	<b>Crop: Maize</b> <b>Function: Parental Selection</b>	<b>SOP #</b>	IITA-MZ-SOP08
		<b>Revision #</b>	IITA-MZ-SOP08-01
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<b>SOP Owner</b>	Breeder (Wende Mengesha)	<b>Approval Date</b>	15/07/2022

## **Standard Operating Procedure (SOP) for Maize Parental Selection**

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### ***1. Introduction***



The choice of parents with excellent agronomic performance and good combining ability is a critical step in maize breeding. Analysis of the parents' isolated behavior and the result of genetic analysis are important in the choice of parents. Measures of the genetic divergence, ahead of making any cross helps breeder to concentrate their efforts only on the most promising combinations.

### ***2. Purpose***

The purpose of this SOP is to outline the roles, responsibilities, and procedures to be followed in parental selection to provide the raw materials for creating new generation. Ultimately, the probability of successfully meeting the breeding objectives depends on selection of parents for intermating.

### ***3. Scope***

This document contains criteria to be considered in selecting parents in maize breeding Program.

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#### 4. *Definition of terms*

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**Hybridization:** It is the process of crossbreeding between genetically dissimilar parents to produce a hybrid. In plants, crossing is done by placing pollen grains from one genotype i.e., male parent, on the stigma of flowers of another genotype i.e., female parent.

**Selection:** It can be defined as preservation of certain individual plants of desirable characters. The germplasm is evaluated to identify plants with desirable combination of characters. Selection of parents is picking up seeds of only those plants for multiplication which have the desired traits. It is the basis of all crop improvement.



**Crossing:** It is the deliberate interbreeding of closely or distantly related individuals to produce new crop varieties or lines with desirable properties. Plants are crossbred to introduce traits/genes from one variety or line into a new genetic background.

#### 5. *Roles and Responsibilities*

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All staff involved in implementing breeding activities in maize improvement program at IITA must use the breeding data management 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 data management SOP in the breeding data cycle are 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.

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**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 Parental selection

- Parental selection is one of the most important steps in maize hybridization program. The breeding objectives or the product concept (PC) need to be taken into consideration when selecting the parents.

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- Different parents for different purposes need to be planted for crossing and important crossing instructions given to technicians involved in the crossings.
- The selection of the parents should be based on both per se performance and their combining abilities with selected testers. Parental selection needs also to consider the breeder's critical field evaluation of the trials to identify crosses and their respective parents.
- The best genotypes based on yield performance and other economically important traits will be selected.
- Genotypes that showed unique/specific merits for some of the desired or priority traits e.g., disease resistance or high quality need to be included as parents to ensure the contribution of the specific desirable genes to the progeny populations.
- Parental selection needs also to consider the genetic divergence or the genetic distance of the parents to ensure high genetic recombination and complementarity. This can be done using genotypic cluster analysis, and breeder's field evaluation of the trials considering phenotypic complementarity in the selection.

## 7. *Appendix*



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### 7.1 Contacts for support

For Issues relating to parental selection, you can contact breeders: Drs. Abebe [Menkir \(A.menkir@cgiar.org\)](mailto:A.menkir@cgiar.org); Baffour Badu-Apraku (B.[Badu@cgiar.org](mailto:Badu@cgiar.org)); Silvestro Meseka ([S.Meseka@cgiar.org](mailto:S.Meseka@cgiar.org)); Wende Mengesha ([W.Mengesha@cgiar.org](mailto:W.Mengesha@cgiar.org))

## 8. *References*

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