University of Nebraska - Dr. Terrance P. Riordan

Breeding, Evaluation and Culture of Buffalograss for Golf Course Turf

Native grasses have the greatest potential in regions of the country where water, poor soils, or climate are limiting factors in providing quality playing surfaces. Taking advantage of the natural selection that has occurred over millions of years obviously will be more successful than a ten-year breeding program; however, the domestication of native species is not a simple task.

Buffalograss is a good example of how a species native to North America can be utilized for golf courses. To date, buffalograss has been improved to the point that it will make an adequate playing surface for golf course roughs. Continued research efforts will allow this species to be used on fairways in areas of the United States where more traditional grasses are not well adapted.

Buffalograss is not a panacea, but represents a major step in the recognition of a valuable natural resource for the turfgrass industry to utilize.

Under the direction of Dr. Riordan, the buffalograss breeding project has developed and released 'NE 84-609'. The 609 cultivar is a drought tolerant grass intended for use on golf course roughs in the south central plains and desert southwest. In addition to 609, four other vegetative and five seed propagated buffalograsses were entered in the National Turfgrass Evaluation Program. In fact, half of the 22 entries in the buffalograss trial were sponsored, in part, by the USGA/GCSAA Turfgrass Research program.

A breeding program must pass many milestones to make continued progress toward the development of better turf-type varieties. Buffalograss is a dioceous plant, or one which requires male and female plants to produce fertile seed. For this reason, research to determine the sex ratios of male and female progeny produced by female parental lines was carried out. Hybridization techniques were developed, and the light required for flowering determined, so pollination could be optimized for seed set.

Seedling germination and establishment differences of seed caryopses versus buffalograss burs, which contain 2 to 3 seed, were compared to determine the best way to process and market seed for the consumer. For the increase of vegetative varieties, a mechanical method of extracting plugs from the field was developed. Methods were developed to "pre-root" plugs in greenhouse nursery liners for faster establishment.

Colorado State University - Dr. Robin L. Cuany

Development of Dryland Western Turfgrass Cultivars

Alkaligrass, blue grama, and fairway wheatgrass are native grasses under evaluation for use as turfgrass by Dr. Cuany at Colorado State University. Alkaligrass was determined to be a cross-pollinated grass which segregates for leaf color, growth habit, and seed panicle characters. Alkaligrass accessions from Eurasia were screened for turf color variation in response to weather changes, disease resistance, and seed production characteristics.

The four best alkaligrass families for rust resistance in Colorado, and at least 2 years of good seed production, were sent to Oregon for seed production and turf trials. Over 25 collections from western states were screened for seed productivity and turf performance; however, only one was equal to the performance of Eurasian alkaligrasses.

Blue grama clones derived from collections originating from the Great Plains of the United States were screened for seed productivity, caryopsis weight and plant type over two generations. New parent plants were chosen from within 20 families and grouped into four recombination blocks. A large blue grama seed production block with the best 25 clones was planted to produce breeder's seed (ELITE). A smaller, secondary blue grama block with 24 parents moderately good in seed production and size also was established (PLUS). Two small blocks selected for leafiness and narrower leaf blades were established for special use with less certainty of seed yield.

Fairway crested wheatgrass was surveyed from 17 Eurasian sources, and parents were selected in two successive generations for rhizome development, disease resistance, leaf width, and seed yield. Two seed production blocks of 60 tetraploid and 30 diploid fairway crested wheatgrasses where established, all rhizomatous types with medium to coarse leaf blades. Narrow-leaf fairway crested wheatgrass seed production blocks with 21 and 27 parents of diploid and tetraploid origin were established.

In addition, inland saltgrass (*Distichlis* sp.) collections were surveyed for growth pattern, and many of the accessions were strongly rhizomatous and produced a dense canopy requiring little maintenance. Several female clones had taller seed heads useful in seed harvest. Seed germination required pre-chilling and the seedlings which emerged were weak. Management studies,

including variable mowing heights and fertility rates, were conducted to evaluate alkaligrass, blue grama, and fairway crested wheatgrass selections.

University of Arizona - Dr. Charles F. Mancino

Breeding and Development of Curly Mesquitegrass as a Desert Turf

Curly mesquitegrass (*Hilaria belangeri*) is a potential turfgrass for low maintenance areas in the Southwestern Desert regions of the United States. Under the direction of Dr. Mancino, germplasm was collected throughout Arizona. Several basic studies were conducted, including cytological examination of chromosome behavior prior to seed formation, effects of chemicals on germination, the effects of seed storage times and conditions on germination, and the effects of seeding dates and rates on establishment. Management studies examined interacting effects of mowing heights and nitrogen rates. In cooperation with Texas A&M University, genetic rooting potential of curly mesquitegrass was determined.

Much of the variation observed among the curly mesquitegrasses collected from Arizona was due to genetic differences, and therefore, the species appears to have the potential to be improved for use as a "low maintenance" turfgrass. The results from cultural practice studies demonstrated that mesquitegrass can perform well (i.e., display acceptable color, density, uniformity, etc.) under turfgrass management practices. Good color and adequate density (> 70%) was achieved for some of the accessions at low nitrogen rates (48 kg N ha^{-1} yr^{-1} or 1 lbs. per 1000 ft^2) and a mowing height of 10 cm (1.5 inches). The research project also demonstrated that seed could be produced and that establishment of mesquitegrass by seed was a viable method.

Annual Bluegrass

Poa annua, annual bluegrass, is widely adapted throughout the world. In cool climates it represents a major, often undesirable, component of golf course turfgrass. In warm climates, as well as in zones of marginal adaptation, it is considered a weed because of its intolerance to extremes of temperature and moisture stress.

The evolutionary parents of *Poa annua* are *P. supina* (a diploid perennial type) and *P. inferma* (a diploid annual type). It was hoped that a breeding program involving standard breeding techniques, as well as tissue culture, could yield superior plants with desirable genetic characteristics.

University of Minnesota - Dr. Donald B. White

Through the efforts of Dr. White, a breeding program to develop annual bluegrasses for golf course putting greens was implemented. With over fifty years of failed attempts to achieve 100 percent annual bluegrass control, it was decided to evaluate the improvement potential of the species. Dr. White states his philosophy simply, "... when served lemons, why not make lemonade!"

Research efforts have developed methods to control flowering, long term viability of seed, determination of chromosome number, and most important, identification of individual parents with superior agronomic characteristics which will be used to develop turf-type cultivars. Research indicates that both the perennial form, *Poa annua* var *reptans*, and an annual species, *P. supina*, exhibit the most potential for new varieties.

Seed production plots of the most promising parents were established in the Pacific Northwest to produce seed for cultivar trials. A limited amount of seed from these production blocks was planted on golf course putting green nurseries in Southern California, Massachusetts, and at the University of Minnesota turfgrass research plots.

In addition, the development of the excised stem/mist technique allows for controlled crosses between elite materials to produce intra- and interspecific hybrids for characters of interest. This technique has allowed for the development and evaluation of several F_1, F_2, F_3 and back-crossed materials segregating for plant type, color, texture, seedling vigor, culm length, stolons, and perennial growth habit.

Research concerning the temperature and photoperiod requirements for seedhead initiation indicates that plants segregate into day-neutral and seasonal flowering categories. One exciting discovery was that segregation ratios for progeny from day-neutral parents suggest that the characteristic may be controlled by a single gene. This type of information could help lead to the development of *P. annua* var *reptans* varieties with reduced flowering periods under mowing.

Zoysiagrass

Zoysiagrass was introduced into the United States from the Orient around 1900. Some selections have been used throughout the transition zone since about 1950. Use has been limited because zoysiagrass selections are propagated