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Identification of genes associated with root architecture under water stress in *Zea mays L.*

Drought is the major limiting factor to crop production worldwide. Root architecture can influence drought response. Viviparous mutant (vp) embryos fail to become dormant and several of the vp mutants are also ABA (abscisic acid) deficient. ABA is a plant hormone and its level is believed to influence plant drought tolerance. Bin numbers 3.05, 4.08, and 8.05 were previously associated with QTL for primary root length and bins 1.03, 1.07, 4.04, and 5.03 with QTL for seminal root number (Gerau, unpublished). An experiment using mutants, (including vp mutants) corresponding to these QTL regions was performed to identify genes associated with root architecture under water stress. Two replicated greenhouse experiments were conducted: a well-watered experiment (watered for the experiment's duration) and a water-stressed experiment, in which a polyacrylamide water retainer was added to the potting media to slow the desiccation rate of the plants. Watering was stopped after 21 days in the water-stress experiment. Thirty-one days after planting, measurements were taken on primary root length, total root mass, root branches, seminal root number, and shoot mass in both experiments. Significant differences were observed between the mutants and wild-type plants for most traits. Mutant vp5-DR3076, a carotenoid and ABA deficient mutant, showed significant water stress-related differences in root architecture for root branching but not for the other parameters. Also vp8, an ABA deficient mutant, exhibited significant water stress differences for root branching, root mass, and shoot mass. The genes identified here are candidates for use in future studies of root response to water stress.