IDT7-007 | GGE biplot to analyse the response of recombinant inbred lines (RILs) of peanut to water stress

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The study was undertaken with the objective to examine the nature and to quantify the magnitude of genotype x environment interaction effects on pod yield of peanut and to determine the best genotype (s) for water deficit conditions. The experiment was conducted for two years (2010 and 2012) under two treatments involving (1) mid-season stress (*i.e* pod formation) and (2) regularly irrigated conditions using 186 Recombinant inbred lines (RILs) along with their parents (TAG 24 and TMV2NLM). Experiment was laid out in split plot design with treatment in main plot and RILs in subplots. ANOVA was performed with year/treatment effects as fixed and genotype as random. ANOVA for pod yield was significantly affected by treatment x year (46.55%), genotype (15.14%), Genotype x year (11.84%), Genotype x treatment x year (3.2%) and Genotype x treatment (1.1%). The result depicted differential performance of RILs at different test environments and hence the presence of interaction effects. The genotype main effect plus genotype x environment interaction (GGE) biplots were applied to analyze and visualize pattern of the interaction component. The first two principal components (PC1 and PC2) of the GGE explained 82.39% with PC1=66.42% and PC2=15.97% of the GGE sum of squares using environment standardized model. RILs, 7, combined both high mean yield and high stability performance across the environments and could be characterized as ideal genotypes.

IDT7-008 | Simulating the effects of plant traits for increasing grain sorghumin water-limited environments: a case study of West Africa Sudano-Sahelian region

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The need to improve the performance of dryland crops in semi-arid environments cannot be over emphasized, because growth and development of such crops are often limited by moisture and other abiotic factors. Sorghum production in commercial situations requires maximising grain yield on limited available water resources, which requires maximizing the ratio of yield to evapotranspiration. In this study, a system analysis was undertaken to identify those plant traits that might be altered to improve sorghum yield in a moisture-limited environment. APSIM model was used to simulate sorghum (*Sorghum bicolor L. moench*) for 30-year period at two locations (Kano, Nigeria and Bamako, Mali), characterized by high inter-annual rainfall variability and evapotranspiration in the Sudano-Sahelian region of West Africa. Since sorghum is known to be better adapted to drier environments, a number of individual plant traits were adjusted in the calibrated APSIM sorghum-module for the two selected varieties. In the tested environments, it was found that decreasing leaf size and increasing seed growth both resulted in decreased yield while the ratio of grain yield to evapotranspiration was decreased. Combining sorghum plant traits in the model resulted in increased yield and the ratio of grain yield to evapotranspiration when the average for all the years simulated. In addition, the simulated grain yield show decline up to 25% in Bamako, Mali and 35% in Kano, Nigeria for both varieties. These results indicate future adaptations strategy to climate variability and change for sorghums variety is required while maintaining improving soil quality in a continuing process.