GEORGIA GOLF ENVIRONMENTAL FOUNDATION

PROGRESS REPORT (NOVEMBER 17, 2016)

TEMPORAL, CULTURAL, BIOLOGICAL, AND CHEMICAL PRACTICES TO ENHANCE SPRING DEAD SPOT (SDS) CONTROL OF BERMUDAGRASS IN GEORGIA.

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1. COMBINATION OF TEMPORAL, CULTURAL, AND CHEMICAL PRACTICES FOR THE CONTROL OF SPRING DEAD SPOT AND EVALUATION OF NEW CHEMISTRIES

PROGRESS:
Three reports have been previously submitted:
1. 03 Nov 2014,
2. June 18, 2015,
3. July 10, 2016).

Field data recording continued until end of July 2016 at the Townelake site. Data was added to the other 3000 data points gathered previously. Data recording and timeline coincides with that of the original grant proposal. Data obtained from both, the Griffin and the Townelake sites, is currently being sorted out and analyzed. Data from 2015-2016 has been submitted to our UGA CAES statistician in the Griffin campus using SAS statistical program. I'm also analyzing further the data using the ARM statistical package. This ARM package unique features such as AUDPC (Area Under the Disease Progress Curve), which measures disease severity/intensity over time.

As previously stated in the last report, penthiopyrad (Velista) was included in the 2015-2016 field trials; therefore, data was recorded through July 2016. We have finalized the data analysis of penthiopyrad (Table 1). Two fall applications of Velista 50WG 0.5 oz significantly reduced SDS severity while two applications of Velista 50WG at 0.3 did not significantly reduced SDS severity.

Table 1. Evaluation of penthiopyrad against SDS in Griffin GA.

	Spring Dead Spot Severity Griffin (%)[z]					
Treatment and rate/1,000 sq ft	06 Apr 2016	21 Apr 2016	28 Apr 2016	11 May 2016	18 May 2016	18 Jun 2016
1. Non Treated Control	50.00a	19.95a	17.60a	40.65a	11.15a	6.45a
2. Velista 50WG 0.3 oz	25.78ab	14.68a	21.13a	23.85a	11.75a	4.13a
3. Velista 50WG 0.5 oz	10.55b	5.28b	6.45b	18.55b	4.40b	1.76a

[z] Within a column, values followed by the same letter are not significantly different according to Fisher's Protected LSD test (P= 0.05).

Disease severity data obtained in 2015-2016 is highly variable. While some trends can be observed, we need to finalize analyzing all data entries to have conclusive information. Among other trends, these can be observed:

1. Overall (except in two rating dates in Griffin) solid tine before fungicide application was statistically similar to non-core aereation in both, fall and spring. In other words, core aereation did not increased fungicide efficacy in spring or fall applications in any of the sites. Solid tine did not negatively impact fungicide efficacy either, neither promoted disease severity.
2. All fungicides treatments provided statistically significant Spring Dead Spot suppression when compared to the untreated control in most of the rating dates.
3. There were statistically significant differences in disease suppressing among fungicide treatments both in fall and in spring.

4. Preventive management of SDS using two fall fungicide applications provided significant disease suppression with the use of new (er) chemistries as well as with previously proven efficacious chemistries.
5. Spring fungicide applications proved to suppress SDS severity significantly when compared to the untreated control resulting in the acceleration of turfgrass recovery.
6. An added benefit of spring fungicide applications is the control and /or prevention of other diseases especially on controlling dollar spot and large patch.

Outputs so far

1. Publication of SDS GGEF-funded research results at the UGA College of Agricultural and Environmental Sciences Impact Statements web page. (available early January 2017 at http://apps.caes.uga.edu/impactstatements/)

2. Presentation of SDS research results at the 2016 Turfgrass Research and Extension Field Day. Griffin GA. August 4, 2016. Public acknowledgment for Georgia Golf Environmental Fund. 600 people reached.

3. Publication of SDS research results at Martinez-Espinoza, A.D. Waltz, C., and Raymer P. 2016. Turfgrass Research and Extension Field Day, 2016. University of Georgia-Extension, Special Bulletin. http://extension.uga.edu/publications/detail.cfm?number=AP117-1. Page 26-27. Prominent acknowledgment for Georgia Golf Environmental Fund.

4. Signage and demonstration of SDS trial at 2016 Turfgrass Research and Extension Field Day. Prominent display of acknowledgement to GGEF.

5. Seminar presentation. Update on Ongoing Turfgrass Research on Spring Dead Spot (SDS) Control of Bermudagrass in Georgia. Georgia Golf Environmental Foundation Seminar (GGCSA). Jan 06, 2016. Griffin, GA.

6. Seminar presentation. Defending Georgia's Turf: Latest Research on Fungicides and Bermudagrass Disease Control. GCSAA Bermudagrass Forum. Sept 14, 2015. St. Simons Is. GA.

7. Seminar presentation. 2015. Temporal, Cultural, Biological, and Chemical Practices to Enhance Spring Dead Spot (SDS) Control of Bermudagrass in Georgia Update. Georgia Golf Environmental Foundation Seminar (GGCSA). Jan 14, 2015. Griffin, GA.

This is what I wrote for the 2016 CAES impact statements located at http://apps.caes.uga.edu/impactstatements/ http://apps.caes.uga.edu/impactstatements/index.cfm?referenceInterface=IMPACT_STATEMENT&subInterface=master&#brief_1

Control of Spring Dead Spot (SDS) of Bermudagrass in Georgia

Summary

Spring dead spot (SDS) (caused by *Ophiosphaerella korrae*, *O. narmari* and *O. herpotricha*) is a persistent and destructive disease of bermudagrass (*Cynodon* sp.) in Georgia. To date, there is no consistent and efficacious control of the disease. We have implemented comprehensive, multi-pronged, integrated research to develop new and efficacious control of spring dead spot in Georgia. Economical support was obtained via a research grant from the Georgia Golf Environmental Foundation (GGEF). This research was set to evaluate the combination of temporal (spring and fall), cultural (aerification) and chemical practices, as well as to examine several new fungicides and biofungicides/organic products. Solid tine did not increase fungicide efficacy in spring or fall applications in any of the sites. Fluoxapyroxad (Xzemplar), fenarimol (Rubigan), and azoxystrobin + difenconazole (Briskway) and penthiopyrad (Velista) provided the most significant and consistent SDS control. Fall fungicide applications were the most efficacious. However, spring fungicide applications proved to suppress SDS severity up to 60% compared to the untreated control resulting in the acceleration of turfgrass recovery up to 47-77 days. An unforeseen benefit of spring fungicide applications is the control and /or prevention of other diseases especially dollar spot and large

patch. Summer monthly applications of calcium nitrate, ammonium nitrate, and 10-10-10 fertilizer provided significant better turf quality/turf recovery. Companion®, Regalia® and Essential® also provided acceptable turf quality/turf recovery. Results from this research provide turfgrass managers with SDS control strategies that are consistent, promote long-term control, reduce fungicide applications, and improve turfgrass health and quality. Effective SDS management could save up to $11, 500 per golf course/year or $3,600,000 statewide.

Situation

Bermudagrass (*Cynodon* sp.) is the single most popular, widely used warm-season grass in Georgia. It is found in most sport fields, lawns, greens, tees, and fairways. It is also extensively produced in sod farms and found in pastures. Spring dead spot (SDS) (caused by *Ophiosphaerella korrae, O. narmari* and *O. herpotricha*) is a persistent and destructive disease of bermudagrass (*Cynodon* sp.) in Georgia. The disease is particularly prevalent and damaging in the northern part of Georgia, especially in the Piedmont physiographic area. However, SDS can be observed throughout the state after harsh winters and in areas where bermudagrass has been exposed to freezing temperatures for extended periods of time. There are 401 golf courses in Georgia with 80% having bermudagrass on greens and 100% using bermudagrass either on tees, fairways, and/or roughs. Anecdotal data estimates that each golf course spends an average of $11,500 a year managing SDS, this translates on an estimated cost of control of US $ 3,600,000 statewide. These estimates do not include data from other turfgrass sectors such as sports fields and lawncare. To date, there is no consistent and efficacious control of the disease. Cultural practices as well as fungicide availability have proven erratic and ineffective at reducing disease. Additionally, inability to identify *Ophiophaerella* infection timing has led to inconsistent control, varying from area to area and from year to year. 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.

Response

We have implemented comprehensive, multi-pronged, integrated research to develop new and efficacious control of spring dead spot in Georgia. Economical support was obtained via a research grant from the Georgia Golf Environmental Foundation (GGEF). This research was set to evaluate the combination of temporal (spring and fall), cultural (aerification) and chemical practices, as well as to re-evaluate SDS labeled fungicides and to examine several new fungicides and biofungicides/organic products. Research was conducted from 2014-2016. Field experiments were conducted on a 'TifSport' bermudagrass sward with SDS history located at the University of Georgia-Griffin campus and at one golf course in Georgia. Fungicide application timing (Spring or Fall) were used as main factor, cultural treatment (core-aeration or no core-aereation), and fungicide chemistry were sub-factors. 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 fungicide –penthiopyrad at 0.7 fl oz/1000 sq ft- was added later in the trial. Ammonium nitrate, calcium nitrate, ammonium sulfate, and 10-10-10 fertilizers at a rate of 1 lb/1000 ft^2 and the bio-fungicides/organic products, 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 also evaluated.

Impact

Core aereation (solid tine) cultural practice before fungicide application did not differ from non-core aereation in both fall and spring. There were statistically significant differences in disease suppressing among fungicide treatments both in fall and in spring. Based on preliminary data analysis of disease suppression and timing, fluoxapyroxad (Xzemplar), fenarimol (Rubigan), azoxystrobin + difenconazole (Briskway) and penthiopyrad (Velista) provided the most significant and consistent control. Fall fungicide applications were the most efficacious. However, spring fungicide applications proved to suppress SDS severity up to 60% compared to the untreated control resulting in the acceleration of turfgrass recovery up to 47-77 days. An unforeseen benefit of spring fungicide applications is the control and /or prevention of other diseases especially dollar spot and large patch. Summer monthly applications of calcium nitrate, ammonium nitrate, and 10-10-10 fertilizer provided statistically significant better turf quality/turf recovery. Companion®, Regalia® and Essential® also provided acceptable turf quality/turf recovery. Results from this research provide turfgrass managers with SDS control strategies that are

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