# *Development of Improved Bentgrass Cultivars with Herbicide Resistance, Enhanced Disease Resistance and Abiotic Stress Tolerance Through Biotechnology*

**Faith C. Belanger**
Rutgers University

**Objectives:**

1. To produce creeping bentgrass cultivars through a combination of genetic engineering and breeding.
2. Provide golf course managers with more effective and selective weed control by developing herbicide-resistant cultivars.
3. To produce creeping bentgrass cultivars with improved disease resistance and abiotic stress tolerance that can be maintained in a more environmentally sound and cost-effective manner.

**Start Date:** 1998
**Project Duration:** 5 years
**Total Funding:** $250,000

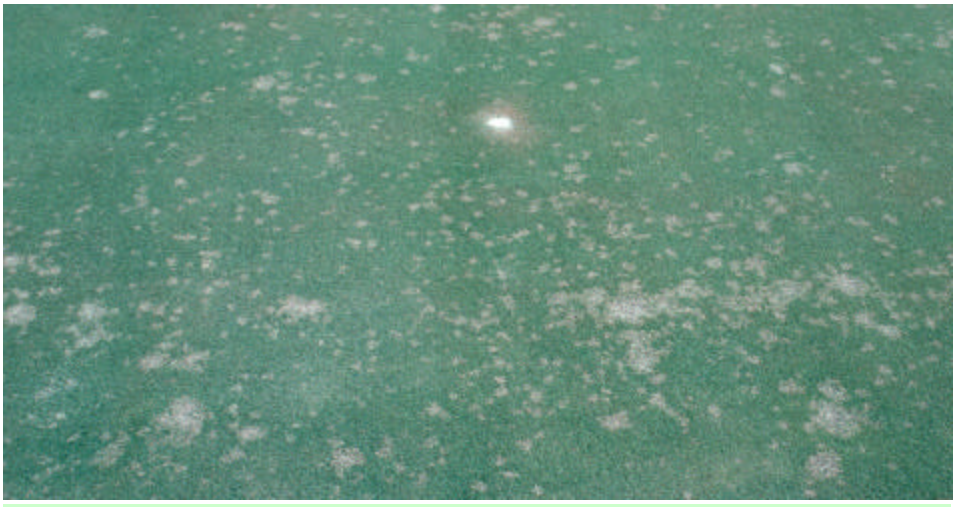
*Novel genes improving disease resistance in other crops have been inserted into bentgrass genotypes. Resistance to some common turfgrass diseases has been observed.*

Dollar spot susceptibility is currently one of the major management problems of creeping bentgrass. During the past year we have obtained some exciting results regarding the potential for improving the resistance to dollar spot.

From the transgenic approach, ribosome-inactivating proteins may be useful. The PAPII line tested this year had excellent resistance throughout the season. We will be testing transgenic plants containing a new mutant ribosome inactivating protein, PAP-Y, next summer. We expect that PAP-Y will overcome the toxicity problems seen with PAPII. We will also be testing transgenic plants expressing an endochitinase originating from a fungal endophyte.

In a new approach to improving dollar spot resistance, we are investigating the potential of interspecific hybridization between creeping bentgrass and colonial bentgrass. Some of our hybrids had excellent dollar spot resistance throughout the entire season.

These plants will be backcrossed next spring to begin introgressing the resistance genes into creeping bentgrass. These plants are also a valuable resource for the identification of the resistance genes by subtractive cloning. We will be focused on this aspect of disease resistance for the upcoming year. We will also be working on development of markers that can be used to identify interspecific hybrids resulting from crosses not using transgenic parents.



*Dollar spot susceptibility is currently one of the major management problems of creeping bentgrass.*

## Summary Points

- A transgenic line containing the PAPII gene had excellent dollar spot resistance throughout the 2001 season.
- Transgenic plants containing the potential disease resistance genes PAP-Y and an endochitinase from an endophytic fungus have been produced for testing next summer.
- Some interspecific hybrids between creeping bentgrass and colonial bentgrass had excellent dollar spot resistance throughout the 2001 season. They will be used in backcrosses next summer.