

# 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 molecular markers associated with genetic loci (genes) controlling agronomically important traits and specific stress tolerances to aid in the breeding and development of improved cultivars of greens-type *Poa annua*.

**Start Date:** 2003 (current cycle)

**Project Duration:** three years

**Total Funding:** \$90,000

Despite repeated attempts to breed improved strains, currently there are no commercial sources available of high quality greens-type *Poa annua*. The intention of this research is not to replace creeping bentgrass as a putting surface but rather to offer an alternative grass to those golf courses where *Poa annua* is simply a better choice.

Our collaborative research project with Dr. Trygve Aamlid from the Norwegian Crop Research Institute, in the areas of pink snow mold (*Microdochium nivale*) tolerance and winter hardiness, showed mixed results. We did find significant differences among our cultivars of green-type *Poa annua* for resistance to pink snow mold which is exciting because of this disease's debilitating impact on greens in areas of winter snow cover. Such demonstrative resistance offers great promise for reducing chemical inputs in the future by planting resistant cultivars. However, the result for winter hardiness demonstrated that little to no variation exists for tolerance to winter damage within the species confirming many of our previous research results.

As a species, *Poa annua* is one of the most widely distributed plant species on Earth and is a hybrid between two other species, namely *Poa supina* and *Poa infirma*. Thus, in order to more fully understand the invasive nature of *Poa annua* as well as the enormous potential that greens-type *Poa annua* has to offer the golfing industry, it is important to secure samples of *Poa annua*'s parental species. After securing a grant from the USDA, I was



Dr. David Huff has been developing improved germplasm of annual bluegrass since

fortunate enough to travel to central Europe this summer to collect samples of these parental species, as well as other grasses closely related to *Poa annua*. My European colleagues and I collected a total of 345 samples (accessions) from 202 sites in Czech Republic and Germany. These samples will ultimately serve as the foundation for achieving this project's ultimate goal of developing genetically uniform and stable commercial cultivars of greens-type *Poa annua*.

Demand for seed of our greens-type *Poa* cultivars for on-site testing at golf courses and various research and evaluation plots at Universities, continues to exceed our capacity to produce. We continue to miss opportunities for establishing plots across the USA and abroad due to a lack of seed. This year the breeding program supplied seed of greens-type *Poa annua* to other research projects across the

country, including Cal Poly, University of Arizona, Cornell, SUNY, and University of Rhode Island.

Commercial seed yield trials established in Oregon last year demonstrated a range of seed yields and survival under field conditions. Two of this project's cultivars show good potential for commercialization and have progressed to a second round of testing using larger seed fields in Oregon and Denmark.

We look forward to testing more of our experimental cultivars for commercialization in seed yield trials. We will continue to supply seed of our experimental cultivars to those universities performing research on greens-type *Poa*.

Finally, we will also work towards unraveling the complex genetics of *Poa annua* by examining its parental species with the aim of improving our chances of developing genetically uniform and stable commercial cultivars of greens-type *Poa annua*.

## Summary Points

- Significant differences for resistance to pink snow mold were observed offering promise for reducing chemical inputs in the future by planting resistant cultivars.
- The parental species of *Poa annua* were collected from central Europe and will serve to unravel the complex genetics of invasiveness, adaptability, and genetic stability.
- Western seed yield trials demonstrated good commercialization potential for two Penn State cultivars and a second round of testing using larger seed fields in two locations has been initiated.
- Seed was supplied to several research projects across the country that are working to enhance the utility of greens-type *Poa annua* for the golf industry.