Breeding and Genetics for Improved Turf Quality and Stress Resistance

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Development of Intergeneric Hybrids of Ryegrasses with Fescues as new Stress and Pest Resistant Turfgrasses

Cool-season turfgrasses are important throughout the United States because of their adaptation to cooler climates, shade, and ability to maintain lush color year-round in warmer climates with supplemental irrigation. However, increased drought frequency and diminishing water resources are jeopardizing the future of turf and its benefits to urban culture, the environment, and the economy. This project aims to combine the desirable characteristics and mitigate the deficiencies of existing turfgrasses by developing turf-type intergeneric hybrids of *Lolium* and *Festuca,* or *Festulolium.* We have already developed a population with an extraordinary capacity to survive without supplemental irrigation in southern California. We will continue to select in the populations of perennial ryegrass, *L. perenne, x* meadow fescue, *F. pratensis,* hybrids for the best combinations of turf characteristics, specifically focusing on drought, heat, and disease resistance. To understand the genetics of turf characteristics, we have developed a set of single chromosome introgressions from *F. pratensis* into *L. multiflorum* and use them to assign desirable characteristics to individual chromosomes and their segments, and to tag such segments with molecular markers for marker assisted selection. Diversity Arrays Technology (DArT) will be used to aid in the discovery and scoring of genetic polymorphic markers with greater efficiency and much lower cost. At the conclusion of this project, the combined efforts of breeding, genetics, agronomy, and plant pathology will hopefully lead to the commercial release of improved turf-type *Festulolium* hybrids. Moreover, we will provide end-users with best management practices for successful establishment and culture.

Selection and Molecular Identification of Traits Responsible for Winter Color Retention, Shade Tolerance, and Stress Resistance in Warm-Season Turfgrasses

Despite the aforementioned strides to improve stress and pest resistance among cool-season turfgrass species, the future of turfgrass culture in southern California and other climates where water resources are diminishing lies with warm-season turfgrasses which are better adapted to drought and heat. However, widespread acceptance among end-users requires that warm-season turfgrasses maintain green color throughout the colder winter months and survive under low light conditions from neighboring trees and frequent cloud cover. We intend to focus our efforts primarily on bermudagrass by evaluating both commercially available and experimental germplasm under field conditions in Riverside. We will also examine kikuyugrass from populations originally collected by Dr. Cheryl Wilen because this species possesses among the best winter color retention among the warm-season turfgrasses and because we believe that there is potential for further improvement of kikuyugrass as a desirable turfgrass species. Once again, our trans-disciplinary approach hopefully will lead to the commercial release of warm-season turfgrasses that are better adapted to meet the challenges that await our industry.