Breeding and Evaluation of Kentucky Bluegrass, Tall Fescue, Perennial Ryegrass, and Bentgrass for Turf

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Objectives:

1. Collect and evaluate potentially useful turfgrass germplasm and associated endophytes.
2. Continue population improvement programs to develop improved cool-season turfgrass cultivars and breeding synthetics.
3. Develop and utilize advanced technologies to make current breeding programs more effective.

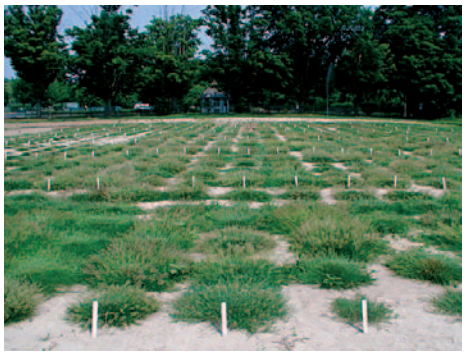
Start Date: 1982
Project Duration: Continuous
Total Funding: $10,000 per year

As of Oct. 4, 2005, over 2,450 promising turfgrasses and associated endophytes were collected from Ukraine, Holland, Spain, France, Scotland, and the New England area of the United States. Many of these associated endophytes should be new and unique and may have properties useful in enhancing turfgrass performance. Over 10,000 new turf evaluation plots, 83,000 plants in spaced-plant nurseries, and 9,000 mowed single-clone selections were established in 2005.

Over 180,000 seedlings from intraspecific and interspecific crosses of Kentucky bluegrass were screened for promising hybrids under winter greenhouse conditions of short daylengths and cool temperatures. Over 120,000 tall fescues were screened for rhizomes using field trials. Over 35,000 European perennial ryegrass seedlings were screened for superior turf qualities. Progenies of 700 bluegrass hybrids were examined for apomictic reproduction, and over 12,000 bentgrasses were screened for superior turf qualities and disease resistance.

Over 30 new perennial ryegrass cultivars were identified in two different National Turfgrass Evaluation trials that displayed superior resistance to gray leaf spot caused by *Pyricularia grisea* in 2004 and 2005. These were developed in collaboration with other organizations since 2000 when a natural epidemic of this disease occurred at the Adelphia, New Jersey Research Center. Continued progress has occurred each year through annual cycles of selection since 2000.

Progress is being made to produce tall fescue cultivars with rhizomes (left).



Mapping populations of creeping bentgrass are being used to study the genetics of dollar spot resistance.

Over one-half of the 34 resistant sources were derived from recent European collections. Improvement work is now continuing for resistance improved to gray leaf spot, dollar spot (*Sclerotinia homeocarpa*), and red thread (*Latisaria fusiformis*) in perennial ryegrass. Four new gray leaf spot resistant cultivars ('Paragon GLR', 'Protégé', 'Repell GLS', and 'Panther GLS') became available in 2005.

Continued progress is being achieved in the development of Kentucky bluegrass x Texas bluegrass hybrids. The experimental cultivars A03-TB-258, A00-TB-101, and SRX-TK95 were identified as having superior heat and drought tolerance. The new Kentucky bluegrass hybrids A00-1400, A00-1254, A03-73, and A99-2959 are showing superior performance to previously released cultivars.

Continued progress has occurred in the development of compact brown patch-resistant tall fescue cultivars. The cultivars 'Firenza' and 'Six Point' are the most recent releases with improved turf quality and disease resistance. Progress has also been made on increasing the frequency of rhizome occurrence in tall fescue. Populations with enhanced rhizome formation are being increased.

Fifty sources of creeping bentgrass, and 30 new velvet bentgrass selections were identified with improved resistance to dollar spot and brown patch. Fifty additional colonial bentgrasses were identified with improved resistance to brown patch. The Kentucky bluegrass cultivars 'Midnight', 'P-105', 'Avalance', 'Moonshadow', 'Bedazzled', and 'Cabernet' showed superior wear tolerance in turf trials.

Summary Points

- Continued efforts to obtain new sources of turfgrass and endophyte germplasm from previously under-explored regions is contributing to programs to enhance stress tolerance, growth characteristics, and resistance to insect pests and diseases.
- Modified population backcrossing and continued cycles of phenotypic and genotypic selection combined with increasing sources of genetic diversity in turfgrass germplasm and beneficial endophytes enables significant improvements in performance of new cultivars.
- Substantial progress is being achieved in the genetic improvement of Kentucky bluegrass (*Poa pratensis*) using intraspecific hybridization, interspecific hybridization with Texas bluegrass (*P. arachnifera*) and *P. angustifolia*.
- Over 1,800 spaced-plants of creeping, velvet, and colonial bentgrasses from new germplasm collections were established to identify new sources of genetic resistance to dollar spot and brown patch. Our best experimental creeping bentgrasses were able to maintain very good turf quality with an 80-90% reduction in fungicides.