Development of Heat and Drought Tolerant Inbred Lines in Industrial Hemp

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ABSTRACT

Industrial hemp (*Cannabis sativa* L.) holds significant potential as a multi-use crop in the United States; however, currently available fiber, grain, and CBD-type cultivars originate from northern temperate regions and are not adapted to the heat- and drought-prone ecoregions of Texas and the southern U.S. This leads to significant stress during seedling establishment, vegetative growth, and flowering, ultimately increasing the risk of crop failure. Our research addresses these challenges through a multi-stage cycle screening and selection utilizing the sequential seedling stress selection (S5) strategy for heat and drought tolerance, followed by mating-type subgrouping and controlled self- and cross-hybridizations of elite selections under greenhouse conditions. Additionally, we induced hermaphroditism (monoecy) in elite female plants to enable inbreeding followed by progeny selections using the S5 strategy for up to five generations. We aim to develop novel, stable, and uniform industrial hemp F1 hybrids and inbred lines specifically adapted to the southern U.S., capable of thriving under high temperatures, intense light, and substantial drought conditions. The resulting cultivars have the potential to advance industrial hemp production by enhancing adaptability and ensuring more reliable yields.

Keywords: Heat tolerance breeding, Drought tolerance breeding, Inbreeding, Cross-fertilization

How to Cite

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