

IDT6-033 | Screening groundnut genotypes using TIR (Temperature Induction Response) technique for thermotolerance

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Heat is one of the major abiotic stresses that adversely affect crop production worldwide at different stages of development. Groundnut is a major crop cultivated in tropical and sub-tropical regions where high temperature stress is a serious constraint for its production. In the present study, temperature induction response (TIR) was conducted for screening the tolerant genotypes, where the seedlings were exposed to sublethal temperature from 34°C-54°C for 4 hours 30 minutes followed by lethal

temperature at 58°C for 3 hours. From the 100 diverse genotypes screened, 24 showed tolerance to high temperature with mean percent seedling survival of 92%, 30 showed moderate tolerance and 46 were identified as temperature susceptible compared with checks (100% survival). Results suggested that TIR is used to identify stable thermotolerant genotypes and could be explored as donor source useful in breeding programmes. Further work will be focused on the physiological and molecular basis of thermotolerance in selected tolerant and susceptible genotypes for the identification of heat stress tolerant genes which could be useful for engineering plants with improved heat tolerance.

IDT6-034 | Genetic gain in heterosis of maize reciprocal composites

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Two improved tropical maize composites representing complementary heterotic pools have been subjected to four cycles of reciprocal recurrent selection (RRS). The objectives of this study were to evaluate the effect of selection on genetic gain in heterosis for grain yield and other agronomic traits. The C₀ to C₄ populations of the two composites and their five varietal crosses along with a commercial check were evaluated at four locations in Nigeria for two years. Mean grain yield of the C₄ x C₄ was 6 % greater than that of a late-maturing commercial hybrid check. Grain yield of varietal crosses increased by 3% per cycle and was accompanied by desirable changes in anthesis-silking interval, ear aspect, plant aspect and resistance

to foliar diseases. These improvements in varietal crosses may result from the fixation of different favourable alleles at each locus in each composite through RRS. Mid-parent heterosis in grain yield increased from 4% at C₀ x C₀ to 25% at C₄ x C₄. The positive average heterotic effects on grain yield may arise from the presence of non-additive genetic effects. The results of our study highlight the potential that exists to exploit the advanced selection cycle of the two composites as useful sources of diverse and stable inbred lines with improved combining ability and as potential parent to develop improved varietal crosses to increase farmers' access to improved seeds in specific production zones.