

Purpose:

Provide students with an example of how to estimate general and specific combining ability using diallel

Goals:

1. Design crosses to estimate general and specific combining ability using diallel.
2. Demonstrate ability to calculate variance components.

ALA: General and specific combining ability – diallel mating design

Read the Griffing 1956 paper for more background on the various methods for making crosses and setting up the performance trial.

In an attempt to determine the general combining ability and specific combining ability in sorghum, the plant breeder used 7 sorghum lines to generate 21 hybrids following the diallel mating design, without reciprocals and parents. The 21 hybrids were evaluated in striga-infested and non-striga fields using the randomized complete block design with three replications.

1. Determine the model and method of the diallel analysis to be used.
2. Using the datasets “QG_Mod8_ALA8.1_ds1.csv” and “QG_Mod8_ALA8.1_ds2.csv” and R script “QG_Mod8_ALA8.1.R” conduct the analysis of variance for the diallel mating.
3. Determine whether the differences among the parents and crosses within parents are significant.

Note: In this exercise, we utilize R and R packages: plantbreeding and DiallelAnalysisR. Other available free software for diallel analysis includes AGD-R (Analysis of Genetic Designs with R for Windows) from CIMMYT/CGIAR. (<https://data.cimmyt.org/dataset.xhtml?persistentId=hdl:11529/10202>)