Georgia Golf Environmental Foundation

PROGRESS REPORT

Temporal, Cultural, Biological, and Chemical Practices to Enhance Spring Dead Spot (SDS) Control of Bermudagrass in Georgia.

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Executive summary

Abstract: Spring dead spot (SDS) caused by *Ophiosphaerella* spp, is a persistent and destructive disease of bermudagrass (*Cynodon* sp.) in Georgia. The disease can be devastating on bermudagrass greens, tees and fairways. The disease is particularly prevalent and damaging in the northern part of Georgia, especially in the Piedmont physiographic area. Cultural practices that result in disturbance of the upper root zone have been reported to reduce SDS damage. However, these practices alone have proven erratic and ineffective at reducing disease pressure below acceptable levels. K_{oc} (soil sorption coefficient) values of several fungicides may limit their movement into the root zone following application. Cultivation practices aimed at increasing infiltration and reducing thatch accumulation may increase penetration and enhance fungicide efficacy. Identification of environmental conditions that favor SDS infection is critical for efficient and effective SDS control with fungicide applications. Once the disease has colonized the root system, fungicides are rendered ineffective. Traditionally, fungicides have been applied in the fall. Applying fungicides earlier in the year (spring) may increase fungicide efficacy. Additionally, several new chemistries have been introduced that may be effective at controlling SDS. Furthermore, environmental stewardship, overreliance on chemical control, and increasing concerns about pesticide resistance has led turfgrass managers to examine alternative practices to reduce plant disease; therefore, the objectives of our research are to evaluate the combination of temporal (spring and fall), cultural (aerification) and chemical practices, to re-evaluate SDS labeled fungicides and examine several new fungicides (tebuconazole, metconazole, azoxystrobin + propiconazole, azoxystrobin + difenconazole, pyraclostrobin + triticonazole, fenarimol, fluoxapyroxad) and biofungicides/organic products (Companion, Essential plus, Rhapsody, Holganix) for the control of SDS disease of bermudagrass in Georgia.

1. Combination of temporal, cultural, and chemical practices for the control of spring dead spot and evaluation of new chemistries

PROPOSED: Field experiments will be conducted on a 'TifSport' bermudagrass sward with SDS history, which is located at the University of Georgia-Griffin campus and at one golf course in Georgia during the spring and fall of 2014. Plots measuring 4 ft x 4 ft will be arranged in a 2 x 2 x 9 factorial within a split/split plot experimental design. Four replications will be used in the chemical control treatments. Fungicide application timing (Spring or Fall) will be the main factor, cultural treatment (core-aeration or no core-aereation) will be the subfactor, and fungicide chemistry (tebuconazole, metconazole, azoxystrobin + propiconazole, azoxystrobin + difenconazole, pyraclostrobin + triticonazole, fenarimol, fluoxapyroxad, tebuconazole + wetting agent or non-treated control) will be the subsubfactor. Aerification (to a depth of 3 inches) will be conducted prior to initial fungicide applications (Spring or Fall) using a green/tee aerifier. Cores will be removed from the turf surface. Liquid fungicides will be applied using 2.5 gal of water per 1,000 sq ft with a hand-held, CO_2-pressured boom sprayer at 30 psi using XR TeeJet 8002VS nozzles. Granular formulations will be weighed and mixed with sterilized sand prior to application. The fungicide /sand mixture will be distributed equally in each replicated plot using a canister with perforated lid. Spring applications will be made on or around 5/15/2014. Application will be timed when average soil temperatures in the primary root zone are consistently above 60 F. In the fall, applications will begin on or around 9/16/2014 when average soil temperature in the primary root zone reach 75 F. Fungicide treatments will consist of tebuconazole at 0.6 fl oz/1000 ft^2, metconazole at 0.37 oz/1000 ft^2, azoxystrobin + propiconazole at 3 fl oz/1000 ft^2, azoxystrobin + difenconazole at 0.75 fl oz/1000 ft^2, pyraclostrobin + triticonazole at 3 lb/1000 ft^2, fluoxapyroxad at 0.26 fl oz/1000 ft^2 , tebuconazole + wetting agent and fenarimol at 6 fl oz/1000 ft^2. A non-treated control will be added for comparison. All treatments will receive a sequential fungicide application 30 days after initial treatment. Irrigation (0.25 inches) will be applied immediately following fungicide applications. Percent SDS disease cover ratings (using a modified Horsfall-Barrat Scale) and # of disease patches will be recorded visually monthly and/or every two weeks starting summer 2014 and spring of 2015 after symptoms appear following bermudagrass spring green-up. Visual ratings will continue until bermudagrass recovers in mid to late summer (2015). Digital photography (DP) (Butler, 2004) will be taken monthly with a Cannon (Rebel XT EOS) camera. Digital images will be analyzed using Photoshop software and/or SigmaScan Pro software (v. 5.0, SPSS Inc., Chicago, IL) to determine differences on SDS severity and/or turf quality.

PROGRESS:

Golf courses and areas with SDS incidence and history were located, visited and scouted in late May early June of 2014. Appropriate sites with history of high incidence of SDS and noticeable SDS symptoms were selected to establish the trials. One selected site is located at a bermudagrass 419 rough area at Townlake Golf course in Woodstock GA (1003 Towne Lake Hills East, Woodstock, GA 30189). An additional and alternate and potential site was located at a rough bermudagrass 419 in Capital City Crabapple Golf course (4115 Earney Rd., Woodstock, GA 30188-2239). The Crabapple site presented less SDS symptoms with rapid green up and high turfgrass quality, which could mask results of this project. This site was reserved for the second year of this project. Several others golf courses were visited including Crystal Falls golf club, Griffin golf club among others.

At the Townlake Golf Course plots were establish to perform the fall and spring fungicide applications (main statistical plot-fungicide timing). Each plot measured 4 ft x 6 ft arranged in a 2 x 2 x 9 factorial within a split/split plot experimental design. The trials contain four replications. As per original protocol, the areas were either core-aerated or not core-aereated (cultural treatment) using 1-inch solid tines*. Two fungicide applications were performed in Oct 1, 2014 and Oct 29, 2014. The fungicide applications closely follow the proposed protocol of average soil temperatures in the primary root zone consistently above 60 F. The fungicide treatments consisted of tebuconazole at 0.6 fl oz/1000 ft^2, metconazole at 0.37 oz/1000 ft^2, azoxystrobin + propiconazole at 3 fl oz/1000 ft^2, azoxystrobin + difenconazole at 0.75 fl oz/1000 ft^2, pyraclostrobin + triticonazole at 3 lb/1000 ft^2, fluoxapyroxad at 0.26 fl oz/1000 ft^2 , tebuconazole + wetting agent and fenarimol at 6 fl oz/1000 ft^2. A non-treated control will be added for comparison. A light irrigation (0.25 inches) was applied immediately following fungicide applications. Percent SDS disease severity and turf quality ratings using a modified Horsfall-Barrat Scale) were recorded visually at the time of fungicide applications. Visual ratings will continue until bermudagrass recovers in mid to late summer (2015). Digital photography (DP) was also taken along with visual ratings.

As proposed in the original grant application, a second trial is located at University of Georgia-Griffin campus on 'TifSport' bermudagrass sward with SDS history. Plots were establish to perform the fall and spring fungicide applications (main statistical plot-fungicide timing). Each plot measured 4 ft x 6 ft arranged in a 2 x 2 x 9 factorial within a split/split plot experimental design. The trials contain four replications. As per original protocol, the areas were either core-aerated or not core-aereated (cultural treatment) using 1-inch solid tines*. Two fungicide applications were performed in Oct 2, 2014 and Oct 30, 2014. The fungicide applications closely follow the proposed protocol of application at an average soil temperature in the primary root zone consistently above 60 F. Percent SDS disease severity and turf quality ratings were recorded visually at the time of fungicide applications. Digital photography (DP) was also taken at the time of the visual ratings.

*Solid tines were used instead of hollow tines because solid tines practice goes more accordingly to turfgrass cultural practices in GA. Hollow tines and core-lifting were considered too harsh of a cultural practices by several GGCS.

2. Evaluate the effect of soil fertility-with emphasis of nitrogen source and fungicide alternatives for the control of SDS.

PROPOSED

Field experiments will be conducted on a 'TifSport' bermudagrass sward with SDS history, which is located at the University of Georgia-Griffin campus and at one golf course in Georgia in 2014 and continue through 2015. Plots measuring 4 ft x 4 ft will be arranged in a complete randomized block with four replications. Treatments will consist of fertilizers with different sources of nitrogen and bio-fungicides/organic products. Liquid products will be applied as per manufacturer use instructions. Granular formulations will be weighed and distributed equally in each replicated plot using a canister with perforated lid. Ammonium nitrate, calcium nitrate, ammonium sulfate, and 10-10-10 fertilizers at a rate of 1 lb/1000 ft^2 and bio-fungicides/organic products will be applied monthly starting in May and finalizing in September. Bio-fungicides/organic products will consist of Companion ® at 6 fl oz/1000 ft^2, Essential plus® at 3 oz /1000 ft^2, Rhapsody® at 10 fl oz /1000 ft^2, and Holganix at 7 fl oz /1000 ft^2.

Percent SDS disease cover ratings (using a modified Horsfall-Barrat Scale) and # of disease patches will be recorded visually monthly and/or every two weeks starting spring of 2015 after symptoms appear following bermudagrass spring green-up. Visual ratings will continue until bermudagrass recovers in mid to late summer (2015). Digital photography (DP) (Butler, 2004) will be taken monthly with a Cannon (Rebel XT EOS) camera. Digital images will be analyzed using Photoshop software and/or SigmaScan Pro software (v. 5.0, SPSS Inc., Chicago, IL) to determine differences on SDS severity and/or turf quality.

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At the Townlake Golf Course, plots were establish to perform the treatments that consisted of fertilizers with different sources of nitrogen and bio-fungicides/organic products. Ammonium nitrate, calcium nitrate, ammonium sulfate, and 10-10-10 fertilizers at a rate of 1 lb/1000 ft^2, Companion ® at 6 fl oz/1000 ft^2, Essential plus® at 3 oz /1000 ft^2, Rhapsody® at 10 fl oz /1000 ft^2, and Holganix at 7 fl oz /1000 ft^2 were deposited. Plots measured 4 ft x 4 ft arranged in a complete randomized block with four replications. Liquid products were applied as per manufacturer use instructions. Granular formulations will be weighed and distributed equally in each replicated plot using a canister with perforated lid. These treatments were applied monthly starting in July 2014 through Oct 2014. SDS disease severity and turf quality ratings have been recorded visually monthly. Digital photography (DP) was also taken at the time of the visual ratings.

A second trial is located at University of Georgia-Griffin campus on 'TifSport' bermudagrass sward. The exact same activities that those described for Townlake golf course were performed on this site.

Responsibilities and Time-Line:

Performed/in progress: ----------

2014

	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sept	Oct	Nov	Dec
Fungicide/ biofungicides/ fertilizer apps.					----------							
Visual ratings					----------							
Digital images						----------						

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We would like to thank Mr. Kyle Marshall and Mr. Mike Studier at Capital City Crabapple Golf Club for they disposition, help, and willingness to use their site as experimental area and as potential site for next year's activities.

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