

Controlling dollar spot: climatic conditions and the timing of fungicide applications.

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Abstract

Effective control of dollar spot (caused by *Sclerotinia homoeocarpa*) typically requires repeated and timely applications of fungicides. Previous research has shown that the application of fungicides to asymptomatic turfgrass in the fall and/or spring may reduce dollar spot severity the following season. The impact of these preventive fungicide applications varied by site and over time. In 2006, replicated field studies were established at two locations to determine the relationship between climatic conditions and the ideal time for making preventive fungicide applications. Weather monitoring stations were installed at both locations to record on-site soil moisture, soil temperature, air temperature, precipitation and relative humidity. Sequential applications of propiconazole and chlorothalonil as a combination treatment were applied to asymptomatic fairway turfgrass in the fall of 2006 and the spring of 2007. Disease severity, assessed as the number of dollar spot infection centers per plot, was recorded through July 2007 and used to calculate an AUDPC for each treatment. In general, fall fungicide applications had no impact on disease severity. Applications made in mid-to-late April significantly reduced disease severity. The average monthly temperature between October 2006 and January 2007 was 2.8C warmer than the 30-year average for the same period. The lack of disease suppression observed with the fall 2006 fungicide applications in this study is consistent with previous reports indicating that climatic conditions significantly impact fungicide efficacy.

Introduction

Dollar spot, casual by *Sclerotinia homoeocarpa* F.T. Bennett, is one of the most widespread and economically challenging turfgrass diseases in the world. In North America, dollar spot primarily infects annual bluegrass and bentgrass, but also affects Kentucky bluegrass and Fescuca spp. Despite this pathogen's impact, relatively little is known about the biology, ecology and epidemiology of this pathogen. Although cultural management practices are employed to reduce dollar spot symptoms, fungicides are typically applied to sustain accept control. This intense use of fungicides has raised concerns regarding the environment, public health and fungicide resistance. A better understanding of the pathogen's biology should lead to the development of environmentally sound and commercially acceptable disease control strategies.

Research has shown that the application of fungicides to asymptomatic turfgrass in the fall and/or spring may reduce dollar spot severity the following season (Niver). The impact of these preventive fungicide applications varied by site and over time. In 2006, replicated field studies were established at two locations in, central Ohio, to determine the relationship between climatic conditions and the optimum time for making preventive fungicide applications.

Materials and Methods

Establishment of Replicated Field Trials:

This study was constructed at The Ohio State University, Ohio Turfgrass Foundation Research & Education Facility (OTF), and The Golf Club, New Albany (TGC), during the fall of 2006 and spring 2007 on grass mowed at fairway height (0.5 inches). The OTF plots were established on creeping bentgrass/annual bluegrass (*Agrostis stolonifera* var. *palustris*/*Poa annua*) with composition of 70% bentgrass and 30% annual bluegrass. The TGC plots were established on creeping bentgrass/annual bluegrass/ rough bluegrass (*Poa trivialis*) with composition of 50% bentgrass, 40% annual bluegrass and 10% rough bluegrass. A randomized complete block design was used. Individual plots measured 3 x 5 feet. The study consisted of 29 treatments with two untreated checks.

Chemical Applications:

Sequential single and multiple applications of the fungicides propiconazole (1.0 oz/1000ft² of Banner Maxx, Syngenta Crop Protection, Greensboro, NC) and chlorothalonil (3.2 oz / 1000ft² of Daconil Ultrex Syngenta Crop Protection, Greensboro, NC) (Table 1) as a combination treatment were sprayed following the high label rates. Water was used as the carrier (2 gal / 1000ft²). Treatments were applied to asymptomatic turfgrass in the fall 2006 and spring 2007. The multiple treatments were sprayed following the 14 day interval recommendation governed by the label. The plots were sprayed with a 3 foot boom equipped with two stainless steel 6503 TeeJet spray nozzles. Applications were made at a recommended 40 PSI controlled by the regulator attached to a portable CO₂ tank.

Materials and Methods Cont.

Weather Monitoring:

Spectrum Technologies, Model 450 watchdog data loggers and sensors, were used to record atmospheric temperature, relative humidity, soil temperature, and precipitation amounts. In addition, six RZ Wireless soil sensors were used at each location to measure soil moisture, temperature, and salinity. Each sensor had two probes that were installed at the one and three-inch soil horizons.

Data Collection and Analysis:

Disease severity was rated by counting the number of Dollar Spot Infection Centers (DSIC). Rating started on June 6, 2007 and continued weekly until the end of July. For each treatment, area under disease progress curves (AUDPC) were calculated and differences among treatments were determined using analysis of variance (ANOVA) by the software program SAS (SAS Institute Inc, Cary NC).

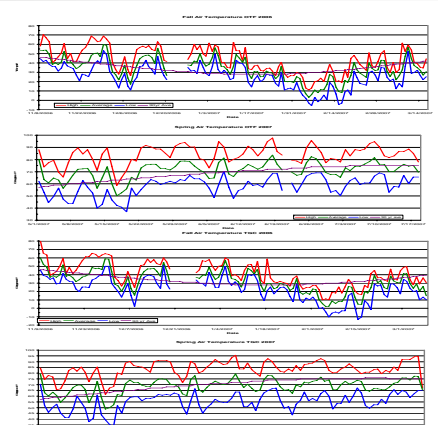
Results

Mean Dollar Spot Severity

Table 1: Impact of fall and/or spring fungicide applications on dollar spot

TREAT	Ohio State Turfgrass Research Center	The Golf Club of New Albany	Description
TREAT 1	2006-06	2006-06	Non-Treated
TREAT 2	2006-06	2006-06	2006-06-06
TREAT 3	2006-06	2006-06	2006-06-06
TREAT 4	2006-06	2006-06	2006-06-06
TREAT 5	2006-06	2006-06	2006-06-06
TREAT 6	2006-06	2006-06	2006-06-06
TREAT 7	2006-06	2006-06	2006-06-06
TREAT 8	2006-06	2006-06	2006-06-06
TREAT 9	2006-06	2006-06	2006-06-06
TREAT 10	2006-06	2006-06	2006-06-06
TREAT 11	2006-06	2006-06	2006-06-06
TREAT 12	2006-06	2006-06	2006-06-06
TREAT 13	2006-06	2006-06	2006-06-06
TREAT 14	2006-06	2006-06	2006-06-06
TREAT 15	2006-06	2006-06	2006-06-06
TREAT 16	2006-06	2006-06	2006-06-06
TREAT 17	2006-06	2006-06	2006-06-06
TREAT 18	2006-06	2006-06	2006-06-06
TREAT 19	2006-06	2006-06	2006-06-06
TREAT 20	2006-06	2006-06	2006-06-06
TREAT 21	2006-06	2006-06	2006-06-06
TREAT 22	2006-06	2006-06	2006-06-06
TREAT 23	2006-06	2006-06	2006-06-06
TREAT 24	2006-06	2006-06	2006-06-06
TREAT 25	2006-06	2006-06	2006-06-06
TREAT 26	2006-06	2006-06	2006-06-06
TREAT 27	2006-06	2006-06	2006-06-06
TREAT 28	2006-06	2006-06	2006-06-06
TREAT 29	2006-06	2006-06	2006-06-06

Combination fungicide treatment of propiconazole and chlorothalonil were applied to asymptomatic fairway turfgrass. Disease severity assessed as the number of dollar spot infection centers per plot were used to calculate an AUDPC for each treatment. Differences among treatments were determined using ANOVA



Conclusions

Applications made in mid-to-late April significantly reduced disease severity in July 2007 (table X). Due to the 2.8 C warmer weather conditions in the fall (table X), the dollar spot fungus did not become dormant causing the fall results to be not as robust. These findings are consistent with previous reports that early spring fungicide applications can reduce dollar spot symptoms later in the growing season. Field studies are underway to refine the correlation between fungicide application and climatic conditions.

Acknowledgements

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References

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