

Developing summer-dormant tall fescue for the southern Great Plains

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Hot and dry summers that prevail throughout the southern Great Plains adversely affect the persistence and productivity of tall fescue [*Lolium arundinaceum* (Schreb.) Darbysh]. Summer-dormancy enables tall fescue to survive better in the region. Attempts were undertaken to identify the environmental factor(s) responsible for inducing dormancy and to develop an *in vitro* method for phenotyping summer-dormancy in tall fescue. Daylength plays a key role and dormancy could be differentiated by comparing growth of tall fescue genotypes under long and short day conditions. The summer-dormant genotype grew less than the summer active as measured by number of tillers (8.6 vs. 15.8), fresh weight (6.0 vs. 16.0g), and dry weight (3.1 vs. 8.8g) under long day and favorable temperature conditions. A biparental population was developed by crossing a summer-dormant and a summer-active genotype to identify genetic loci associated with summer-dormancy. Parental linkage maps were constructed with SSR, STS, and DArT markers using a two-way pseudo testcross strategy. The population was phenotyped in both field and growth chamber conditions. Significant variations were observed for several traits including leaf senescence, plant height, moisture content, fresh weight and dry weight. Identification of quantitative trait loci associated with important traits is in progress. Both the parents contributed significant QTLs associated with the studied traits. A set of summer-dormant tall fescue populations was evaluated at Oklahoma and Texas locations. The plots were mowed at 5 cm stubble height multiple times throughout the growing seasons. NFTF1700 showed the best persistence across locations among the populations evaluated. These results showed the feasibility of developing suitable tall fescue cultivars for the southern Great Plains.