Cultivar Development and Extreme Temperature Tolerance of Greens-Type Poa annua

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Objectives:

1. Collect, select, breed, and develop genetically stable and phenotypically uniform cultivars of greens-type *Poa annua* for commercial production.
2. Develop techniques to screen large numbers of germplasm accessions for tolerance to extreme temperatures and coverage by sheets of ice.
3. Identify genetic markers associated with genetic loci (genes) controlling agronomically important traits and specific stress tolerances in order to aid in the breeding and development of improved cultivars of greens-type *Poa annua.*

Start Date: 1998
Project Duration: 5 years
Total Funding: $175,000

One of the main problems with *P. annua* greens is that they normally exist as a patch-work of different strains. This patch-work results in a non-uniform putting surface due to differences among the strains in texture, seedhead production, and vertical leaf extension rates after mowing. Differences in pest and environmental stress tolerance among the various strains also complicate the management of such a diverse population of plants. The main focus of this project is to develop commercial seed sources of uniform and stable cultivars of greens-type *P. annua*.

A total of 60 selections with two replicates of plot size 1.2m x 1.2m were established on an 85-15 sand:peat mixture, that adheres to USGA construction recommendations. This was done in September of 2000 using a seeding rate of approximately 0.75 lb per 1,000 sq.ft. All plots were maintained at 1/8-inch mowing height and turf quality ratings were collected on an as needed basis (usually every one or two weeks) from April through November.

One of the 60 selections was more of an annual type that lost all of its green color by the end of May. Many of the remaining selections showed superior turf quality throughout the 2001 growing season. Differences among selections were also observed for resistance to naturally occurring dollar spot disease.

For much of the early to mid-summer, growing conditions were ideal. Then in mid-August, we experienced a hot, humid condition that was accompanied by anthracnose disease. Six selections were relatively unaffected by the disease while the turf quality of the remaining 53 selections was seriously impacted, but to varying degrees. The results thus far suggest that most selections in the breeding program are capable of being successfully established and maintained on sand-based rootzones and that several selections have superior turf quality.

The total seed harvest of 2001 yielded approximately 30 lbs of seed from all selections. Nearly all this seed was hand-harvested, however, several different means of mechanical harvesting were evaluated. To date, we have not discovered a means of mechanical harvesting that seems appropriate for the task at hand. Additional mechanical harvesting techniques will be evaluated in Spring, 2002.

The 2001 seed crop was used to establish the 2001 evaluation trial plots planted at the Valentine Research Center, to plant seed increase fields at both the PSU Turfgrass Breeding Nurseries and the Agronomy farms at Rock Springs, and to initiate some limited on-site testing. The 2001 seed harvest has been very insightful for estimating future seed yield potentials of the project's current elite selections. As a result, the 2002 seed yield of the Nursery planting is expected to be in the 30 lb range (for all selections) while those of the three selections planted at Rock Springs are expected in the 120 to 200 lb range depending on the success of mechanical harvest.

Eric Lyons, an NSF Fellow graduate student, is researching the root biology of greens-type *Poa annua* and creeping bentgrass. Eric continues to collect data on his experimental green and is beginning to analyze root initiation and longevity across rootzone depth throughout the growing season for cultivars and selections of both species.

Annual bluegrass nursery at Pennsylvania State University.

The *Poa annua* breeding program is continuing its collaboration with Drs. Julie Dionne (University of Guelph) and Yves Castonguay (Agriculture Canada) by supplying interesting germplasm for their research and through discussion.

Summary Points

- Sixty selections of greens-type Poa annua was established on USGA rootzones.
- Total seed yield on 2001 was approxiimately 30 lbs.
- Anthracnose seriously impacted 53 out of 60 selections.
- The results thus far suggest that most selections in the breeding program are capable of being successfully established and maintained on sand-based rootzones and that several selections have superior turf quality.