

Developing Regionally-Adapted, Resilient Alfalfa Germplasm Pools

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Germplasm collections are most widely used to introgress simply inherited traits, especially resistance genes, into commercial breeding lines. However, the use of germplasm collections as a source of desirable alleles for complex traits, such as yield, adaptation to diverse stresses, or persistence, is less widely practiced. In this project, we discuss our progress in implementing a pre-breeding program to enhance alfalfa germplasm that can be ultimately used in commercial cultivar development programs. We are working with two broad categories of germplasm – a “dormant” group consisting germplasm from fall dormancy classes of roughly 1-5 and a “nondormant” group of FD 6-11. In the dormant group, we conducted two cycles of selection in four populations originating from Siberia, Central Asia, Europe, and Turkey and neighboring countries. We increased seed of these populations in 2021, are evaluating them in multi-location trials, and will release them as germplasms in 2022. We conducted one cycle of selection in a second round of germplasm accessions and will produce seed in 2022. For nondormant germplasm, we have developed populations from salinity and drought stress locations in California. In 2021, we planted a large non-dormant germplasm evaluation trial across four highly diverse locations (Prosser, WA; Davis, CA; Fresno, CA; and Gainesville, FL). We will review our progress to date and discuss future plans for these breeding programs.