Standard Operating Procedure (SOP) for Maize Crossing Block

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1. Introduction

All sorts of crossings in maize (Cross pollination, Selfing, back crossing) are very crucial in the breeding activities. Crossing need to be done in time and when both male and female are ready to be crossed.

2. Purpose

The purpose of this SOP is to outline the roles, responsibilities, and procedures to be followed in making and harvesting successful crosses.

3. Scope

This document contains crossing procedures in maize breeding. It covers steps to making crosses, items needed for a successful crossing, checking crosses, and harvesting crosses.

4. Definition of terms

Pollination: is the transfer of pollen grains from an anther to a stigma. Pollen can be transferred by an animal or by the wind. Fertilization takes place inside the ovary when the nucleus of pollen grain fuses with the nucleus of an ovule to produce a zygote.

Cross-pollination: is where pollen is transferred between flowers on two different plants.

Self-pollination: takes place when pollination occurs within just one flower or between flowers on the same plant.

Pollination bags: sometimes called crossing bags, isolation bags or exclusion bags, are containers made of various materials for the purpose of controlling pollination for plants. They are designed to fit well over the inflorescence or individual flowers of a plant type. The size, shape and strength of bag should ensure that there is no contact with flowers to avoid development of diseases and physical hindrances in seed development.

5. Roles and Responsibilities

All staff involved in implementing breeding activities in the maize improvement program at IITA must use the breeding Crossing Block SOP. No alteration should be made to the procedures unless approved exceptionally by the program leaders. The list of individuals responsible for each section of the Crossing Block SOP in the breeding data cycle is listed below.

Crop Lead (CL) Responsible for the overall management of the trials and for delegating team responsibilities. The CL is the lead breeder and coordinator of Maize Improvement Program at IITA.

Breeder (B): Coordinate the field layout of experiments, planting, and checks on the implementation of defined protocols on the different experimental sites. Ensures all trials

are established in the on-station and out-stations respectively. This includes trial management and data collection.

Trial Manager (TM): Oversees trial preparations and management protocols, land acquisitions, oversees planting in the outstations. Also supervises planning of inputs and other planting logistics for the various stations.

Research Supervisor (RS): Coordinates the activities of the Research Technician to ensure that assigned tasks are carried out correctly. The RS involves in planting, field management and post-trial management practices as well as coordinates fertilizer application in on station and outstation experimental fields. S/he involves in the Nursery and seed increase protocols as delegated by the CL and B respectively.

Research Technician (RT): The Research Technician performs field tasks as defined in the trial protocols such as field data collection or field management practices. RT's responsibility is to perform assigned tasks including the use of digital tools defined in the protocol for capturing, storing, transmitting, and ensuring quality of data within defined time periods.

6. Procedure

6.1 Items in a crossing kit:

i. Blank tags
ii. Pencil
iii. Pencil sharpener
iv. Garden marker
v. 90% ethanol
vi. Digital tablet with bar code reader for data collection

vii. Stapler and staples

viii. Shoot cutter

6.2 Making crosses

1. Plant female and male rows alternatively next to one another
2. Cover the pollen of the male plant with a pollination bag immediately the first sign of anthesis is seen
3. Cover the shoot of the plants designated as female with shoot bag before the silk is out
4. Collect pollen from male row and pollinate the female rows at flowering
5. Cover the pollinated ears of the female plant with a pollination bag and fit it secured to the stem with a stapler.
6. The number of female rows and that of male rows depends on the quantity of seed you need to harvest.

6.3 SELFING

1. Plant the genotypes you need to self/advance in a series of rows.
2. Self-vigorous and disease-free true-to-type plants in a row.
3. Cover the pollen of the same plant with a pollination bag immediately the first sign of anthesis is seen.
4. Cover the shoot of the same plants with shoot bag before the silk is out.

5. Collect pollen from the tassel of the same plant and pollinate the shoot.
6. Cover the pollinated shoot with the pollen bag, until harvest.
7. Harvest each row separately unless there is an instruction to bulk the ears.
8. Label the harvested material with all the necessary information included.

7. Appendix

7.1 Contacts for support

For Issues relating to crossing block, you can contact the maize breeders: Drs. Abebe Menkir (A.menkir@cgiar.org); Baffour Badu-Apraku (B.Badu-Apraku@cgiar.org); Silvestro Meseka (S.Meseka@cgiar.org) and Wende Mengesha (W.Mengesha@cgiar.org)

8. References