

## BIOLOGICAL CONTROL OF TURFGRASS DISEASES

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### INTRODUCTION

Concerns related to the use of fungicides and the development of fungicide resistance has promoted the exploration for alternative means to manage fungal turfgrass pathogens. Biological control is the utilization of live organisms to manage plant diseases. The organisms most frequently applied as biological control systems consist of bacteria, fungi, and nematodes. Two bacteria strains isolated from turf samples have been shown to exhibit inhibitory properties to the growth of the pathogens responsible for the turf diseases dollar spot (*Sclerotinia homoeocarpa*) and summer patch (*Magnaporthae poae*) on laboratory plate tests.

Research into new chemicals for the management of turf pathogens has been broadened by examination of antifungal compounds that are produced by organisms in nature. The antifungal compound produced by the bacteria used as biological controls in this study have been isolated in crude form through a series of extractions with organic solvents. This crude extract was included as a treatment in this years biological control of dollar spot study. Application of the extract was at the same rate of active ingredient equal to that of the commercial fungicide Bayleton applied at a 2.0 oz./1000 ft<sup>2</sup> rate. The crude extract was not included in this years biological control of summer patch study because the extracts had not yet been prepared when the study was initiated.

### DOLLAR SPOT

The dollar spot study was conducted on Penncross (*Agrostis palustris*) creeping bentgrass greens maintained in greens condition at the Hancock Turfgrass Research Center, East Lansing, Michigan. The study was set up as a randomized block design with four reps and plot sizes of 3' x 6' with 1' alleyways. Bacteria biological controls were applied as spray applications with a hand CO<sub>2</sub> sprayer and as an amendment to the organic composting aid Compost Plus which is produced by the Ringer Corporation. Bacterial extract fractions were applied by CO<sub>2</sub> sprayer at the same rate of active ingredient as the chemical control Bayleton (2.0 oz/1000 ft<sup>2</sup> which corresponded to 0.25g/plot. Application of all treatments was on a 14 day schedule. All plots except for the untreated control received rates of nitrogen of ½ pound /1000 ft<sup>2</sup> every two weeks in an 18-4-10 formulation. Compost Plus treatments (which provides nitrogen) were also applied at the ½ pound /1000 ft<sup>2</sup> rate. Ratings were conducted by direct count of the number of lesions within a plot. Data was analyzed using Duncans multiple range test at a 5% level of significance.

## RESULTS

The first rating date (August 28, 1992), was two days following the first outbreak of disease. The fourth rep was not rated because it was over-sprayed with fungicides which were applied to a nearby study. The treatments which were significantly better than the fertilized controls were the Bayleton chemical control, extract fraction II, and the Compost Plus. The treatments that included Compost Plus also demonstrated a marked greening effect within two days of application. Spray applications of the bacteria did not significantly reduce disease activity when compared to the fertilized control plot.

As of the second rating date (September 11, 1992) disease pressure had continued to increase. The best treatments were Bayleton, bacterial extract, and all treatments including the product Compost Plus. The Compost Plus product continued to induce a noticeable greening effect. The remaining treatments were statistically equal with the fertilized control. There was little disease pressure following this rating date.

## DISCUSSION

There was no evidence of disease reduction as a result of treatment with live bacteria either as a foliar spray application or as a topdressing with amended Compost Plus. The Compost Plus product significantly reduced disease in treated plots and exhibited greening effects and a noticeable increased rate of plant growth. Why the Compost Plus increased the rate of growth in comparison to the 18-4-10 formulation is uncertain although it may be related to the slow release nature of the product as well as the broad variety of minerals provided. This may account for the reduction in disease intensity in plots treated with Compost Plus as simply an effect of the grass being able to outgrow the disease. The bacterial extract was efficacious in reducing disease severity.

Next years study will include purified bacterial extract applied at two to three different rates. Compost Plus will be included again in next years study as well. Unless significant progress is made on improving the efficacy of biological control of dollar spot with live bacteria, the viability of using these bacteria to control dollar spot is in question.

## SUMMER PATCH

—Study of the biological control of summer patch (*Magnaporthe poae*) was conducted on annual bluegrass (*Poa annua*) fairways at Forest Lake Country Club, Bloomfield Hills, MI, and at Dearborn Country Club, Dearborn, MI. The study was set up as a randomized block design with four replications with plot size of 6' x 7'. Application of bacteria was through direct spray application and by amendment to Compost Plus which was spread by hand. This study was initiated June 30, 1992 and applications were made on a monthly basis through September. All treatments except for the untreated control and Compost Plus (which acts as a nitrogen source) received nitrogen at the rate of ½ pound /1000 ft<sup>2</sup> per month.

## RESULTS

Due to the cool weather during the summer months, the development of summer patch disease symptoms did not appear at either of the two sites where studies were conducted. Therefore it was not possible to rate the effectiveness of biological control treatments.

## DISCUSSION

A similar summer patch study will be conducted next year. Also to be included in this study will be the application of the purified form of the bacterial extract.