

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 adapted 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 stolonifera*) 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.

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.

Field evaluations of dollar spot and snow mold diseases were completed this year with the collection of grey snow mold data from East Lansing, MI and speckled snow mold data from Land 'O Lakes, WI. We also completed our dollar spot assessment of these clones, collecting data from East Lansing, MI, Land 'O Lakes, WI, and Urbana, IL.

Field observations for both dollar spot and snow mold were highly repeat-



*Creeping bentgrass clones originating from Illinois, Michigan, or Wisconsin tended to have better resistance ratings to both dollar spot and snow mold when evaluated in their state of origin compared to clones from outside that state. Four creeping bentgrass clones demonstrating various levels of resistance to the dollar spot fungus, *Sclerotinia homeocarpa*, at Gateway Golf Club, Land 'O Lakes, WI., are shown above.*

able within locations, but showed low repeatability between locations. Clones originating from Illinois, Michigan, or Wisconsin tended to have better resistance ratings when evaluated in their state of origin compared to clones from outside that state. This was observed for both dollar spot and snow mold. This may indicate some potential for race and species specificity for both of these diseases. This result underscores the importance of using multiple locations and growing seasons to evaluate these important diseases of creeping bentgrass.

Based on a total of 13 disease assessments in 2004 and 2005, an overall disease index was computed for each of the 600 clones. The disease index ranged from 14 to 72 out of a maximum possible 99 points. Clones with a disease index greater than 66 were chosen, evaluated for turf density and texture, and photographed in preparation for release to private bentgrass breeders.

The selected clones fell into two color classes: medium and dark green.

Selected clones had a mean snow mold rating of 5.9, compared to 5.0 for the remaining clones, and a mean dollar spot rating of 6.3, compared to 5.0 for the remaining clones, using a rating scale of 0 = brown or dead plant to 9 = no disease symptoms. Because these plants were selected from old golf courses for high turf quality, they all have relatively fine texture, high tiller density, and above average turf quality.

Summary Points

- Creeping bentgrass plants with improved resistance to both dollar spot and snow mold fungi have been identified and propagated.
- These plants will be released to private turf breeders for use in developing new and more disease-resistant creeping bentgrass varieties.
- This research has demonstrated that both of these diseases appear to have some racial or species specificity, so that new bentgrass varieties must have broad-based resistance to several races of fungi if they are to be broadly useful to the golf industry.