
**AFRICAN STEM BORER RESISTANCE IN EARLY SEGREGATING GENOTYPES
OF F2 SORGHUM POPULATION IN UGANDA**

BY

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**A RESEARCH PROJECT REPORT SUBMITTED TO THE FACULTY OF
AGRICULTURE AND ANIMAL SCIENCE IN PARTIA FULFILLMENT OF THE
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DECLARATION.

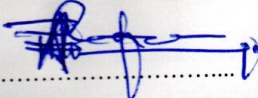
I Driciru Knight declare that the work presented in this research proposal is entirely my own and has been submitted to Busitema University for award of academic qualification Bachelor of Science in Agriculture.

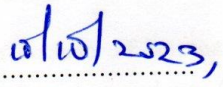
Signed Driciru Knight

Date 10/10/2022

APPROVAL.

This reach proposal will be submitted for examination with my approval as the University supervisor.

Sign.....

Date.....

Mr ANDIKU CHARLES
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DEDICATION.

I dedicate this work to all the households who participated in this research, to my family members and my supervisor. God bless you all.

ACKNOWLEDGEMENT.

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LIST OF ACRONYMS

SSA: Sub-Saharan Africa.

SBC: Stem borer count

NaSARRI: National Semi Arid Resources Research Institute.

UNDP: United Nations Development Program

Rep: Replicate

ABSTRACT

Sorghum is a cereal and key food staple grain to over 500 people in semi-arid tropics Africa and Asia. The grain yield in subsistence farming ranges from 0.5 t/ha to 0.8 t/ha compared to potential yield of 10 t/ha. Low yields are attributed to biotic, abiotic and social-cultural factors. Stem borers an insect pests to sorghum causes yield losses of up to 15 - 80% due to leaf damage, death heart, exit holes and tunneling damages. Multiple control measures have been employed for stem borer management but they show some limitations. Besides, host plant resistance is an economical and effective way of controlling stem borer suitable for the resource-poor farmers. Therefore, there is need to know the resistance level among the F2 population which has been developed at NaSARRI Forty eight (48) F2 population were sown in 8 x 6 alpha-lattice design of 3 replicates each in two sites – NaSARRI in Serere district and Busitema University Arapai campus in Soroti district. Data was collected on grain weight, plant height, 50% flowering leaf damage, dead heart, tunnel length, exit holes waxi blooms and leaf glossiness Genstat 18th version was used for data analysis where ANOVA was performed for all the observed traits. A significant different ($p < 0.05$) was detected for all the studied parameters

Some sorghum genotypes experienced low damage and registered better yields (mean 3752-3978) with genotype SILAxTanzaniaACC#42 having the highest grain yield (5720 kg/ha), followed by NAROSORG1xIS30310 (4550 kg/ha), NAROSORG1xTanzaniaACC#42 (4380) and SILAxIS12750 (3988 kg/ha). In addition, the result also revealed variation in resistance to the damage parameters across the locations and rep.

CHAPTER ONE

INTRODUCTION

1.1 Background

Sorghum (*Sorghum bicolor* L. Moench) with chromosomal number $2n=20$ is a cereal grain that originally was domesticated in Africa and has since spread globally (Muturi, 2013). It is a member of grass family Poaceae, Subfamily Panicoideae, tribe Andropogoneae and subtribe Sorghinae (Breckinridge, 2022) and has five cultivated races including bicolor, guinea, kafir, caudatum & durra (Pontieri & Giudice, 2016). The crop is important staple in the diet to the poor throughout semi-arid Asian and African regions. It is the fifth important cereal grown in the world following rice, wheat, maize and barley in total area planted and productivity (Balakrishna et al., 2018). Over 90% of its production by area is in the developing countries (Deb et al., 2004). Globally sorghum is annually produced in total land area of production of 41.31 million ha and total production of 59.83 million tons was achieved and mean yield is normally 1.45 tons per ha (Andiku et al., 2021). By 2020, sorghum production in the whole world was 62.0 million metric tons. By 2011, the leading producers to sorghum were Nigeria 12.6%, India and Mexico who produced 11.2% each, United states 10.0% (Tracheophytes et al., 2022) This shows a better improvement from the previous years. Nigeria and Sudan have been the leading producers of sorghum in Sub Saharan Africa (SSA) where the crop ranks the second major crop produced after maize. Uganda is the fourth leading producer of sorghum in East Africa with production of 314,553 tons from 398,050 ha of land (Andiku, Shimelis, & Laing, 2022).

Sorghum is ranked the third most vital cereal crop after maize & rice in Uganda, and it is grown for grain, forage and sugar and is a fast emerging biofuel crop in subsistence farming and it is also used for brewing purposes (Fabiana Meijon Fadul, 2019). Sorghum can grow in harsh environments where other crops for example cassava do not perform well, it can grow well without the application of any fertilizers (Nagesh Kumar et al., 2021) and it is tolerant to longer duration of water logging. High yielding sorghum cultivars having dense nutrient contents have been breed in Uganda to increase productivity level. However, some of the high yielding nutrient-dense sorghum genotypes developed in Uganda highly succumbs to insect pest attack. Among the insect pests are the stem borers *Busseola fusca* Fuller, *Chilo partellus* Swinhoe, *Chilo orichalcociliellus* Strand, *Eldana saccharina* Walker and *Sesamia calamistis* Hampson present key contribute to yield losses (Togola et al., 2020a). These

- iii. The following quantitative sorghum characteristics can be used to indirectly select genotypes with high yields; days to 50% flowering and plant height

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