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TESTING DREB GENETICALLY MODIFIED SOYBEAN PLANTS FOR DROUGHT TOLERANCE IN BOTH GREENHOUSE AND FIELD CONDITIONS

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The development of drought tolerant plants is highly desirable as areas suffering with drought are due to increase in the future. One strategy being used for this purpose is the genetic engineering of plants with transcription factors that regulate the expression of several genes related to abiotic stress. The *DREB1A* and *DREB2A* genes driven by the stress inducible promoter, *rd29A* were introduced into a drought-sensitive soybean cultivar BR16 through biolistics. From the lines obtained we evaluated drought tolerance and yield performance of the genotypes: DREB1A-P58, DREB1A-P1142, DREB2A-P2193 and a crossing between the cultivar BR16 and DREB1A-P58, named 09D-0077. Drought was simulated in the greenhouse by exposing the plants to progressive soil drying in pot culture. Testing DREB plants in the field is particularly important, considering that few studies have reported results in realistic field conditions. Field performance was evaluated in plots under three different water regimes, irrigated, natural drought (non-irrigated) and stressed by sheltering the plots from rain at the vegetative or reproductive stages. Occurrence of natural drought was verified through meteorological data obtained at the site. We were able to show that DREB genetically modified (GM) plants had a higher survival rate than its non-GM isoline BR 16, after severe water stress in both greenhouse and field conditions, and that, under stress, DREB plants had a higher relative growth ratio (RGR). Although DREB plants did not outperform the cultivar BR16 in terms of yield, there was a clear tendency of superiority for some yield components such as number of seeds, number of pods with seeds and total number of pods when stress was applied at the vegetative stage. Further studies are needed to better characterize the conditions in which these plants may outperform the non-transformed parental. Plant drought responses are influenced by diverse plant-soil-atmosphere interactions and also by the time, intensity, duration and frequency of the stress. More insights into the mechanisms of stress tolerance of DREB soybean plants are been investigated in our on-going studies.