

**EVALUATION OF THE POTENTIAL OF CHILI PEPPER AND NEEEM LEAF  
AQUEOUS EXTRACTS TO CONTROL FALL ARMYWORM (*SPODOPTERA  
FRUGIPERDA*) ON MAIZE PLANTS.**

**BY**

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**DECLARATION**

I, Mugwanya Steven, duly declare that the work presented is my original work and has not been submitted for a degree or any other award in any university or any other institution of higher learning.

Mugwanya Steven

Signature..... date.....

## **APPROVAL**

I, Madam Namusana Hellen, as the candidate's Supervisor, hereby confirm that the candidate carried out the work reported in this report under my guidance and supervision.

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Supervisor's signature

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Date

## **DEDICATION**

I dedicate this research study to beloved my father Mr. Ssebintene Emmanuel and my beloved mother Naluja Harriet for their continued and precious support towards my studies right from primary level up to this level.

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## ABSTRACT

FAW is a cosmopolitan and highly polyphagous insect pest that attacks more than 80 plant species. (PrasannaB., 2018). In response to the damage caused by FAW, a number of control measures have been used. Most farmers have been using synthetic insecticides due to their faster pest knockdown effect however synthetic insecticides have various side effects among which include being non-biodegradable, non-specific, hazardous to handle and are too costly to (Oyewusi., 2019). Due to the side effects of synthetic insecticides, farmers have resorted to the use of botanical insecticides in the control of FAW (CABI & FAO, 2019). This is because they are locally available, specific, environmentally friendly and biodegradable (Okweche, Ogunwolu, & Adeyemo, 2013).

The main objective of the study was to evaluate the potential of chili pepper and neem leaf aqueous extracts to control fall armyworm (*Spodoptera frugiperda*) on maize plants. Its specific objectives were to compare the effectiveness of CPE, NLE, and their combination on the third larval instars of FAW using both the contact and feeding method all trials done within the laboratory. The experiment was laid out in a randomized complete block design; consisting of three treatments each replicated three times. Treatments which were used consisted of extracts from the leaves of neem tree(NLE), extract from dried chili pepper (CPE) and a combination of dried chili pepper extract with neem leaf extract (CPE +NLE) plus water as the control. Each treatment was applied through two methods, the contact and feeding application of the extracts all of them in the laboratory.

The results were analyzed using the Chi-square t-Test and student t-Test. The results revealed that the application of Neem leaf extract and chili pepper extract plus their combination caused a significant death of fall army worm 3<sup>rd</sup> larval instars compared to untreated control experiment irrespective of the method of application. When using feeding method of application, highest larval mortality was observed in the NLE (72%) and a combination of NLE and CPE (72%) and lowest observed in CPE (22%) as shown in table 5. When using contact application of extracts as shown in table.4, highest larval mortality was observed in CPE (61%) and a combination of NLE and CPE (61%) and lowest mortality observed in CPE (22%). Therefore, the use of NLE and CPE as botanical insecticides in the control of FAW in maize production will make a

contribution in the improvement of the crop yield, reduce on the sided effects of synthetic insecticides and increase food production by farmers.

Keywords—Chili, neem leaf, fall army worm, maize plants, botanical insecticides.

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## **LIST OF ABBREVIATIONS**

FAW	Fall Army Worm
BUNIC	Busitema University Nagongera Campus.
H <sub>0</sub>	Null hypothesis
H <sub>a</sub>	Alternative hypothesis
CPE	Chili pepper extract
NLE	Neem leaf extract
FAO	Food and Agriculture Organization
CABI	Centre for Agriculture and Bioscience International.

## CHAPTER ONE

### 1.0: INTRODUCTION OF STUDY

#### 1.1 Background

Fall Armyworm (FAW) scientifically called *Spodoptera frugiperda* is an insect pest that belongs to order Lepidoptera, family Noctuidae, genus *Spodoptera*, and Species *frugiperda* (Johnson, 1987). It is an insect pest native to tropical and subtropical regions of the Americas (Nagoshi, 2009). The pest accounts for annual crop losses of over US\$ 500 million throughout the South-East United States and the Atlantic coast (Young, 1979). According to (Carvalho RA., 2013), FAW is a most destructive pest in maize and it accounts for an annual estimated loss at U\$400 million. The FAW was first noticed in Central and West Africa-Benin, Nigeria, Sao Tome, and Principe, and Togo (Goergen, Lava, Sankung, Abou, & Manuele, 2016) and later reported and confirmed in the whole of mainland Southern Africa (except Lesotho), Seychelles and Madagascar (FAO, 2018). In 2017, the pest was spread to Ghana (Cock, Beseh, Buddie, Cafá, & Crozier, 2017) and by January 2018 it was spread to about 44 Sub Saharan African countries, except Djibouti, Eritrea, and Lesotho. Subsequently, FAW has rapidly spread throughout Sub-Saharan Africa (SSA) (Rwomushana, et al., 2018).

In Uganda, the FAW was first reported in June 2016 in the districts of Kayunga, Kasese and Bukedea and towards the end of 2017, it had spread to all the districts of Uganda (FAO, 2018). The pest has been found to persist throughout the year where there is availability of alternative hosts and favorable climatic conditions (CABI & FAO, 2019).

FAW is a cosmopolitan and highly polyphagous insect pest that attacks more than 80 plant species. These include maize, rice, soya bean, cotton sorghum, millet, sugarcane, and vegetable crops, nevertheless, maize is the main crop affected by FAW in Africa (PrasannaB., 2018).

Maize being the primary staple food crop grown in Africa, however with lack of effective control methods, estimates show that FAW has the potential to cause maize yield losses in a range from 8.3 to 20.6 million tons of maize per annum. The value of these potential losses is estimated at between US \$2,481 and \$6,187 m (Abrahams, et al., 2017)

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