

Evaluating Stress Tolerance & Productivity of Non-Dormant Alfalfa Germplasm Pools

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Alfalfa (*Medicago sativa*) plays an essential role in dairy and livestock production in California and worldwide. In the Central Valley and the low desert, where non-dormant alfalfa is mostly grown, limited water availability and poor water quality are among the main constraints to alfalfa production. These challenges underscore the need for enhanced resilience in future alfalfa production. Pre-breeding uses germplasm collections to broaden the local genetic base, which can then be crossed with elite cultivars to enhance traits that have seen limited progress, such as on-farm yield. Effective pre-breeding requires selection under conditions that reflect the environment of the target production system. Therefore, an evaluation with different water availability conditions is needed to characterize the new germplasm pools.

In this study, 21 newly developed populations of non-dormant alfalfa germplasm accessions, derived from seven regions, selected across three environments, and 3 check cultivars, were planted at two locations in California: Davis for high productivity and El Centro for heat and drought tolerance. Each location was planted under two water availability treatments: full irrigation and deficit irrigation. The deficit irrigation treatment will experience irrigation cut-off from July for three consecutive months. Yield data from both locations will be analyzed to identify accessions with the ability to survive and maintain productivity under contrasting irrigation and environmental conditions. The results will provide insight into the agronomic potential of the newly developed non-dormant germplasm populations for use in alfalfa improvement.

Keywords: Nondormant, germplasm, deficit irrigation