

Responses of Symbiotic Nitrogen Fixation to Rehydration after Drought Stress in Peanut Genotypes

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Drought stress is an important environmental factor that may severely impair peanut growth and productivity. Previous studies demonstrated that rehydration after a short-term drought might alleviate the negative effects of drought in peanut. The objective of this study was to evaluate the impact of rehydration on symbiotic nitrogen fixation in various peanut genotypes. Two parental lines (Tifrunner and C76-16) and 14 recombinant inbred lines with varying drought tolerance characteristics were planted in rainout shelters using a split plot design with a randomized complete block design within in 2015 and 2016. Two drought-recovery regimes (four-week middle-season or late-season drought followed by two-week rehydration) were applied along with an irrigated control. The ^{15}N natural abundance technique was used to evaluate differences in symbiotic nitrogen fixation among different genotypes after the drought and rehydration periods. Reductions in the percentage of shoot N derived from the atmosphere (%Ndfa) after drought stress were observed in both 2015 and 2016, indicating the negative effects of drought stress on symbiotic nitrogen fixation. Variabilities in %Ndfa were observed among different genotypes after rehydration. In most genotypes, %Ndfa remained unchanged after rehydration. Only a few genotypes showed a slight increase in %Ndfa after rehydration following mid-season or late-season drought. However, no consistent pattern was observed in either year. Our data suggest that unlike other traits, symbiotic nitrogen fixation in many peanut genotypes may not recover from the damage caused by mid- or late-season drought upon rehydration.