

IDT3-004 | Comparison of three C4 cereals for transpirational sensitivity to elevated evaporative demand

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Maize, sorghum and pearl-millet are leading C4 cereals for tropical regions where evaporative demand is high. The transpiration response to high VPD and leaf area of plants grown under different VPD conditions was compared among species to assess the degree of water conservation of these crops and then their potential fitness to different stress scenarios. Ten genotypes of each species were grown under moderate (2.2-2.8kPa) and high VPD (3.9-4.5kPa) conditions till early vegetative (V5-V7) stage with no water-limitation. At that stage transpiration was measured under elevating VPD (0.9-4.1kPa) in controlled conditions. All three species grown under moderate VPD conditions showed a variation in transpiration restriction above 3.0kPa, although the decrease in transpiration above 3.0kPa was high in the case of maize. Sorghum and pearl-millet grown under high VPD condi-

tions showed significant reduction in leaf area whereas maize showed trivial differences in leaf area across VPD conditions. Therefore, under high evaporative demand when soil water was not limiting, maize saved water only by restricting water use during pre-flowering stages whereas sorghum and pearl millet both reduced canopy size and transpiration under high VPD. The soil moisture thresholds where transpiration declined upon progressive water stress imposition did not differ significantly, regardless of different VPD in the growing conditions. Maize had also higher TE than sorghum and millet in the high VPD conditions. Therefore, water conserved in maize by restricted transpiration in high VPD condition, probably leading to higher TE, was sufficiently rewarded to sustain biomass accumulation in water stress period.

IDT3-005 | Ideal root types in drought resistant rice (*Oryza sativa* L.)

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Roots may promote plant growth under water stress condition, providing desirable root geometry. The present experiment was conducted to evaluate root traits in laboratory by growing them in glass plates under osmotic stress at different concentrations of PEG, and further growing them in PVC pipes. The data on 13 rice genotypes for shoot length, root length and root diameters were taken from 11 days glass plates-grown seedlings. The data for maximum root length, root volume, fresh and dry root weight, dry shoot weight and estimated root-shoot ratios were taken from 65-days-old plants grown in PVC pipes. Osmotic stress at seedling stage using PEG identified *Dular* and *Browngora* as less affected genotypes with increased root length and root diameter. *Aditya*, *Dular* and *Browngora* found were found to be favourable genotypes with respect to the root

traits. Records from later growth phase revealed maximum heritability for root length. High genetic advance with moderately high heritability was noticed for dry root weight, followed by dry shoot weight. On the basis of two experiments, three genotypes (*Dular*, *Browngora*, *Aditya*) were found as favourable parents, while IR 64, IR 30 and *Satabdi* as poor parents under water stress conditions, and these parents were mated in di-allele combinations without reciprocals. Results showed both additive and non-additive gene action in the inheritance of all the root traits, with predominance of non-additive gene action confirmed from predictability ratio. *Dular* was identified as the best general combiner for all the root traits. Maximum heterosis with high per-se performance for the root traits as well as yield was found in *Dular* x *Aditya* cross.