



EMERGING AND RE-EMERGING DISEASES OF WARM SEASON GRASSES: DETECTION, IMPACT AND MANAGEMENT STRATEGIES



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2011 PLANT DISEASE *DIAGNOSIS*

Crop	Commercial Samples	Homeowner IPM Clinic	Total
Field Crops	275	0	275
Vegetables	439	42	481
Fruits & Nuts	95	23	118
Herbaceous Ornamentals	58	18	76
Woody Ornamentals	63	68	131
Trees	31	38	69
Turf	388	145	533
Miscellaneous	7	7	14
TOTAL	1356	341	1697

2010 PLANT DISEASE *DIAGNOSIS*

Turf	475	121	596
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2011 TURFGRASS NEMATODE SAMPLES

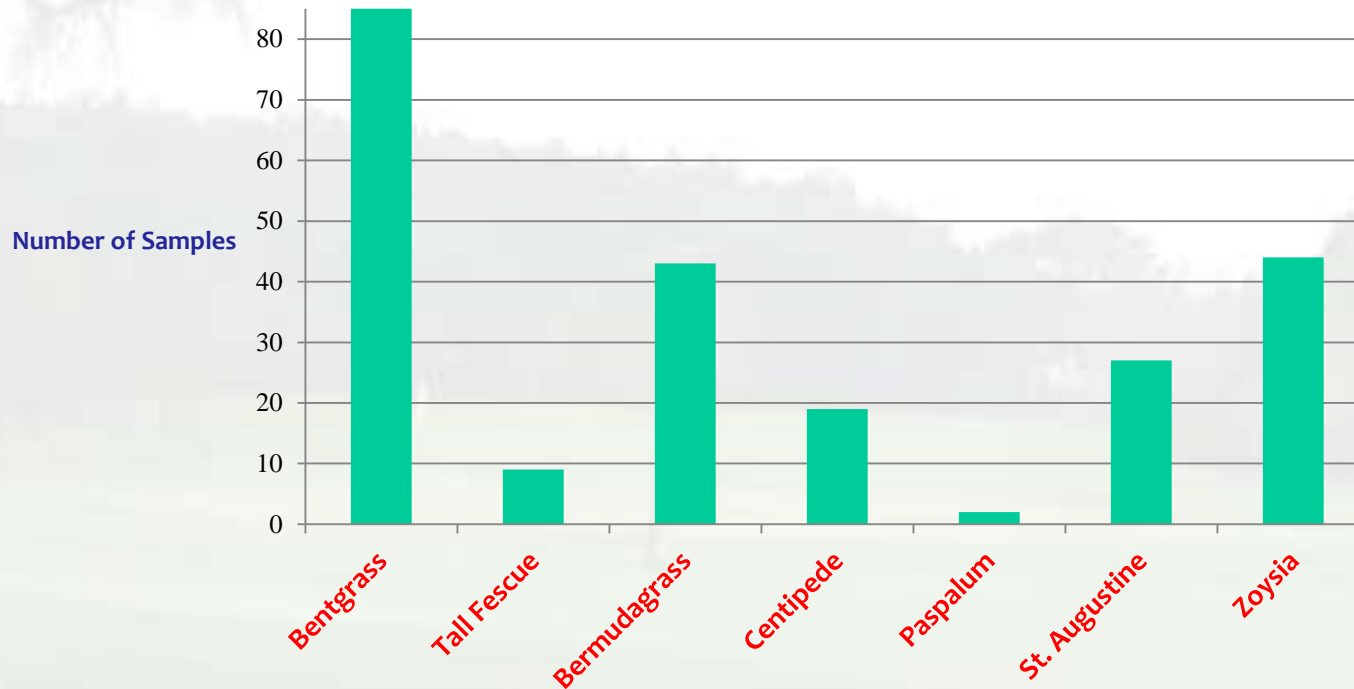
Crop	Commercial Samples Total
Turf	1125
	Usually ~700 Increased in 2010



TURFGRASS DISEASE DYNAMICS

UGA Plant Disease Clinic Turfgrass Sample
Submission –Commercial 2011

Turfgrass Disease Samples per Turfgrass specie 2011



- 5 species of warm season grasses samples =one (two) species of cool season grasses
- On warm season-onset of dormancy (fall); green-up
- Abnormal weather patterns (2011 unusual; 2012 winter-bermudagrass never went fully dormant in many areas of the state)
- Continuous activity of several pathogens; rare events-microdochium patch-spring

PREVALENT TURF DISEASES-WARM SEASON GRASSES

•**Rhizoctonia**= Most prevalent on Zoysia and Bermudagrass. Present on centipedegrass, St. Augustinegrass. As use increases, more prevalent on Seashore paspalum.



•Recently observed in ultradwarf greens and 419 and zoysia fairways.

•Abnormal weather patterns 2012 have infection going at our experimental zoysia area for over three months



PREVALENT TURF DISEASES-WARM SEASON GRASSES



- Dollar spot ubiquitous on landscapes. Not usually submitted to diagnosis clinic.

- Associate with low fertility

- Humidity on canopy

- Symptoms on seashore paspalum. Increased fitness/aggressiveness?



- Student from Honduras: *Sclerotinia paspalum* isolate grew faster (mean of 9 mm) than *Agrostis* and (5 mm) bermudagrass isolates on growth media. Cross pathogenicity to *Agrostis*



Fertility and dollar spot

Curative Control of Dollar Spot in Princess 77 Bermudagrass at Griffin, GA - Fall 2010

Treatment ^x	Rate ^y	% Dollar Spot						
		9/29	10/4	10/8	10/12	10/15	10/20	10/28
Daconil WeatherStik	3.2 fl. oz	25.8a ^z	22.3a	43.0a	17.6b	17.0c	30.9c	27.3b
Torque 3.6F	0.6 fl. oz.	25.8a	23.4a	25.8b	7.0b	10.5c	10.5d	14.1b
Ammonium nitrate	1.0 lbs. N	18.8a	12.5a	7.8b	6.2b	7.8c	7.8d	17.2b
Non-treated Check	-	28.1a	27.3a	36.7a	54.7a	57.0b	68.0a	74.2a

Treatment ^x	Ingredient
Daconil WeatherStik	Chlorothalonil
Torque 3.6F	Tebuconazole

- Bermuda (Cynodon) has a rapid response of Nitrogen against dollar spot. Seems to have an effect on rapid vegetative growth but also against the pathogen. Lesions are smaller compared to control
- Similar results in Spring 2011

EMERGING AND RE-EMERGING TURF DISEASES-WARM SEASON GRASSES

- Some older diseases that seem to be an increasing problem.
- Older pathogens in new hosts
- Some are newer diseases and spreading incidence
- New/unreported diseases

•**Bipolaris**

•**SDS**

•**Fairy ring**

•**Miniring= Rhizoctonia zeae**

•**Nematodes; Microdochium (Fusarium) patch**

• **New: SDS on zoysia; Tar spot on Seashore paspalum**



EMERGING AND RE-EMERGING

Bipolaris Leaf Spot and Crown Rot (Bipolaris Leaf Blotch-Melting out).

Bipolaris cynodontis; *B. sorokiniana*, *B. specifera*; *Exserohilum*

- Observed in bermudagrass but also in cool season grasses especially over-seeding. Observed consistently in the fall before dormancy and during spring at green-up. Increased samples received 2009, 2010, 2011 and spring 2012.

- Sample distribution all throughout the state. And through all varieties or type of use (greens, sports, fairways, landscapes etc)

- Black to brown spot on blades, sometimes tan center, lower leaves on plants are shriveled

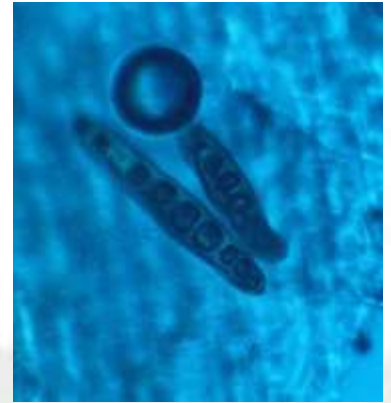
- High late N applications can promote the infection; Leaf wetness more than 10 hrs for several days

- Mowing height –low promotes *Bipolaris* infections.



Bipolaris Leaf Spot and Crown Rot (Bipolaris Leaf Blotch-Melting out).

- Early vigilance, diagnosis and fertility are key for management. Avoiding excessive growth will help to reduce the disease
- Phosphorous and potassium regimes, avoiding N spikes.
- Water management and proper irrigation regimes
- Use lightweight mowing equipment to avoid stress on turf
- Thatch management



Bipolaris Leaf Spot and Crown Rot (Bipolaris Leaf Blotch-Melting out).

Fungicide	Class	Efficacy	Products
prodione + thiophanate-methyl**	benzimidazole	++++	26/36, Dovetail, Fluid Fungicide
iprodione**	dicarboxamide	++++	26GT, IPro, Iprodione Pro, Raven
vinclozolin**	dicarboxamide	++++	Curalan, Touche
mancozeb**	dithiocarbamate	++++	Fore, 4 Flowable Mancozeb, Dithane, etc
mancozeb + myclobutanil**	dithiocarbamate + DMI	++++	Manhandle
mancozeb + copper hydroxide**	dithiocarbamate + inorganic	++++	Junction
azoxystrobin + propiconazole	DMI + QoI	++++	Headway
azoxystrobin	QoI	++++	Heritage
chlorothalonil + thiophanate-methyl**	benzimidazole + nitrile	+++	Spectro, ConSyst, Peregrine, Tee-1-Up, TM/C
pyraclostrobin + boscalid**	carboxamide + QoI	+++	Honor
chlorothalonil + propiconazole**	DMI + nitrile	+++	Concert
chlorothalonil + propiconazole + fludioxonil**	DMI + nitrile + phenylpyrrole	+++	Instrata
chlorothalonil**	nitrile	+++	Daconil, Chlorostar, Chlorothalonil, etc
chlorothalonil + phosphorous acid**	nitrile + phosphonate	+++	Vitalonil
pyraclostrobin	QoI	+++	Insignia



EMERGING AND RE-EMERGING

Spring Dead Spot (Ophiosphaerella herpotricha, korrae, narmari spp)

O. korrae mostly in southeast

Widespread in GA Mountains and Piedmont; Macon in 09, 10, 11 and incidences in 2012!

Ectotrophic Root Infecting Fungi (ETRI)

Survive as mycelium in roots

Root infection at 50-70° F in the FALL

-Infection of bermudagrass roots in the FALL makes the infected plants more sensitive to *low-temperature kill during the winter.*





Photo E.L. Butler

**SDS
Infected**



Spring Dead Spot Management

Identification and Control of Spring Dead Spot in Georgia C 1012

http://www.caes.uga.edu/Publications/pubDetail.cfm?pk_id=7983&pg=dl&ak=Plant%20Pathology

Use of resistant species and cultivars

-High fall N can delay dormancy and increase chances of winter kill

-Proper soil K-tolerance to winter kill; thatch reduction and reducing soil compaction to promote good root growth



avoid use of DNA herbicides in spring - prodiamine (Barricade)-
dithiopyr (Dimension)

- Aerify or spike affected areas (every two weeks)
- Apply 1 lb N per 1000 per month from May to Sept

Use ammonium-based nitrogen fertilizers to reduce pH of
thatch and soil. *Ophiosphorella* spp. do not grow well at
pH < 6.3

- Spring dead spot pathogens exhibited a differential response to nitrogen sources
 - *O. korrae* was effectively suppressed by calcium nitrate
 - *O. herpotricha* was suppressed most effectively by ammonium sulfate
- *O. korrae* was negatively correlated with soil pH and foliar Ca content, whereas *O. herpotricha* was positively correlated with these factors
- Fall applications of potassium, dolomitic lime, gypsum, and elemental sulfur had no effect on either spring dead spot pathogen
- Spring dead spot pathogens responded similarly to preventive fungicide applications



Fungicides for Spring Dead Spot Control

Benzimidazoles

thiophanate-methyl (3336, Systec, T-Storm)

DIMs

fenarimol (Rubigan)

myclobutanil (Eagle, Immunox)

propiconazole (Banner Maxx, Propiconazole Pro, Savvi, Spectator)

tebuconazole (Torque)

triticonazole (Trinity, Triton)

Qols

azoxystrobin (Heritage)

fluoxastrobin (Disarm)

pyraclostrobin (Insignia)

Premixes

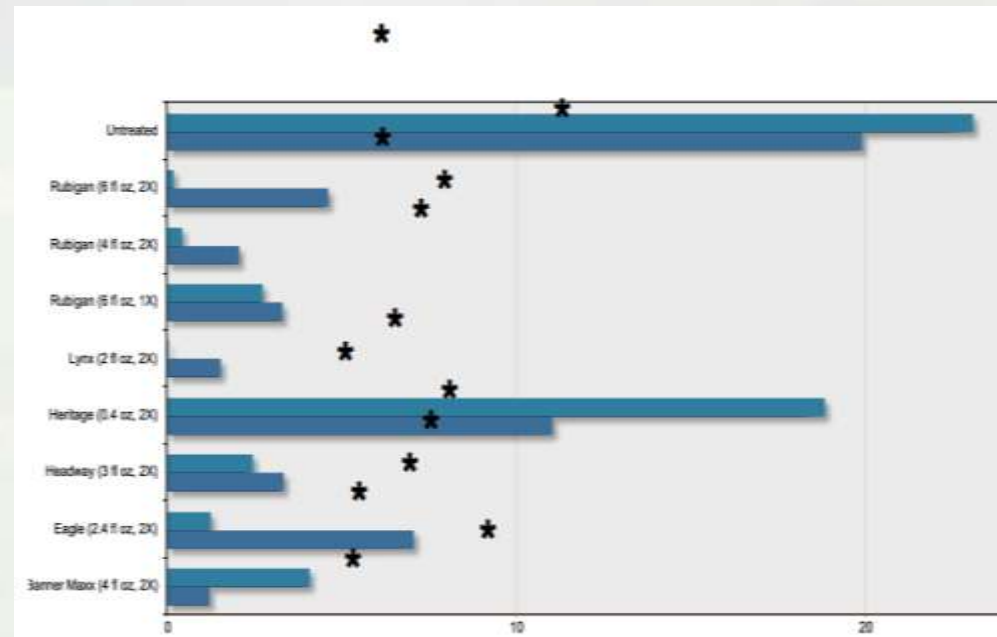
azoxystrobin + propiconazole (Headway)

fluoxastrobin + myclobutanil (Disarm M)

TORQUE (TEBUCONAZOLE) AT 0.6 FL OZ
FOLLOWED BY A TANK MIX OF TORQUE 0.6 OZ
+ 3336 5.0 OZ 28 DAYS LATER

RUBIGAN 6 OZ / 1000 SQ FT FOLLOWED BY
3336 5 OZ 28 DAYS LATER

Martin B., Clemson



EMERGING AND RE-EMERGING

Type I Fairy Ring



EMERGING AND RE-EMERGING

Mini-ring, Rhizoctonia leaf and sheath spot (RLSS) by *Rhizoctonia zeae*

A relatively new disease has been observed the past 5+ years increasing in severity on bermudagrass greens in GA

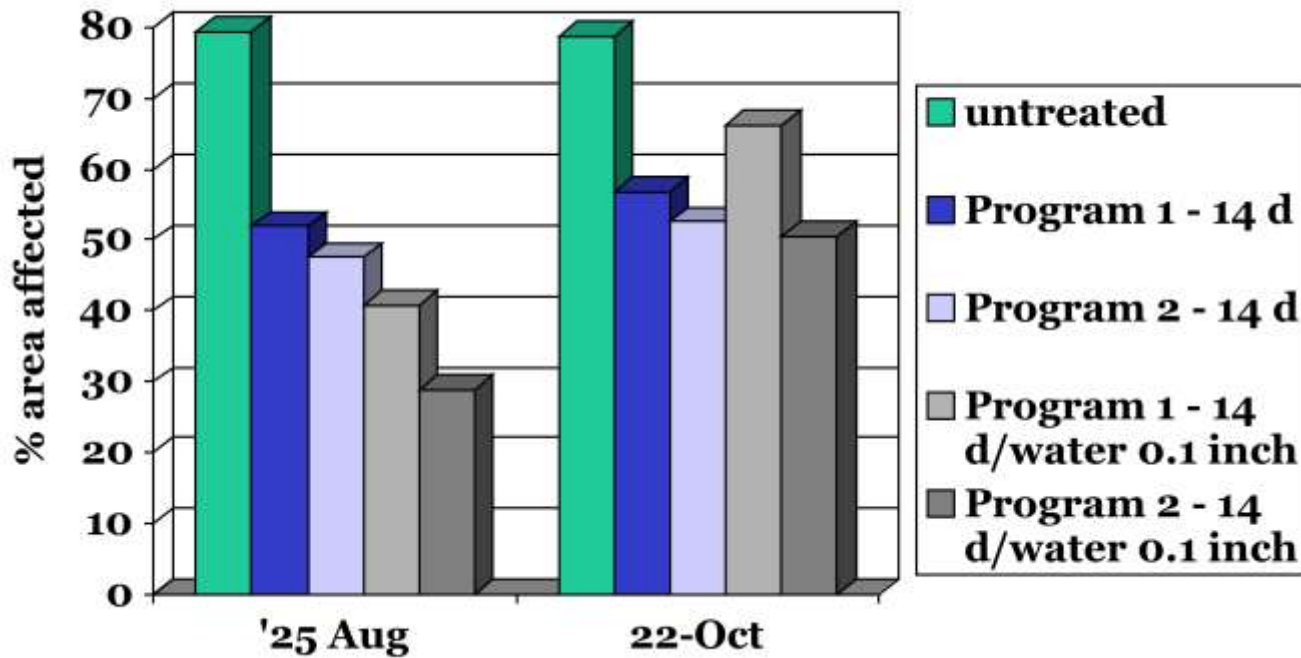
The disease becomes most symptomatic towards the end of the summer/beginning of Fall (coinciding with the slowing of the growth of bermudagrass)

R. zeae is a pathogen with ideal growth at temperatures ranging from 85 – 95°F



Mini-ring, Rhizoctonia leaf and sheath spot (RLSS) by Rhizoctonia zeae Management- What we know so far

Martin/Kammerer -Tifeagle SC work



Program 1: Heritage TL 1 fl oz + Medallion 0.5 oz/ Headway 1.5 fl oz/ Renown 2.5 fl oz + Medallion 0.5 oz

Program 2: Heritage TL 2 fl oz/ Medallion 0.5 oz/ Headway 1.5 fl oz

**Mini-ring, Rhizoctonia leaf and sheath spot (RLSS) by Rhizoctonia zeae
Management- What we know so far**

**Georgia; Working with 2 golf courses:
Symptoms observed in early-mid August. Rhizoctonia leaf and sheath spot- mini-ring symptoms infected prior to second week in July**

Fungicide timing is crucial for management; Some response if applied curative (after symptoms)

Preventative applications work best. Azoxystrobin and/or Prostar applied first week in July, follow up application at 28 days. At least 2 gal/1000 sq ft (3-4 gal).

Kammerer et al- Rhizoctonia zeae has a prostrate growth habit, more-so than R. solani. Fungicide might need to go into and below the thatch



NEW/UNREPORTED TURF DISEASES-WARM SEASON GRASSES

First report of *Ophiosphaerella korrea* (SDS) on *Zoysia matrella* (Manila grass/Diamond zoysia) in Georgia. Identification and corroboration using morphological, microscopic and DNA analysis. Tredway (NCSU) and Alfredo Martinez (UGA). Sent for publication.



Use of species-specific
Ophiosphaerella
DNA primers on PCR assay

Photos Lane Tredway

First Report of *Phyllachora* spp (Tar Spot) on Seashore paspalum. Identification using morphological, light microscopy, electron microscopy, pathogenicity tests. The causal agent was found to be the ascomycete *Phyllachora paspali* .



TURFGRASS DISEASES IN GA: IDENTIFICATION AND CONTROL

<http://pubs.caes.uga.edu/caespubs/pubcd/B1233.htm>

ABIOTIC DISEASES AND INJURIES OF TURFGRASSES IN GA

<http://pubs.caes.uga.edu/caespubs/pubcd/B1258.htm>

2012 GEORGIA PESTICIDE HANDBOOK

<http://www.ent.uga.edu/pmh/>

2012 TURFGRASS PEST CONTROL RECOMMENDATIONS FOR PROFESSIONALS

http://www.griffin.uga.edu/caes/turf/Publicat/1640_Recommendations.htm

GUIDE TO TURFGRASS FUNGICIDES

<http://pubs.caes.uga.edu/caespubs/pubcd/B1316.htm>



NEMATODES



OPTIONS OF CONTROL RECENTLY DEVELOPED/REGISTERED

- Use of bio-nematicides (Nortica-Bacillus firmus, Econem, others)

The Georgia Department of Agriculture has approved a SLN 24(c) registration for the use of Avid® 0.15 EC Miticide/Insecticide (abamectin). Golf greens only. 57 fl oz per acre



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Gray leaf spot

Pyricularia grisea



- Leaf spot disease
- Straw-gray lesions
- with purple/brown margins
- Rapid spread
- Severely affected leaf blades wither and turn brown



Gray leaf spot

- Affects St. Augustinegrass favored by high N and excess moisture
- Optimal temps
75 to 90°F





Management of gray leaf spot

- Plant cultivars resistant to Gray Leaf Spot; 'Roselawn' and 'Tamlawn' have some resistance
- Avoid excessive applications of N
- Proper watering practices
- Reduce thatch when excessive (vertical cutting)
- Reduce shade
- Protectant fungicides available

Fungicides for gray leaf spot control

- Triadimefon (i.e. Bayleton) (1-2 oz per 1000 sq ft)
- Thiophanate Methyl (i.e. Cleary's 3336 WP, F, G) (4-6 oz)
- Propiconazole (i.e Banner) (1-2 fl. oz)
- Metconazole (i.e. Tourney) (0.37 oz);
- Myclobutanil (i.e. Eagle) (1.2-2.4 oz)
- Spectro (Thiophanate methyl-Chlotrothalonil) (3.72-5.76 oz)
- Pyraclostrobin (Insignia) (0.9 oz);
- Fluoxastrobin (Disarm) (0.18-0.36 oz)
- Trifloxystrobin (Compass) (0.15-0.2 oz)

Conclusions*

- Rhizoctonia leaf and sheath spot (with mini-ring symptoms) infected prior to July 15
 - *R. zae* is a pathogen with ideal growth at temperatures ranging from 85 – 95°F
- RLSS can be controlled with the appropriate fungicides, curatively but...
 - preventive control is the better route as the growth of new non-infected turfgrass is essential for recovery, a STRONG preventive fungicide program is essential
 - Heritage TL, Renown, Medallion and Headway all demonstrated curative activity
 - IRRIGATION directly after application for curative control gave significantly better, longer lasting control for Program 2
- Program 2 performed better than Program 1
 - this may be due to the later application placement of Headway fungicide, which contains Banner, as Banner (propiconazole) and, as are all DMI's, is known to potentially cause adverse PGR effects under hot temperatures
- Syngenta's Fungicide program for bermudagrass greens (www.greencastonline.com/programs/register.aspx) in the Coastal South, SE, Texas and South Florida all incorporate this information into a preventive program for RLSS