Disease Resistant Bentgrass
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Introduction

Disease control continues to be a costly challenge for golf course superintendents requiring repeated fungicide applications throughout the growing season. One of the major diseases facing superintendents is dollar spot. The dollar spot fungus is becoming more resistant to all of the classes of fungicides. Dollar spot control often consumes a large portion of the fungicide budget. One means of reducing this cost, as well as overcoming the resistance problem, would be to have access to a disease-resistant bentgrass cultivar.

Several years ago, dollar spot resistant creeping bentgrass clones were found and collected from an old, segregated bentgrass green. These clones proved to be far more resistant to dollar spot than the most resistant commercial bentgrass varieties. These selected clones (MSU-2 and MSU-3) are being used to develop a dollar spot resistant bentgrass cultivar for commercial release. In the multi-year process of developing a cultivar, crosses are made, the resultant progeny are screened for the desired traits (disease resistance and other desirable agronomic characteristics) and the best progeny are selected to undergo further development.

Back-crossing F1 Lines

Significant progress was made during 2004-2005 toward the development of a disease-resistant creeping bentgrass cultivar. During 2004, we established a space plant nursery on the MSU campus where we could backcross our most promising F1 lines with the original disease-resistant parent lines and produce seed for future testing. After preparing the 8000 sq. ft. plot area and installing drip irrigation, 729 clones representing the two parent lines and our most promising progeny lines were planted in the nursery. The nursery was hand weeded and sprayed with appropriate herbicides on a regular basis. Plants were fertilized as needed to maintain vigor. During the spring and early summer, the plants in the nursery successfully crossed with each other and set seed. By July, the plants produced acceptable quantities of seed which was hand-harvested by a crew of 4-6 workers over a period of approximately one week.

Corporate Partner Cooperative Research

Our corporate partner harvested seed from a nursery that the company had established in September, 2003 using our dollar spot-resistant bentgrass lines. Sod was established in the MSU greenhouses in specially constructed flats during the winter of 2004-2005 using this backcrossed seed. The sod was

installed at the Hancock Turfgrass Research Center on both a green and fairway during the spring of 2005 for further evaluation. This sod has been rated for dollar spot and turfgrass quality during the summer of 2005, and ratings will continue during the summer of 2006 in order to ascertain the level of dollar spot resistance that has been conferred from the parents to the progeny.

DNA Fingerprinting

DNA fingerprinting using AFLP's has been initiated and is on-going. Initial attempts at fingerprinting provided some basis for separation of cultivars although greater specificity is needed. Based on the first attempts at fingerprinting the clones using AFLP's, further refinement of the fingerprints is continuing through MSU's Genomics Technology Support Facility (GTSF). Material and initial fingerprint information has been provided to the personnel at GTSF, and they have made progress in refining and then expanding the scope of the DNA fingerprints.

Planned Studies for 2006

This seed will be threshed and cleaned by hand this winter to separate the seed from the other plant debris. The seed will then be planted in flats in the greenhouse for establishment in the field during the summer of 2006. The newly established sod will be monitored and rated for disease resistance and turfgrass quality, as well as other agronomic characteristics. In addition, the nursery will be maintained and cultivated so that the plants will cross and produce seed again which will be harvested during the summer of 2006 for future testing.

DNA-fingerprinting will continue at GTSF where expanded efforts at refined DNA fingerprints will be made.

In this proposal we are seeking support for the continued screening and field testing of in-house and corporate-generated progeny. This is the third year of a multi-year project with a long term goal of cultivar release in 5-7 years.

Objectives

Short term (1 year):

1. DNA fingerprinting of disease-resistant bentgrass lines (parents and F_1 progeny.) (**Partially completed in years 1 and 2, continuing in year 3**).
2. Field-testing of MSU-generated F1 progeny and other corporate-generated backcrossed disease-resistant progeny. (**Completed in year 2, continuing in year 3**).

3. Testing of seed harvested from the F2 progeny of the mass crossing during the summer of 2005 for dollar spot resistance under field conditions. (**Year 3**).

Long term (5-7 years):

1. Release of a disease-resistant bentgrass cultivar for commercial use.

Budget

Year 3	
Research Assistant (30% salary + fringes)	$21,000
Supplies (biochemicals, planting supplies)	4,000
Total for year 3	$25,000