consists of data which was originally collected from the field by, me and no part of this report has been submitted to any university or institution for the award of Bachelor of Science in Agriculture

Signature: .....

Name: Ayapo Dorothy Grace

Date 28/7/2023...

APPROVAL

This research report has been approved by the academic supervisor

Date……

Sign…….

DR. OPIO PETER

DEPARTMENT OF CROP PRODUCTION AND MANAGEMENT DEDICATION

I dedicate this report to my father, Mr. Egau joseph, Aunty Deborah Eyatu, Otubeny Emmanuel and my family members who have always supported me through my education life up to the level am at the moment. God bless you.

Furthermore I dedicate this report to my academic supervisor Dr. Opio Peter and all the staff of Busitema University Arapai campus for the love, care and support they rendered to me during my research. May the Almighty God bless the work of your hands.

Lastly I also dedicate this report to all my friends and course mates.

I have done this to all of you for your immeasurable, tangible/non tangible motivation and moral support rendered to me during the studies as well as the completion of this report, may the almighty lord bless you all generously and abundantly; Amen.

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MAY GOD GREATLY AND ABUNDANTLY BLESS YOU

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LIST OF ABBREVIATIONS

Sp……...Species

BAUC…… Busitema University Arapai Campus

EPF …….Entomopathogenic fungi

PC……Positive Control

NAC…….No Application control

NC…… ……...Negative Control

NaSARRI……....National Semi Arid Resources Research Institute

NaCRRI……...National Crop Resources Research Institute

ANOVA……..Analysis of variance

SPVD……...Sweetpotato Viral Disease

ABSTRACT

Pests and diseases pose a big threat to Agriculture and this makes it difficult to attain higher yields; especially for crops like sweet potato. Experiments were conducted at National Semi Arid Resources Research Institute **(**NaSARRI) in Serere district for two different seasons (2022A and 2022B). During the first and second season of to find out the efficacy of entomopathogens in controlling sweetpotato weevils in sweetpotato. The experiments consisted of seven (7) treatments of fungal isolates that is, No Application Control –NAC (0.00g), Negative Control + tween- NC-Tween (0.01%), K191 (7g), K157 (7g), K020 (7g), K040 (7g) and Positive controlPC (Cypermethrin) and 500ml of water. The experiment was layedout in a Randomized Complete Block Design (RCBD) and replicated three times and the spraying was carried out after every one month from planting. The parameters analyzed were leaf incidence and severity, sweetpotato weevil stem damage and tuber damage. These parameters were collected fortnightly from the first treatment while the yield data was collected at harvest. The result showed K191 treatment produced the highest number of tubers (yield) in season one (45.33kg), and season two (103kg), than the NC (25.0kg) that had the lowest number. While NAC had the lowest weight of tubers with (11.57kg) in season one while second season highest weight of tubers was (16.77kg). K191 had the highest vine weight (43.23kg, 29.70kg) compared to NAC (19.77kg, 25.07kg) in both season one and two respectively while in season two all the EPFS had no significant difference but however PC had the highest vine weight of (43.33kg), K191 also showed the least severity of

damaged tubers (1.33) than NC (4.00) in first season, however PC showed the lowest (1.00) severity of tuber damage in both seasons. Overall, the study found out that K191 had a significant impact in controlling sweet potato weevils in the first season than in the second season and this could be likely due to the presence of rainfall in the second season that limits the proliferation of weevils.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background to the study

Sweetpotato *Ipomoea batatas* (L.) Lam, belonging to the family Convolvulaceae, is an important root vegetable which is large, starchy, and sweet tasting (Mohanraj & Sivasankar, 2013). Globally, sweet potato is considered an important, versatile and underutilized food security crop. It belongs to the second most important set of food crops in developing countries, namely root crops. The crop is highly nutritive, and it outranks most carbohydrate foods in terms of vitamin, mineral, dietary fibre and protein content (Mosta and Modi, 2015). Sweet potato is currently ranked as the seventh most important crop in the world with a total production of 103 million tons in 2013 (Haynes, 2018). It is produced largely in Asia (accounting for up to 76.1% of world production in 2013), followed by the African continent (19.5%)(Hue & Low, 2015). The top five producers of sweet potato in 2014 were China, Nigeria, Uganda, Indonesia, and the United Republic of Tanzania. Sweet potato is one of the five most important crops in 40 developing countries besides rice, wheat, maize, and cassava. Despite the crop's economic importance, widespread sweet potato weevil infestation results in losses of millions of dollars annually (Jackai et al., 2006).

Since weevils are widely dispersed in tropical regions of the world, their management is the key issue faced by farmers in major sweet potato producing countries(Hue & Low, 2015)The four main species of weevils that cause the most harm to sweetpotato plantation are *Euscepes postfasciatus* (Fairmaire), *Cylas formicarius* (Fabricius), *Cylas puncticollis* (Boheman), and *Cylas brunneus* (Fabricius) (Hue & Low, 2015). *Euscepes postfasciatus* is a South American species that is more prevalent in Central and South America. *Cylas formicarius* is an Asian species but is usually found throughout the tropical regions worldwide including North America, the Caribbean, Europe, Africa Asia, and Oceania. *Cylas brunneus* and *Cylas puncticollis* are African species and are restricted to Africa (Nelson et al 2000). There are other species of sweet potato weevils in the tropical regions in Africa, for example, the rough sweet potato weevil (*Blosyrus* spp.) and striped sweet potato weevil (*Alcidodes dentipes* and *Alcidodes erroneous*), but their damage to sweet potato cultivation is not as severe as the main species (*Cylas* spp.) Hatching will generally occur in a week after oviposition by females. Hatched larvae will start making tunnels inside tubers and feed inside galleries. The tunnels inside the tubers of sweet potatoes will be filled with excrement from the larvae. As the larvae feed, the sweet potato will impart a bitter flavour and terpene odour, making

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