

MSc RESEARCH PROGRESS REPORT

**TITLE: STUDY OF QTLS FOR BANANA RESISTANCE TO WEEVIL
(*COSMOPOLITES SORDIDUS* GERMAR)**

NAME OF STUDENT: Mwanje Gerald

SUPERVISOR: Prof. Patrick Rubaihayo and Dr. Brigitte Uwimana

UNIVERSITY: Makerere , Kampala

Research Objectives

1. To determine the inheritance of banana resistance to weevils.
2. To identify and map QTLs associated with banana resistance traits to weevil.

Achievements

- Phenotyping of 138 F₁ progenies of Monyet×Kokopo was done.
- DNA was extracted from all the genotypes in the Monyet ×Kokopo population.
- Genotyping data was obtained.
- Thesis writing has been done.
- Prof. Patrick Rubaihayo (University supervisor) examined and approved the thesis for submission.

Abstract of the thesis

Banana weevils (*Cosmopolites sordidus* Germar) are a very important pests contributing to the decline in banana production of up to 50% - 100% after the 3rd ratoon cycle. East African highland cooking bananas are an important staple crop in the Great Lakes region of Eastern and Central Africa. However, they are highly susceptible to banana weevil. The objective of this study was to determine the inheritance of banana resistance to weevils and to identify and map quantitative trait loci (QTL) associated with weevil resistance traits in banana. This is to help in determining the breeding method and help in developing molecular markers for use in selection

for weevil resistance breeding. F₁ progenies developed from crosses of two banana types; Monyet (resistant tetraploid) and Kokopo (susceptible diploid) by IITA were screened for segregation for banana resistance to weevils in a pot experiment. There was a significant difference at $P < 0.001$ among the genotypes for peripheral damage, outer cross-sectional damage, inner cross-sectional damage, and total cross-sectional damage, indicating that the population was segregating for resistance to banana weevils. Broad sense heritability values for total cross-sectional damage, outer cross-sectional damage and inner cross-sectional damage were 0.40, 0.34 and 0.41 respectively, which were moderately high, indicating that a moderate percentage of the variation amongst the genotypes is due to genetic factors. However, peripheral damage had lower broad sense heritability values of 0.11. There were also strong significant positive correlations amongst total cross-sectional damage, outer cross sectional, inner cross sectional and peripheral damage parameters. The quantitative QTL mapping identified four QTLs for both peripheral damage and total cross-sectional damage. The QTLs that were significant for peripheral damage were located on chromosomes 6, 7 and 11. Two QTLs on chromosome 6 were identified for total cross section damage. Quantitative mapping also identified 65 loci significantly associated with peripheral damage and 8 loci significantly associated with total cross-sectional damage. These loci can be used to develop molecular markers for use when selecting for banana resistance to weevils.

Pending work

Approval by Dr. Brigitte Uwimana , so that I can submit the thesis to the university.