Phenotypic Characterization of Groundnut (*Arachis hypogaea* L.) Genotypes Based on Shoot and Root Mass Indices Using Temperature Induction Response (TIR) Approach

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ABSTRACT

Groundnut (*Arachis hypogaea* L.) is a vital global crop cultivated across diverse agro-climatic regions. However, the prevalence of high-temperature stress due to climate change poses a significant challenge to groundnut production. This study employed the Temperature Induction Response (TIR) technique to assess the heat tolerance of 36 advanced groundnut breeding lines. The TIR method involved subjecting seedlings to sub-lethal and lethal temperatures, followed by recovery, and evaluating shoot and root mass indices. The results revealed significant genetic diversity in heat tolerance. Some of the genotypes exhibited greater resilience to heat stress. Genotypes ICGVs 16598, 16594, and 06040 were identified as heat-tolerant, while ICGVs 181023, 181013, and 181031 were found to be heat-susceptible. These findings underscore the importance of genetic variability in crop resilience and highlight the potential of the TIR technique as a reliable and cost-effective tool for assessing heat stress tolerance at the seedling stage. Further research into the underlying mechanisms of heat tolerance in these genotypes offers promising avenues for enhancing crop resilience in the face of climate change.

Keywords: *Groundnut, Shoot and root mass indices and TIR*