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Evaluation of drought tolerance in contrasting cassava varieties under a Brazilian semi-arid environment

To identify some traits that are most contrasting and can be useful attributes in selecting genotypes for drought tolerance in cassava, contrasting varieties have been evaluated in some field trials in the semi-arid environment of Petrolina, northeast Brazil, where the annual average rainfall and potential evapotranspiration are around 560 mm and 1500 mm, respectively. Plants were submitted to two water treatments: irrigation and water deficit (irrigated only until 2-3 months after planting-MAP) and evaluated in different periods using growth and physiological parameters. The results showed significant effect of the Petrolina's environment on production's parameters such as storage roots fresh weight-SRFW, number of storage roots-NSR, root dry matter-RDM and harvest index-HI, with different responses among varieties. In general, all the parameters were negatively affected by water deficit, with more pronounced effect on SRFW (reduction of 57%), followed by NSR (38%). Leaf conductance, leaf retention, leaf size, harvest index, ABA, sugars and starch accumulation in the leaves and stems were also differentially affected in the cassava varieties. Under water deficit, leaf retention, leaf conductance, and storage root establishment (onset of root bulking), measured within the critical period for water stress (until 6-7 MAP), were highly correlated to yield performance at the final harvest (11 MAP). The different responses to water deficit for the evaluated parameters has helped us to better discriminate varieties as tolerant or susceptible to drought and to define the best traits for selecting in breeding programs.