
**FACULTY OF AGRICULTURE AND ANIMAL SCIENCE
DEPARTMENT OF CROP PRODUCTION AND MANAGEMENT**

**RESISTANCE RESPONSE OF COWPEA GENOTYPES TO SCAB
DISEASE**

BY:

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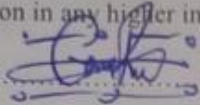
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**RESEARCH REPORT SUBMITTED TO THE DEPARTMENT OF CROP
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DECLARATION

I declare that this research report is my original work and has not been written before for academic qualification in any higher institution of learning.

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APPROVAL

This research report has been submitted for grading with my approval as the University Supervisor

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DEDICATION

With preference, I dedicate this research report to my parents, Mr. Elly Waitamu and Mrs. Muwugumya Veronica; siblings; Naikesa Irene, Tikoli Brian, Mpola Stuart, Walamaku Allan and Katooko Lillian for their prayers, persistence, love and sustenance during the entire period of my studies. In special way, this book is devoted to my beloved Uncle, Dr. Gwali Samson (PhD); I am pleased of you for being my mastermind always. May the good Lord gift you long life and the spirit of good deeds.

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ACRONYMS

ANOVA	Analysis of Variance
AUDPC	Area under disease progress curve
BSA	Bachelor of Science in Agriculture
FAO	Food and Agricultural Officer
IITA	International Institute for Tropical Agriculture
MaRCCI	Makerere Regional Center of Crop Improvement
MUARIK	Makerere University Agricultural Research Institute Kabanyoro
NaSARRI	National Semi Arid Regional Research Institute
SECOW	Serere cowpea

ABSTRACT

Cowpea is among the ancient crops known to man globally. After cereals, grain legumes are the most important family of agricultural crop species worldwide. The crop has been attributed to several production limitations such as pests and diseases, soil infertility, drought and water logging. Cowpea scab is one of the major serious fungal diseases in cowpea production, capable of causing yield losses of up to 100%. The research study directed to determine the resistance response of fifty one (51) cowpea genotypes assessed for two rain seasons at Busitema University Faculty of Agriculture and Animal Sciences (Arapai Campus), in Soroti district using a 5 by 11 alpha Lattice design with three replications. The analysis of variance showed significant differences ($P < 0.001$) for grain yield, scab severity, scab incidence, and area under disease progress curve (AUDPC) across genotypes, season and genotype by season interaction except scab incidence for genotype by season interaction. The mean grain yield of 563.4 Kg ha^{-1} was recorded across the cowpea genotypes with genotype, Par47*LGC074/30 having the highest grain yield of 911.1 Kg ha^{-1} . Most of the cowpea genotypes with cowpea scab resistance had low grain yield, with the lowest grain yield recorded by genotype MUAL19-143, Par47*LCG074/29, NAROCOWPEA 5, MUALMP-17, MUAL19-118-4, MUALMP-12, MUALMP-42, NAROCOWPEA 2. Correspondingly the cowpea genotypes had low scab incidence except in genotypes MUALDT-05, MUALCP-21, Bruc2019B-470, and Eblate*NE51 respectively. The area under disease progress curve was equally low except in genotypes MUAL19-119, Bruc2019B-17, MUALDT-05, MUALCP-21, Bruc2019B-470 and Eblate*NE51 respectively. The Scab resistant cowpea genotypes can be used as parental breeding lines for development of scab resistant cultivar with farmer preferred traits. Grain yield had a significant positive correlation damage index on the pods ($r = 0.336$, $p < 0.001$), scab incidence on pods ($r = 0.347$, $p < 0.001$), scab severity on pods ($r = 0.330$, $p < 0.001$). The identified cowpea genotype such as Eblate*NE5, NAROCOWPEA 2, NAROCOWPEA 4, MUAL19-118-4, Par47*LGC074/29, NAROCOWPEA 3, and others (Table 6) with scab resistance capability as parental lines in the cowpea breeding program to develop cultivars with improved yield and extensive horizontal resistance to the scab disease.

Key words: Response, resistance, cowpea scab disease, incidence, severity

CHAPTER ONE

1.0 INTRODUCTION

1.1 Back ground

Cowpea (*Vigna unguiculata* (L.) Walp.), is among the ancient crops known to man (*Osipitan et al., 2021*). After cereals, grain legumes are the most important family of agricultural crop species worldwide (*Kebede & Bekeko, 2020*). Cowpea in particular is a versatile, vascular, annual, and warm season legume. It belongs to the family Fabaceae, sub-tribe Phaseolinae, genus *Vigna*, and section Catjang. Cultivated cowpeas are grouped under the *Vigna unguiculata* subspecies *unguiculata*. The other Fabaceae family members includes peas and many perennial and non-herbaceous (e.g., trees and shrubs) leguminous plants (*Osipitan et al., 2021*). The genus *Vigna* consists of over one hundred different species widely found in the tropical and sub-tropical regions, it has great morphological and ecological diversity. The common names of cowpeas include black- eye bean, southern pea, bean, cowpea, china pea and cow grain (*Oyewale & Bamaiyi, 2013*)

Among the grain legumes, cowpea (*Vigna unguiculata* (L.) Walp.) is an important food legume growing in tropical and subtropical regions of the world (*Kebede & Bekeko, 2020*). It originated in Africa, which according to the Food and Agriculture Organization Corporate Statistical Database, accounts for the majority of the world's production (96.7%), with Nigeria being the largest producer (~3.6 million tons in 2019) (*Osipitan et al., 2021*)

Growth forms of cowpea vary and may be erect, trailing, climbing or bushy, usually indeterminate under favourable conditions. Leaves are alternate and trifoliate usually dark green. The first pair of leaves is simple and opposite. Stems are striate, smooth or slightly hairy, sometimes tinged with purple (*Afutu, 2017*). Cowpea is able to tolerate fluctuating climatic conditions and is thought to be drought tolerant, characteristics which may help this species to adapt in a changing climate (*Monteiro et al., 2020*). Cowpea thrives in dry environments and available cultivars produce a crop with as little as 300 mm of rainfall. This makes it the crop of choice for the Sahel zone and the dry savannahs, though cultivars that flourish in the moist savannahs are available as well (*Afutu, 2017*).

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