

Current Challenges in Peanut Breeding for Drought Tolerance and Future Prospects

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Drought is the main abiotic stress in peanut that can cause significant yield loss and reduce seed quality. Plants responds to drought stress by modulating plant morphology, physiology, biochemistry, and molecular gene activation. Progress in the development of drought tolerant peanut lines has been difficult due to the multi-allelic affect and variable environmental factors. Yield, as a composite of all the interactions of biotic and abiotic components and stress tolerant genetic potential of specific peanut genotypes, can be significantly variable depending on year and location. Recent advances in peanut genomics research have identified QTLs for drought tolerance and putative drought responsive candidate genes through GWAS analysis. But the usefulness of these putative gene markers must be validated by field experiments and consistently correlated with the phenotyping traits measured. Recent research has indicated that several potential drought tolerance mechanism(s) exist in peanuts ranging from morphological, physiological, biochemical, and/or genetic variations in different genetic background that maybe combined through targeted crosses to produce peanut lines with higher levels of drought tolerance. A discussion of our on-going drought research as well as other drought research to highlight the needs or potentials of different peanut traits that can be targets for peanut drought breeding will be presented.