TITLE: INFLUENCE OF TURFGRASS MANAGEMENT PRACTICES ON DEVELOPMENT OF ANTHRACNOSE BASAL ROT IN MIXED BENT-POA GREENS

INVESTIGATOR/COOPERATOR:

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PURPOSE:

To determine the effects of source and rate of nitrogen application on severity of anthracnose basal rot in mixed Bent-Poa greens

LOCATION OF PROJECT:

Valentine Turfgrass Research Center, The Pennsylvania State University

INTRODUCTION

Anthracnose basal rot is a serious disease of annual bluegrass (*Poa annua* var. *annua*) and creeping bentgrass (*Agrostis palustris*), particularly in annual bluegrass-bent mix greens in different geographic regions of the United States. Historically, the disease has occurred in annual bluegrass during periods of moderate temperature and high moisture in summer particularly, when the plants are under nutritional and/or environmental stress. Currently, the problem has become more evident in creeping bentgrass in annual bluegrass-bent mix greens. The disease problem had also been observed in pure bentgrass stands in certain regions of U.S. Additionally, the disease has been diagnosed on turf during cold and wet periods in certain locations in the northeastern U.S. In January of 2001, anthracnose basal rot disease was diagnosed in annual bluegrass-bent mix greens under the snow cover in Pennsylvania, and profuse production of spores was observed in the newly infected plants. Application of fungicide does not always provide satisfactory control of the disease. Therefore, cultural management of turf plays an important role in development of the disease. While many superintendents usually maintain a fertility program with moderate to low nitrogen application usually with quick release type nitrogen sources, such management practices appears to favor the anthracnose basal rot disease. Additionally, it is unclear whether modification of fertility program will have serious impact on anthracnose basal rot development. For example, application low amount of nitrogen for reduce turfgrass growth in mixed bent-Poa green are potentially serious predisposing factors to anthracnose basal rot development. Additionally, quick release nitrogen may also favor the disease. Therefore, the objectives of this study are developed to evaluate the application rates and sources of nitrogen as factors that could influence anthracnose basal rot severity. Finding from this study will aid in development of a sound turfgrass cultural management program.

MATERIALS AND METHODS

Field Plot Maintenance

The experiment was conducted in 2005 at the Joseph Valentine Turfgrass Research Center, University Park, PA, on a mixed sward of creeping bentgrass (*Agrostis palustris* Huds.) cv. Penncross and annual bluegrass (*Poa annua* L.) cv. Annua. The turf was maintained as a golf course green mowed at a 0.125-inch height six times per week. The soil was Hagerstown silt-loam with pH 6.9. The experimental area was not fertilized at any point during the growing season prior to initiation of the study. No herbicides, fungicides, or insecticides were applied prior to or during the test period. Irrigation was applied as needed to prevent drought stress.

Application of Field Treatments

Three sources of nitrogen with varying release characteristics: urea 46-0-0), methylene urea (26-0-0), and IBDU (30-0-0), were utilized in the experiment. Each nitrogen source was applied at 0.1, 0.3, and 0.5 lb actual nitrogen per 1000 sq ft on a 14-day schedule from 27 Apr through 6 Jul. All treatments were applied six times during that period. An untreated control was included for comparison.

Treatment plots 3 feet by 6 feet were arranged in a randomized complete block design with three replications. Treatments were applied with a CO2-powered sprayer equipped with a TeeJet 11008E nozzle at 40 psi in water equivalent to 2 gal per 1000 ft^2.

Plots were evaluated for symptoms of anthracnose-basal rot. Assessments were made on 24, 27, and 30 May; 2, 5, and 8 Jun; and 14 Jul. Foliar tissue samples were collected from each plot on 8, 16, and 22 Aug for analysis of nitrogen levels. Soil samples, 0.75-in. diameter by 2-in. depth, were collected on 8, 16, and 22 Aug for analysis of soil nitrogen levels. Four sub-samples were collected from each plot in all replications. Results of foliar tissue analysis and overall assessment of the disease severity (i.e. AUDPC, rate r, Y_{max}) will be presented in a later date in the next report.

Statistical Analysis

Severity of anthracnose basal rot (Index 0-10; 0=turf asymptomatic; 10=>90% turf area symptomatic) was assessed every four days. Disease severity data were subject to analysis of variance using the General Linear Model procedure, and multiple comparison of means were made using Student-Newman-Keul's test. Statistical procedures was performed using Statistical Analysis System software (SAS version 8.02, Cary, NC).

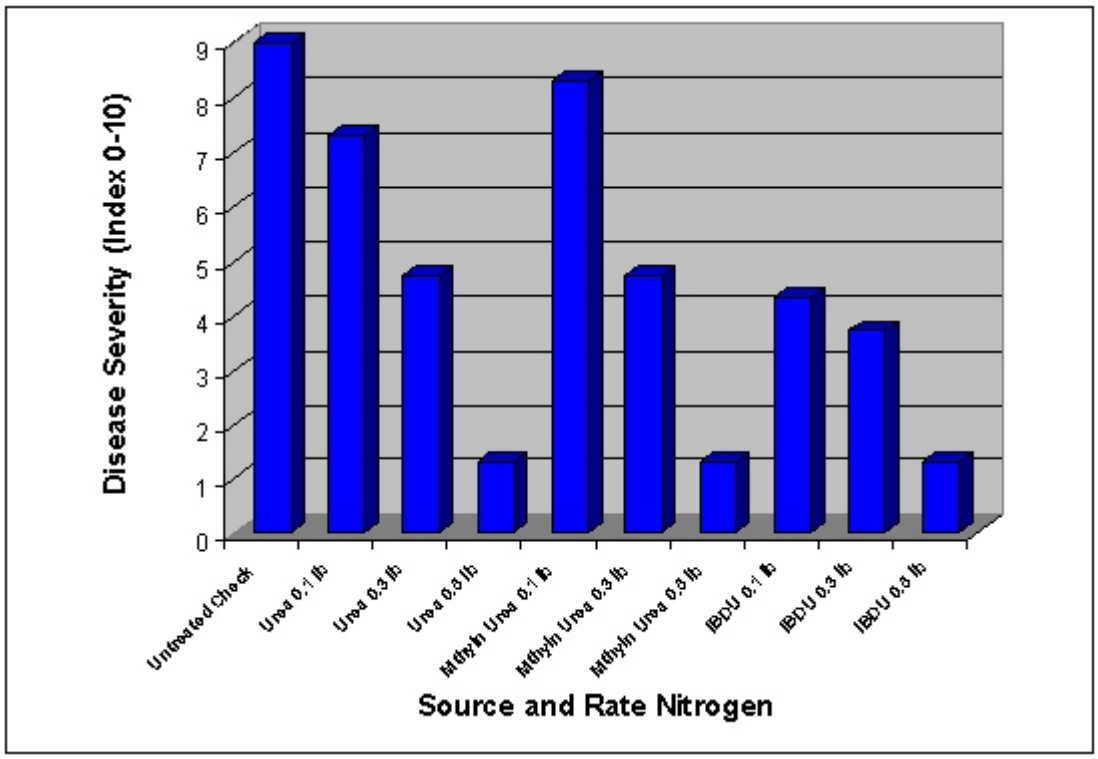
RESULTS AND CONCLUSION

The results of our study indicates that source of nitrogen and application rate are important factors influencing anthracnose basal rot development. In first disease assessment, the effect of nitrogen source and application rate on disease severity were significant ($P \leq 0.05$). Application of low rate (0.1 lb) of urea and methylene urea did not significantly reduced anthracnose basal rot. However, application of low rate (0.1 lb) of IBDU significantly reduced

the disease. Disease severity in plots treated with low rate (0.1 lb) of IBDU was significantly not different from that of the plots which received middle rate (0.3 lb) of urea and methylene urea. Application of high rate (0.5 lb) of nitrogen, regardless of the source, provided the most effective control of anthracnose basal rot. Disease severity on those plots were 13% compared to 90% in untreated control. Although disease severity in plots that received low rate of IBDU was significantly lower than that of the plots received low rate of urea and methylene urea, such differences were not observed when application rates were increased to middle rate or high rate. Effects of source of nitrogen and application rate on development of anthracnose basal rot disease in the second disease assessment followed a similar pattern.

It has been reported in the literature that several turfgrass pathogen effectively infects plant hosts that were grown under stressed conditions such as drought, wounding, and fertility. *C. graminicola* is a stress-pathogen that appeared to have effectively infected the host plants under low nitrogen condition and quick release type as the source of nitrogen. Although it has become apparent in recent years that the fungus can also effectively infect plants that are growing under non-stressed conditions, the nitrogen fertility factor appears to remain critical during the infection process. Our study revealed the significance of nitrogen fertility as part of the cultural management practices in anthracnose basal rot development. These results will be instrumental in providing disease management recommendations to golf course superintendents.

Disease Assessment 1



Disease Assessment 2