A Bentgrass Breeding Consortium to Support the Golf Industry

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Objectives:

1. To develop elite clones of creeping bentgrass with multiple pest resistances and stress tolerances that can be delivered to the seed industry for use in synthesizing new creeping bentgrass cultivars broadly adpated to a range of ecological and environmental conditions including reduced pesticide application.

Start Date: 2003
Project Duration: three years
Total Funding: $170,817
(three institutions)

Creeping bentgrass (*Agrostis palustris*) is the premier grass for golf course putting greens and is one of the most desirable grasses for fairways and tee boxes for many of the nation's golf courses. Recent breeding advances demonstrated that genetic variation exists within creeping bentgrass for a range of pest resistances and stress tolerances. Many of these traits allow bentgrass to be grown in environments and under conditions that were impossible just a few years ago.

For many golf courses, maintenance of high quality turf requires frequent, varied, and intensive pesticide applications. Pesticide costs can consume up to 10% of the total budget for a high-management golf course. Intensive management (including frequent and low mowing, irrigation) and heavy play serves to enhance and/or spread the development of pest problems, particularly fungal diseases.

Evaluations of creeping bentgrass clones revealed a wide range of snow mold reactions from very susceptible (above) to highly resistant genotypes (below).

*A severe snow mold (*Typhula ishikariensis*) at Gateway Golf Course allowed researchers to evaluate creeping bentgrass clones for their inherent resistance to infection by this low-temperature fungal pathogen.*

Genetic resistance to disease and other pests is a widespread phenomenon in agricultural and horticultural plants. Disease resistance has been used to protect economically important plants for over 90 years. While there has been much research on genetics and breeding for individual pests of creeping bentgrass, there has been no concerted effort to develop multiple pest-resistant germplasm.

Three populations have been developed for this study. At the University of Wisconsin, crosses have been made between creeping bentgrass clones selected for resistance to grey and speckled snow mold fungi. At Michigan State University and the University of Illinois, clones were selected for high turf quality from a large number of old golf courses. All clones were selected from old golf courses where there have been many years of natural selection for survival under close-mowing conditions.

From crosses made at each location, 200 plants were chosen for this study, for a total of 600 creeping bentgrass plants. Each plant is being vegetatively cloned in a greenhouse. Researchers met in Chicago in February 2003, and exchanged clonal material, each contributing 200 clones from their respective collections and breeding programs. They each increased the 600 clones using vegetative propagation techniques in the greenhouse during the remainder of the winter and early summer.

Five field experiments were planted with four replicates each: one at Urbana, IL; one at East Lansing, MI; two at Madison, WI; and one at Land 'O Lakes, WI. These experiments will be inoculated and scored beginning in 2004. Plants were transplanted into perennial ryegrass fairways and topdressed for rapid establishment and sod formation.

Summary Points

- The snow mold (*Typhula ishikariensis*) outbreak at Gateway Golf Course was particularly severe in spring 2004, resulting in relatively uniform symptoms throughout the entire nursery. We were able to take ratings of snow mold reactions and recovery for all clones at this location in April and May 2004. Differences were highly significant with a wide range of snow mold reactions among clones, including some that appear to be highly resistant.
- One field experiment at Madison, WI was infested with larvae of the black cutworm (*Agrotis ipsilon*) and scored for number of surviving larvae and damage to the bentgrass foliage. There were large differences in both larval survival and damage to the turf. Statistical analyses will be conducted to determine differences in black cutworm feeding among creeping bentgrass clones.