New Mexico State University - Dr. Arden A. Baltensperger

Breeding Improved Seeded Bermudagrass for Turf

Until the recent research support of the USGA, most of the bermudagrasses used on golf courses were established by vegetative methods, i.e., sod, plugs, or sprigs. Dr. Baltensperger's bermudagrass breeding program made significant progress toward the development of seed propagated bermudagrass varieties. His project successfully estimated the genetic variation and heritability for turfgrass quality, shade tolerance, and seed production characters.

These research efforts led to the release and production of NuMex 'Sahara' bermudagrass in 1987. Sahara is the first improved, seed propagated turf-type bermudagrasses released exclusively for golf course and sports turf usage. During this time, the USGA also partially funded recurrent selection for shorter internodes, increased density, bermuda stunt mite resistance, and increased seed yield.

Oklahoma State University - Dr. Charles M. Taliaferro

Breeding and Evaluation of Cold-Tolerant Bermudagrass Varieties for Golf Course Putting Greens and Fairways

The bermudagrass breeding program at OSU has devoted attention to the development of seed propagated, cold tolerant, fine textured bermudagrass varieties for the transition zone climates of the United States. In addition, the last three years were devoted to developing improved, vegetatively propagated bermudagrasses for golf course putting greens in southern climates. Both breeding objectives aim to reduce water use and maintenance costs by providing a better adapted warm-season turfgrass species where poorly adapted cool-season species are over-utilized.

For the seeded bermudagrasses, three cycles of phenotypic recurrent selection for increased seed fertility within a cold hardy germplasm resulted in a three-fold increase in the percentage of florets setting seed. A breeding nursery was established in Yuma, Arizona to evaluate seed production potential in the part of the United States where most bermudagrass seed is produced. Four experimental seeded bermudagrasses were successfully tested in Fort Collins, Colorado and in Columbia, Missouri. Two new seeded bermudagrasses were entered in the 1992 National Turfgrass Evaluation Trial.

Very fine-textured, cold-tolerant *C. transvaalensis*, identified as having good seed set, were used to produce over 6,000 segregating progeny plants. Over 3,000 individual plants currently are being evaluated under putting green conditions in Oklahoma. Plants with superior performance under Florida and Oklahoma climates have been advanced to preliminary cultivar trials. These trials should help identify new putting green bermudagrasses in the next two to three years.

In addition to progress made in the development of new seeded and vegetatively propagated bermudagrass varieties, new and effective screening techniques were implemented. Repeatable laboratory techniques, such as the "electrolyte leakage" and "freeze-regrowth" tests, have been used for evaluating actual and relative cold tolerance. Alterations in protein synthesis associated with cold acclimation in 'Tifgreen' and 'Midiron' bermudagrass indicate differences in the amount of low molecular weight proteins.

Techniques were perfected for regenerating bermudagrass plants from cultured tissues using vegetative and seed explants. Somaclonal variants have been identified among regenerated populations. Drought avoidance mechanisms, using techniques developed in other USGA sponsored projects, were used to document differences among promising parents and commercial varieties.

Native Grasses

There are native or other introduced grasses which are potentially valuable for use as turf. Among these are buffalograss, fairway crested wheatgrass, blue gramagrass, kikuyugrass and species of *Distichlis*, *Puccinella*, and *Paspalum*. Very little previous work had been done assessing these species; therefore, two early objectives were to determine the extent of their genetic variation and potential usefulness as turfgrasses.

A long term objective included the collection and evaluation of potentially useful biotypes. In the cases where species showed promise for improvement, the appropriate breeding techniques would be employed.

Specific objectives varied among the species and with the possible use of each species. Most of these species demonstrated an ability to persist under unfavorable conditions such as drought or salinity. Improvement efforts were directed toward the characteristics which would contribute to the usefulness of each species for turfgrass application.