


UNIVERSITY OF GEORGIA
College of Agricultural & Environmental Sciences
Department of Plant Pathology

Recent Research on Warm-Season Turfgrass Diseases

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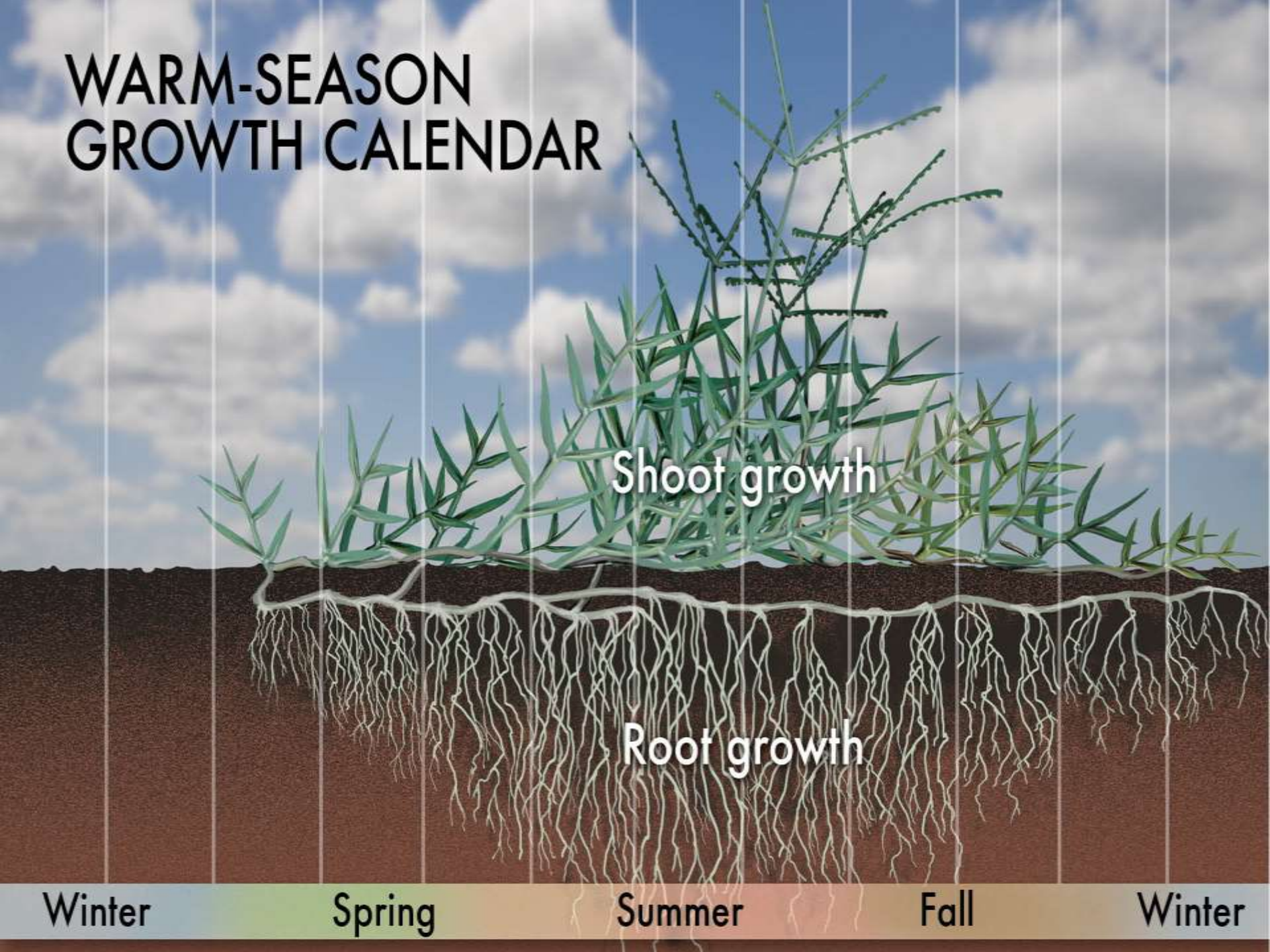

WARM-SEASON
GROWTH CALENDAR
Shoot growth
Root growth
Winter
Spring
Summer
Fall
Winter

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

- **Improved Management for *Bipolaris* Leaf Spot and Crown Rot**

- **New Strategies for Control of Large Patch (*Rhizoctonia solani*) of zoysiagrass**

- **Improved Control Against Turfgrass-Parasitic Nematodes in Georgia**

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

Objectives:

Determine optimal fungicide application timing for the control of spring dead spot

Evaluate the combination of cultural and chemical practices for the control of spring dead spot in Georgia

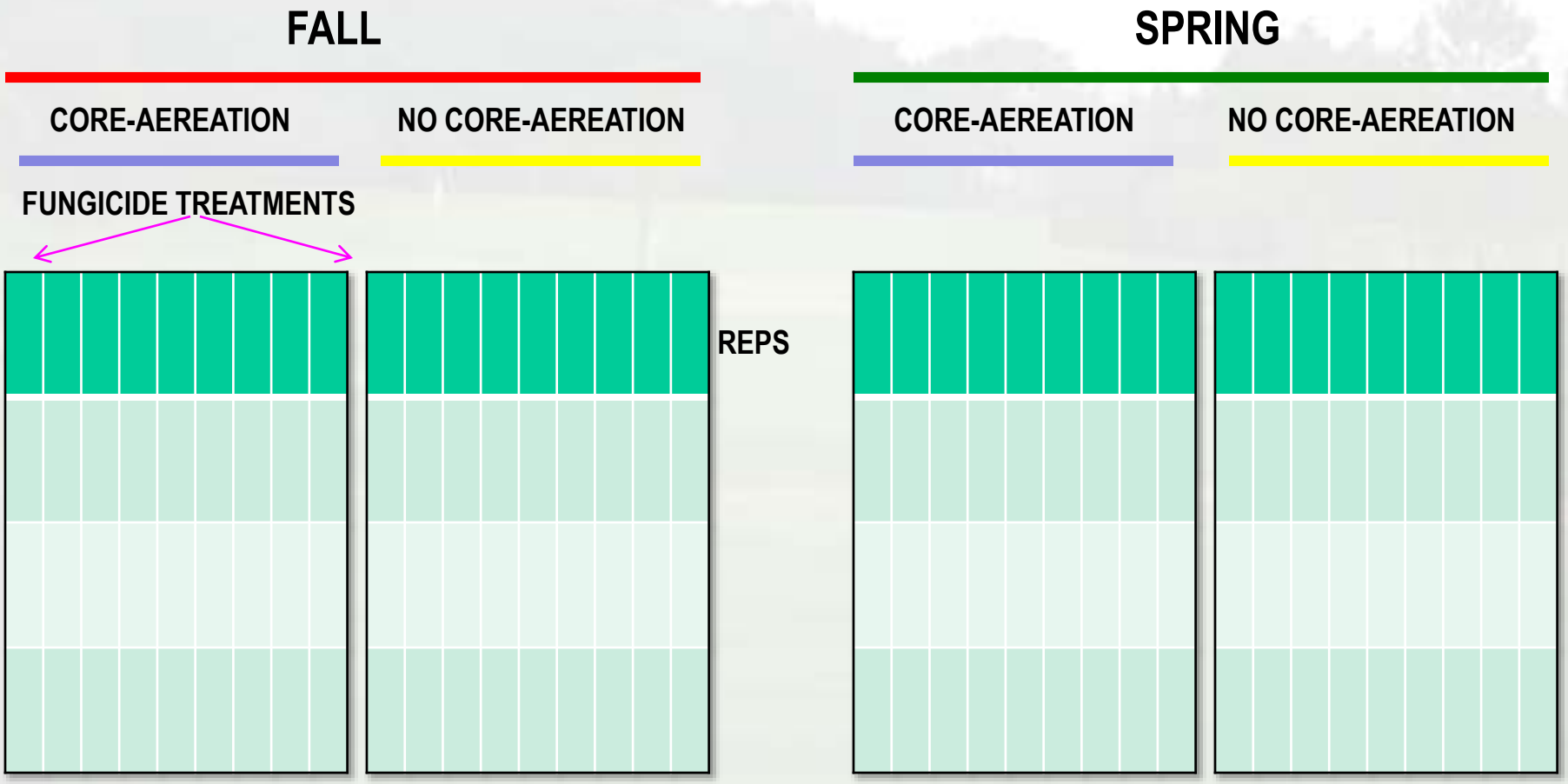
Examine the efficacy of labeled fungicides and several new fungicide chemistries for the control of spring dead spot in Georgia sites.

Evaluate the effect of soil fertility-with emphasis of nitrogen source and fungicide alternatives for the control of spring dead spot.

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

Experimental design is a factorial:

- **Fungicide application timing (Spring or Fall) is the main factor**
- **Cultural treatment (core-aeration or no core-aereation) is a subfactor**
- **Fungicide chemistry will be a sub-subfactor**



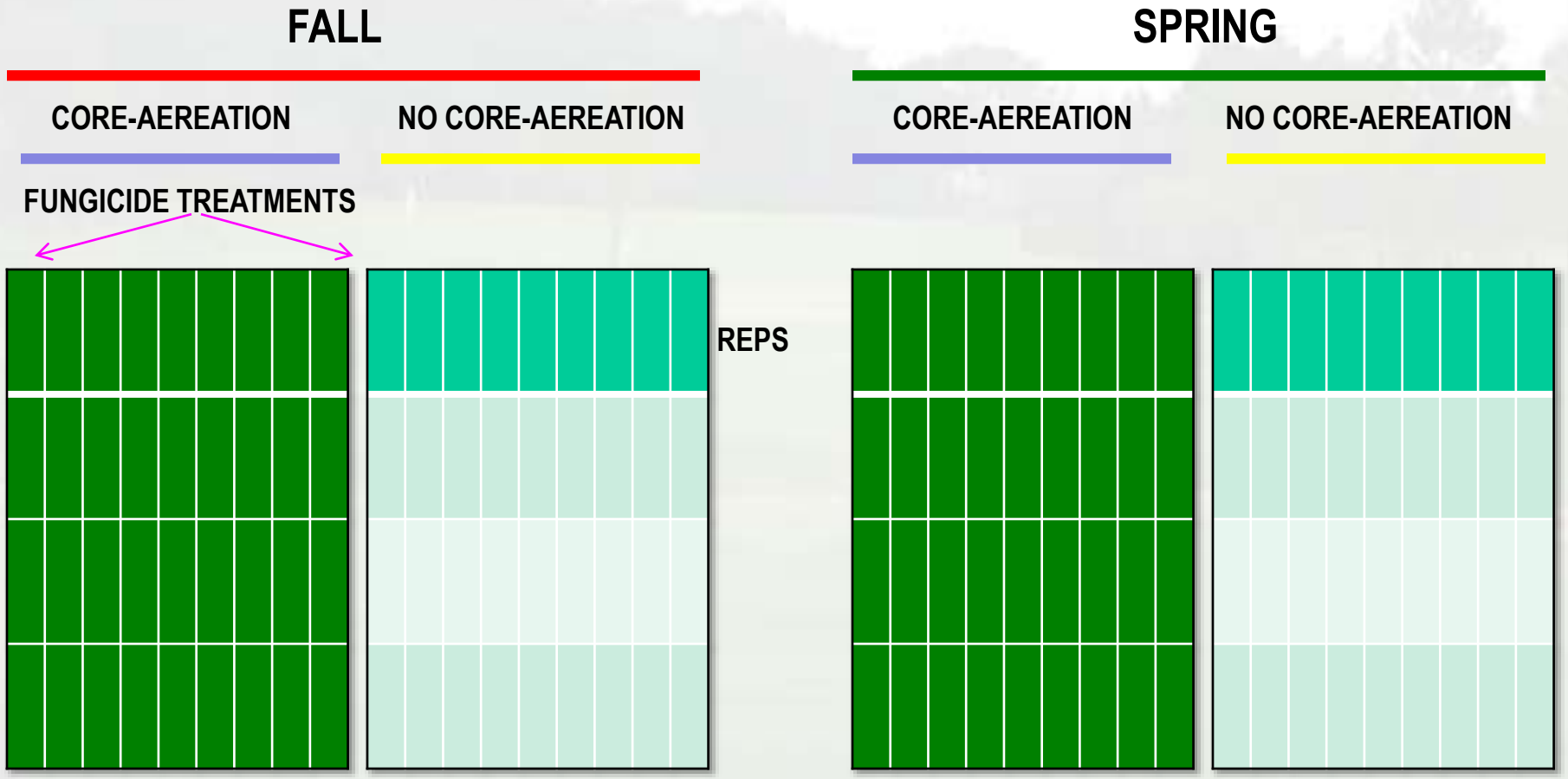
CHEMICAL AND FORMULATION	RATE PER 1000 sq ft	Chemical group
tebuconazole Torque	0.6 fl oz	DMI
metconazol Torney	0.74 oz	DMI
fluoxapyroxad Xzemplar	0.26 fl oz	Carboximide
azoxystrobin + propiconazole Headway	3 fl oz	Strobilurin + DMI
azoxystrobin + difenconazole Briskway	0-75 fl oz	Strobilurin + DMI
pyraclostrobin + triticonazole Pillar	3 lbs	Strobilurin + DMI
tebuconazole + alkylated polyol Torque + Revolution	0.6 fl oz + 16 fl oz	DMI
fenarimol Rubigan	6 fl oz	DMI
Non-treated control	----	---

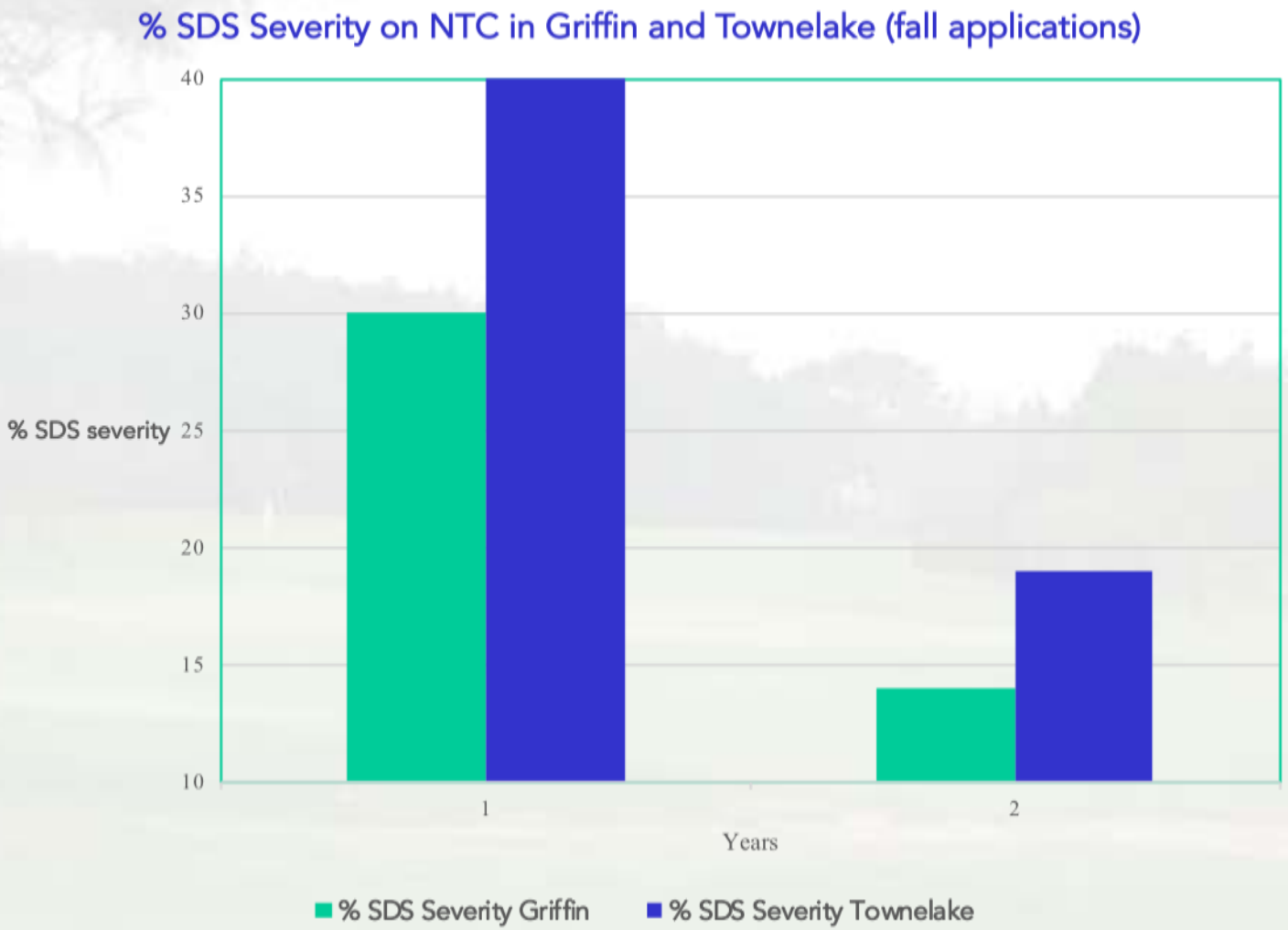
Percent SDS disease cover ratings (using a modified Horsfall-Barrat Scale) recorded visually monthly (and/or every two weeks starting) summer/fall 2015 and in / after spring of 2016 following bermudagrass spring green-up

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

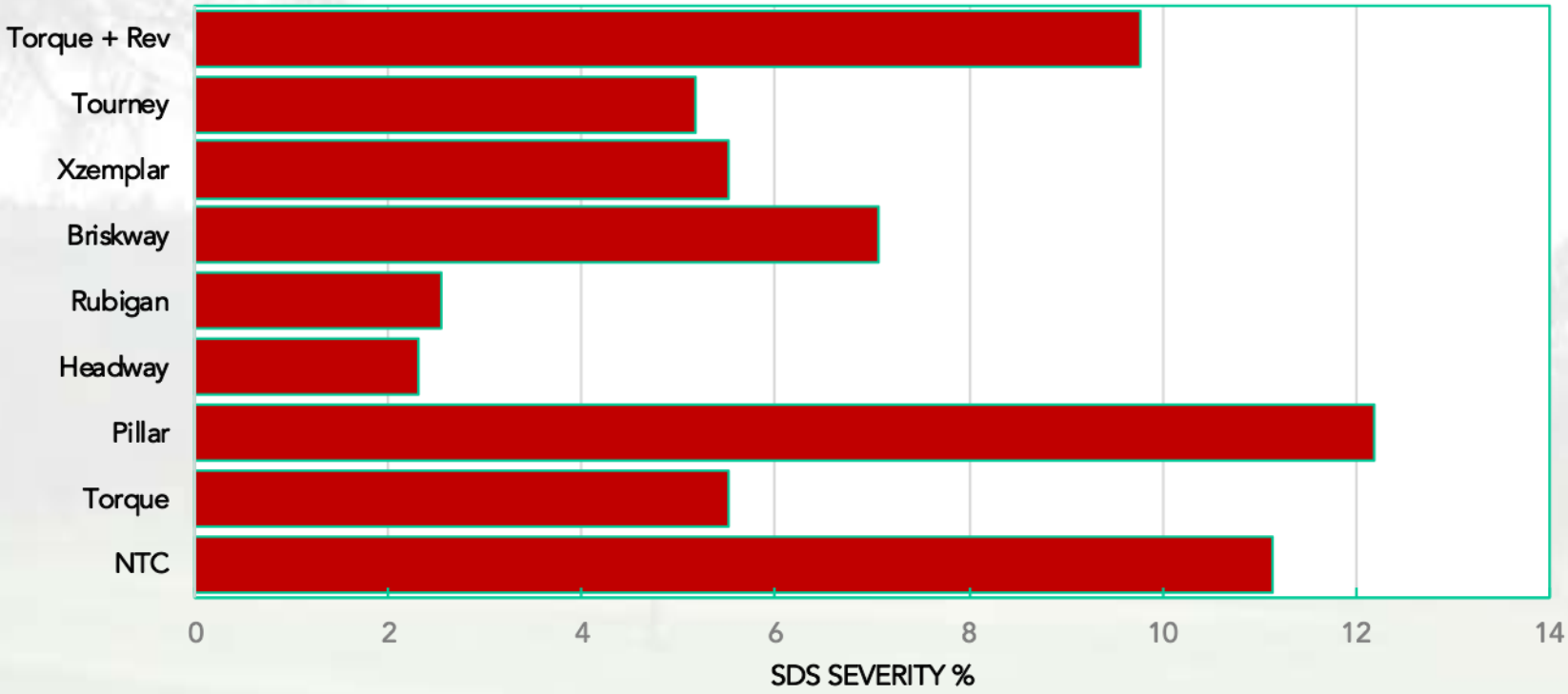
- **Cultural treatment (core-aeration or no core-aeration) is a subfactor**

Core aereation (solid tine) cultural practice before fungicide application was statistically (P= 0.05) 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, and neither promoted disease severity



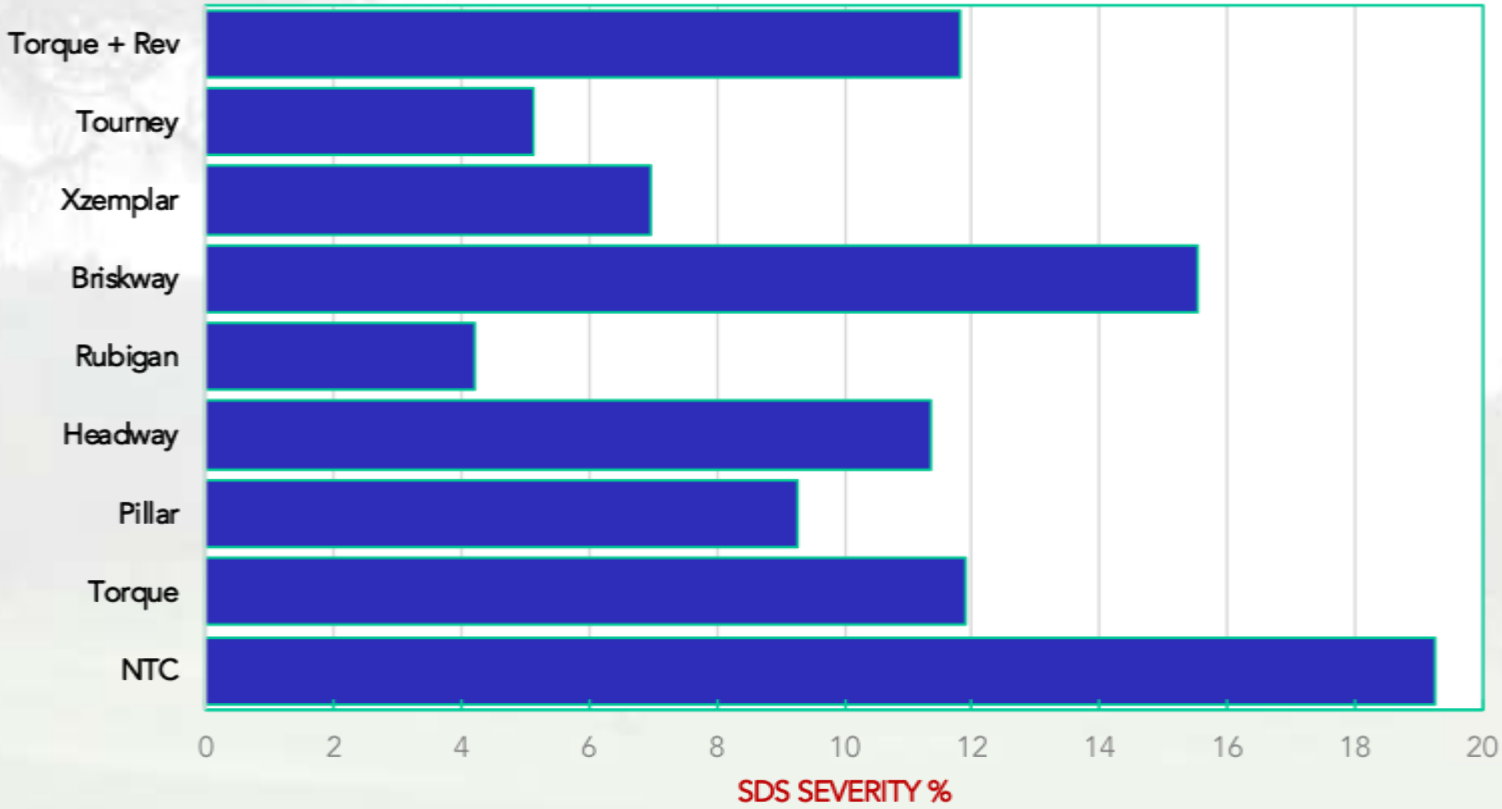

% SDS Severity on NTC in Griffin and Townelake (fall applications)
% SDS severity
40
35
30
25
20
15
10
1
2
Years
% SDS Severity Griffin
% SDS Severity Townelake

SDS Severity Using Fungicides Applied in the FALL at GRIFFIN, n (SAS of all data when disease present)

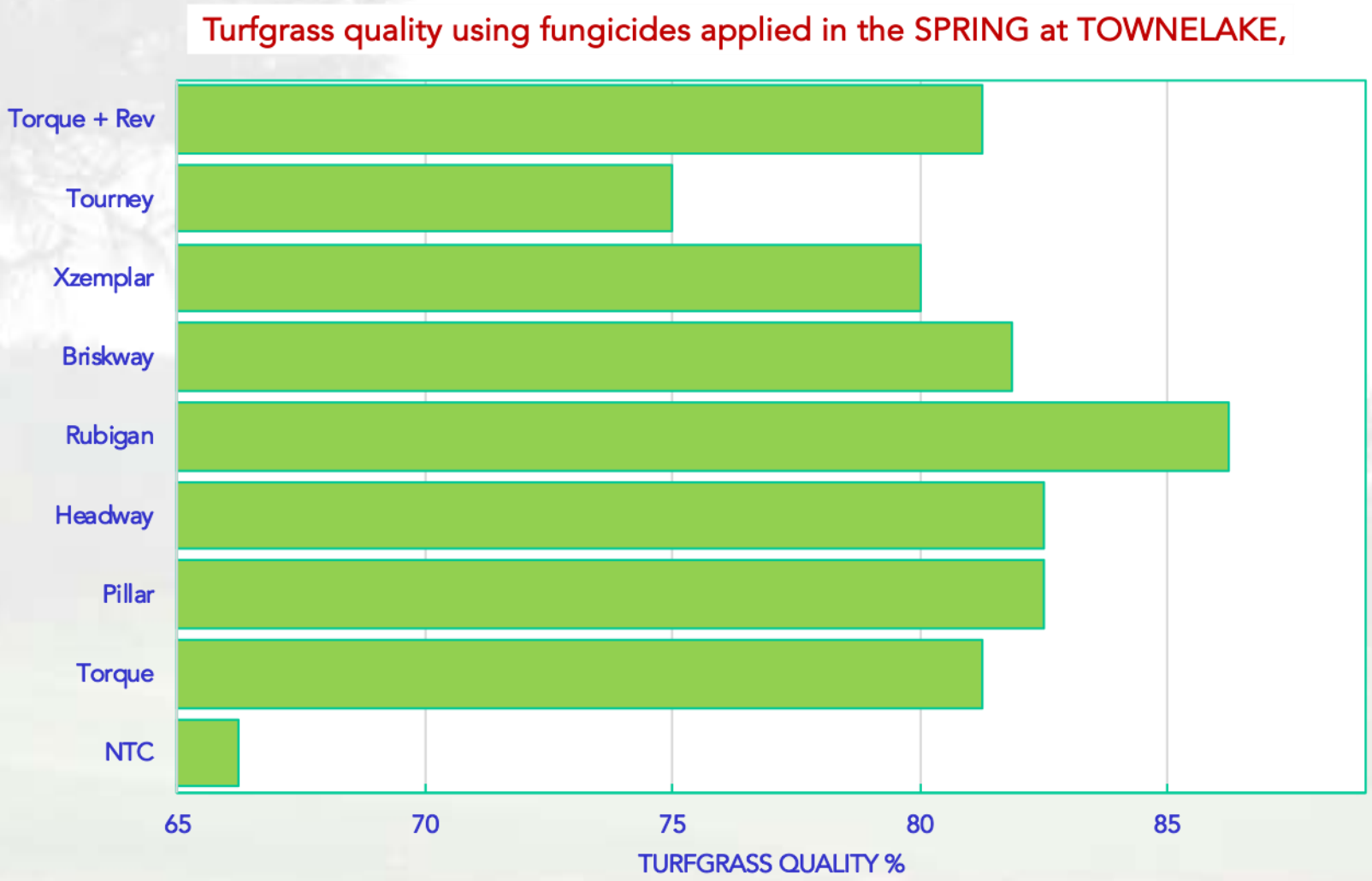


Treatment	Disease Severity %	% SDS Reduction	Rank
1. Non Treated Control	11.14 ab	-----	------
2. Torque 0.6 fl oz	5.52 bcd	50.45	5
3. Pillar 3.0 lb	12.20 a	---	8
4. Headway 3.0 fl oz	2.30 d	79.36	1
5. Rubigan 6.0 fl oz	2.53 d	77.29	2
6. Briskway 0.75 fl oz	7.06 bcd	36.63	6
7. Xzemplar 0.26 fl oz	5.52 bcd	50.45	4
8. Tourney 0.37 oz	5.16 cd	53.63	3
9. Torque 0.6 fl oz + Revolution 6.0 fl oz	9.78 abc	12.79	7

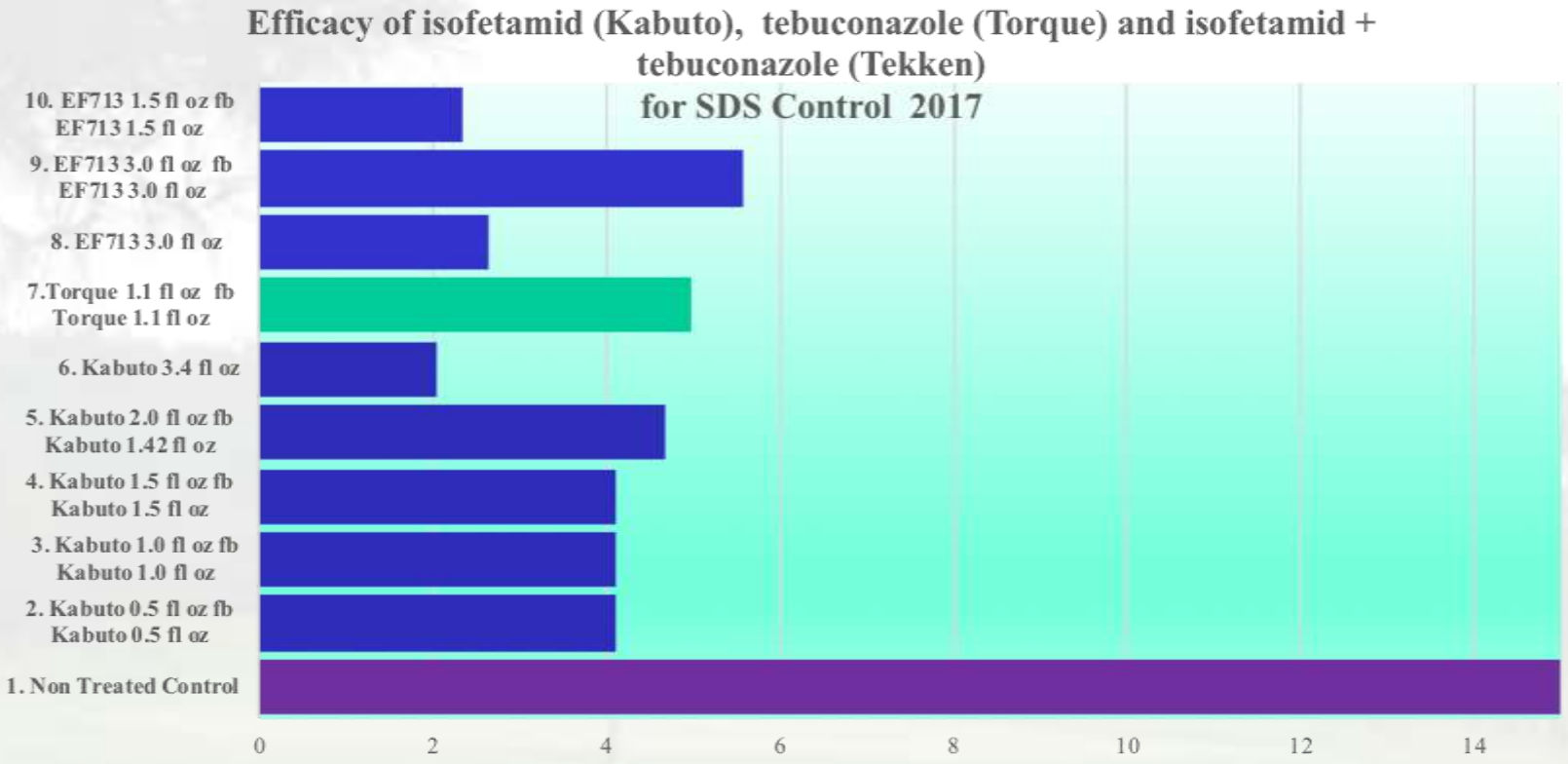
SDS Severity Using Fungicides Applied in the FALL at TOWNELAKE,



Treatment	Disease Severity %	% SDS Reduction	Rank
1. Non Treated Control	19.26 a	-----	------
2. Torque 0.6 fl oz	11.91 bc	38.17	6
3. Pillar 3.0 lb	9.27 bcd	51.87	4
4. Headway 3.0 fl oz	11.34 bcd	35.26	7
5. Rubigan 6.0 fl oz	4.19 d	78.25	1
6. Briskway 0.75 fl oz	15.55 b	19.27	8
7. Xzemplar 0.26 fl oz	6.97 cd	63.82	3
8. Tourney 0.37 oz	5.12 cd	73.42	2
9. Torque 0.6 fl oz + Revolution 6.0 fl oz	11.81 bc	38.69	5



Is noteworthy to mention that turfgrass quality was influenced not only by SDS incidence but also by heavy epidemics of dollar spot, bipolaris leaf spot and large patch. Therefore, an added benefit of spring fungicide applications is the control and /or prevention of these diseases



	Spring Dead Spot Severity Griffin (%)[z]
Treatment and rate/1,000 sq ft	
Non Treated Control	11.15 a
Velista 50WG 0.3 oz	11.75 a
Velista 50WG 0.5 oz	4.40 b

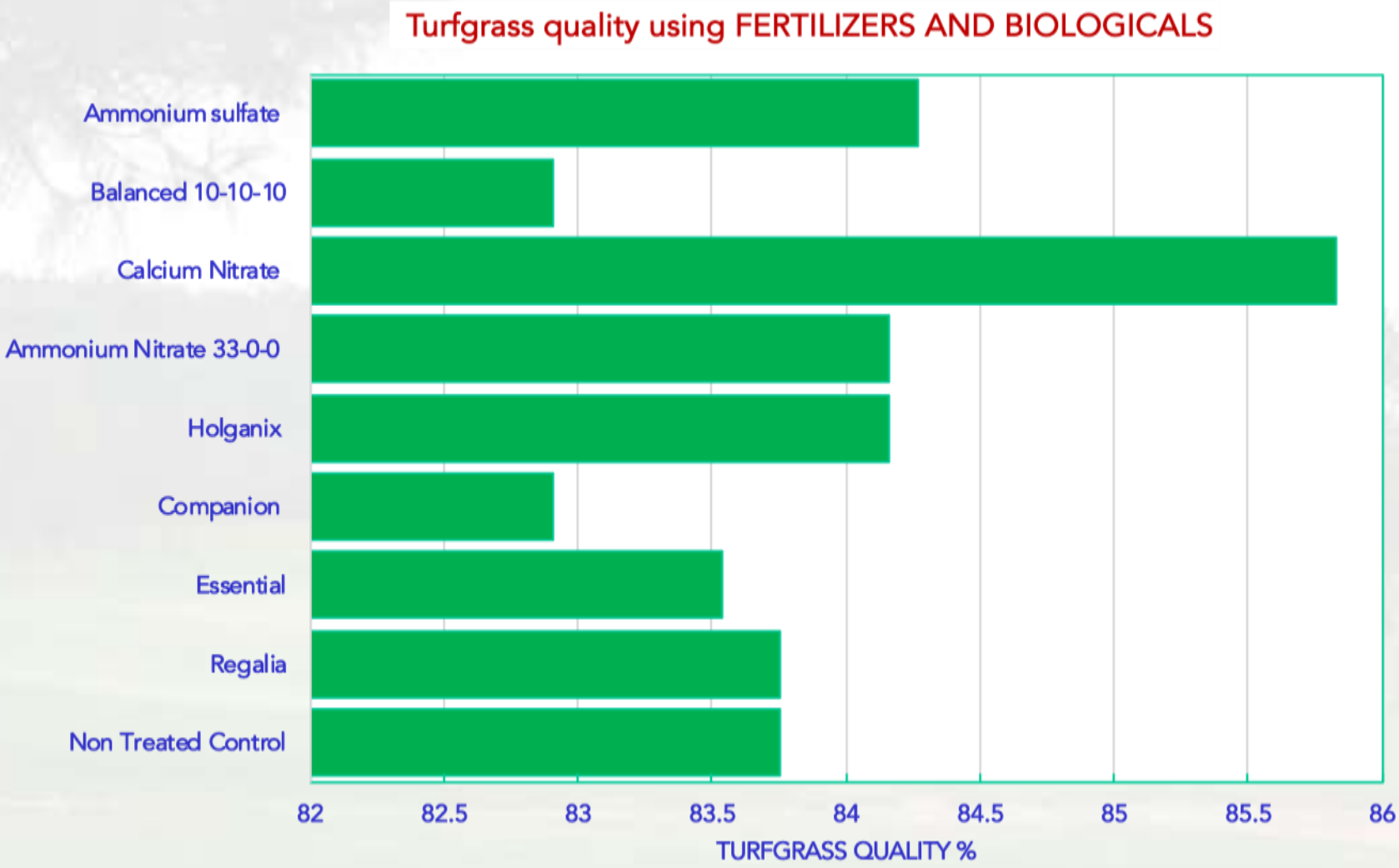
Conclusions and Discussion

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

- **Overall; disease suppression by fungicides was variable between sites**
- **Both application times (Fall and Spring) are beneficial;**
- **On both timings; all SDS labelled fungicides have significant disease suppression**
  - **IN THE FALL;**
    - **STILL THE MOST EFFICACIOUS TIMING FOR SDS MANAGEMENT**
    - **PREVENTATIVE, PRE-EPIDEMIC**
    - **USE OF A DMI (ALONE-RUBIGAN, TORQUE, TOURNEY, OR IN COMBINATION WITH STROBILURIN (BRISKWAY, HEADWAY, PILLAR)**
    - **OR A SDHI (XZEMPLAR, VELISTA)**
  - **IN THE SPRING**
    - **USE OF A DMI IN COMBINATION WITH STROBILURIN (BRISKWAY, HEADWAY, PILLAR).**
    - **USE OF FUNGICIDES SHORTENS THE TIME TO ACHIEVE ACCEPTABLE TURF QUALITY FOR UP TO 4 WEEKS**
    - **EFFECT OF PREVENTATIVE EFFECT ON DOLLAR SPOT, BIPOLARIS AND RHIZOCTONIA**
- **Use of wetting agent did not significantly enhanced fungicide efficacy**
- **Fungicide rate matters (see Velista, Rubigan)**

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

Treatment	RATE PER 1000 sq ft/month or as per instructions	
Regalia Reynoutria sachalinensis	3.0 fl oz	Plant extract
Essential Several ingredients	3.0 fl oz	Organic/fertilizer/other
Companion Bacillus subtilis	6.0 fl ozfl oz	Biological control agent
Holganix Headway	7.0 fl oz	Organic/fertilizer/other
Ammonium nitrate 33-0-0	1.0 lb	Fertilizer
Calcium nitrate	1.0 lb	Fertilizer
10-10-10	1.0 lb	Fertilizer
Ammonium sulfate	1.0 lb	Fertilizer
Non-treated control	----	---

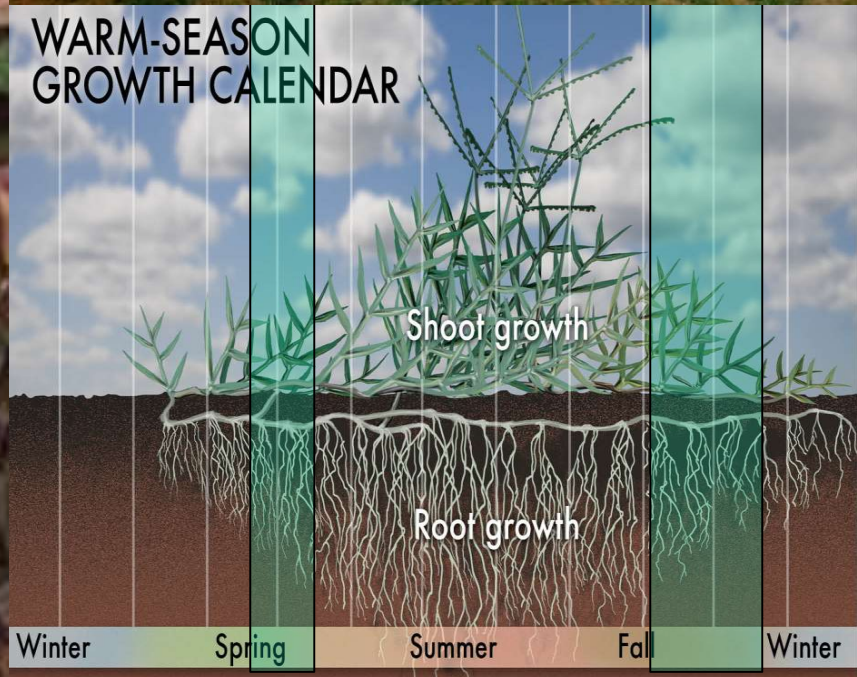


Special thanks to the Georgia Golf Environmental Fund (GGEF) for their support

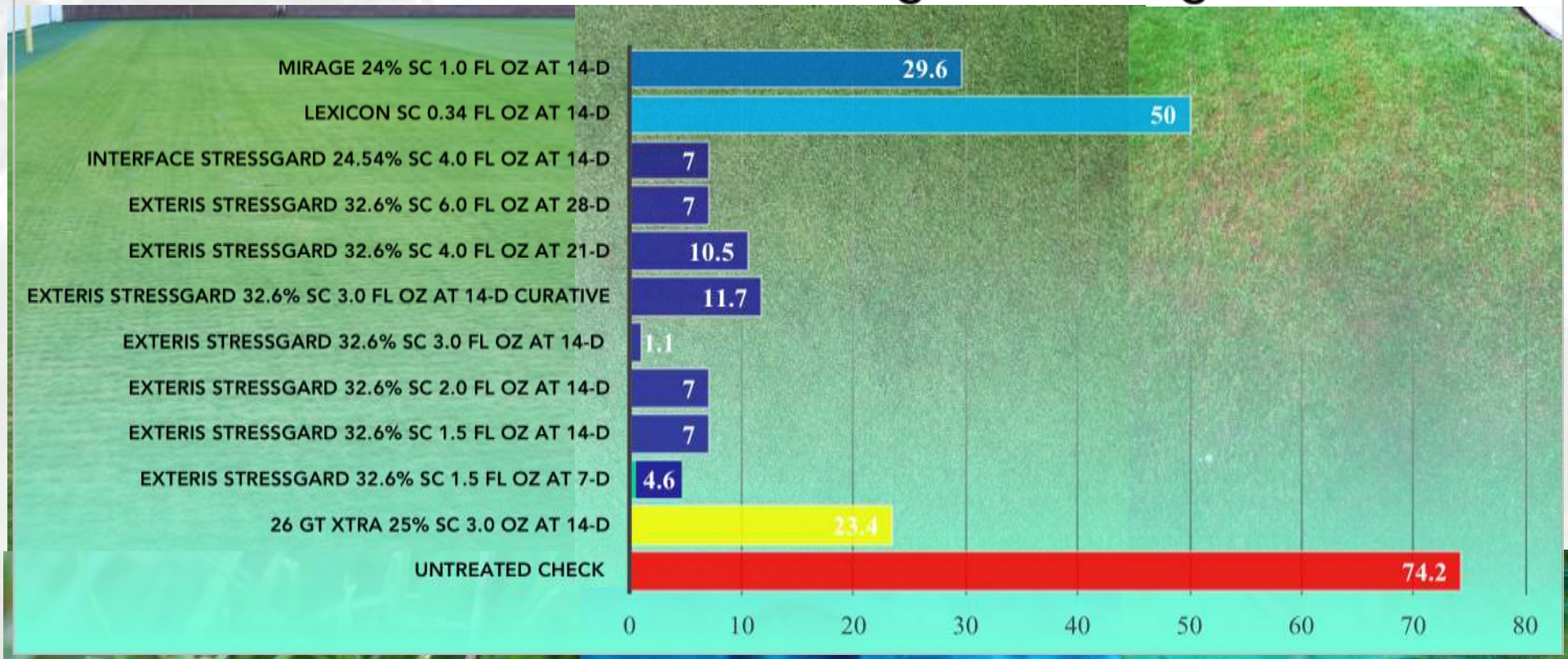
Improved Management for Bipolaris Leaf Spot and Crown Rot (Bipolaris Leaf Blotch-Melting out)

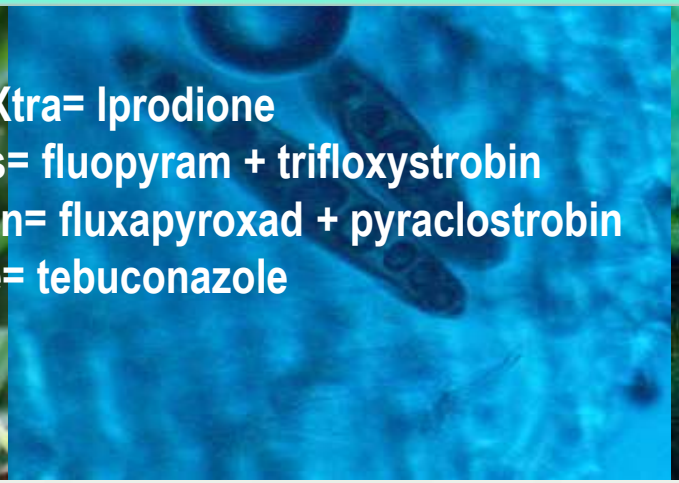
Bipolaris cynodontis; B. sorokiniana, B specifera; Exserohilum

•Observed in bermudagrass but also in cool season grasses especially over-seeding. Observed consistently (most active) in the fall before dormancy and during spring at green-up.

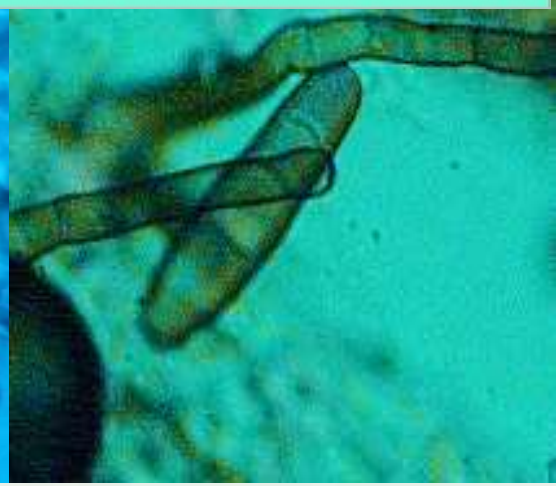


Fungicides for leaf spot suppression and turfgrass quality on ultradwarf bermudagrass in Georgia





26GT Xtra= Iprodione
Exteris= fluopyram + trifloxystrobin
Lexicon= fluxapyroxad + pyraclostrobin
Mirage= tebuconazole



Fungicides for bermudagrass leaf spot suppression and turf quality

Similar trials evaluated in 2015, 2016, 2017 and 2018

Evaluated and now labeled fungicides for Bipolaris leaf spot

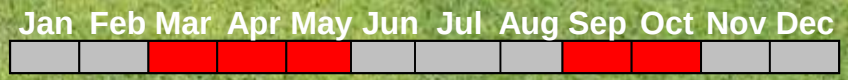
26GT Xtra= Iprodione
Exteris= fluopyram + trifloxystrobin
Lexicon= fluxapyroxad + pyraclostrobin
Xzemplar= fluxapyroxad
Velista= penthiopyroxad
Heritage Action= azoxystrobin + acibenzolar
Daconil action (chlorothalonil + acibenzolar) +Appear (phosphonate)

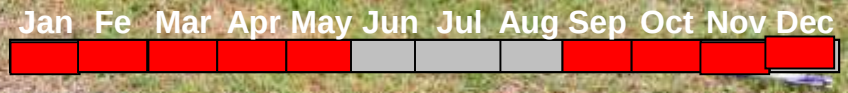
Inoculation improvement

•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
•Readily produces spores, therefore mowing, traffic etc can spread the disease
•Thatch management

LARGE PATCH (*RHIZOCTONIA SOLANI*) OF ZOYSIAGRASS (*ZOYSIA JAPONICA*)

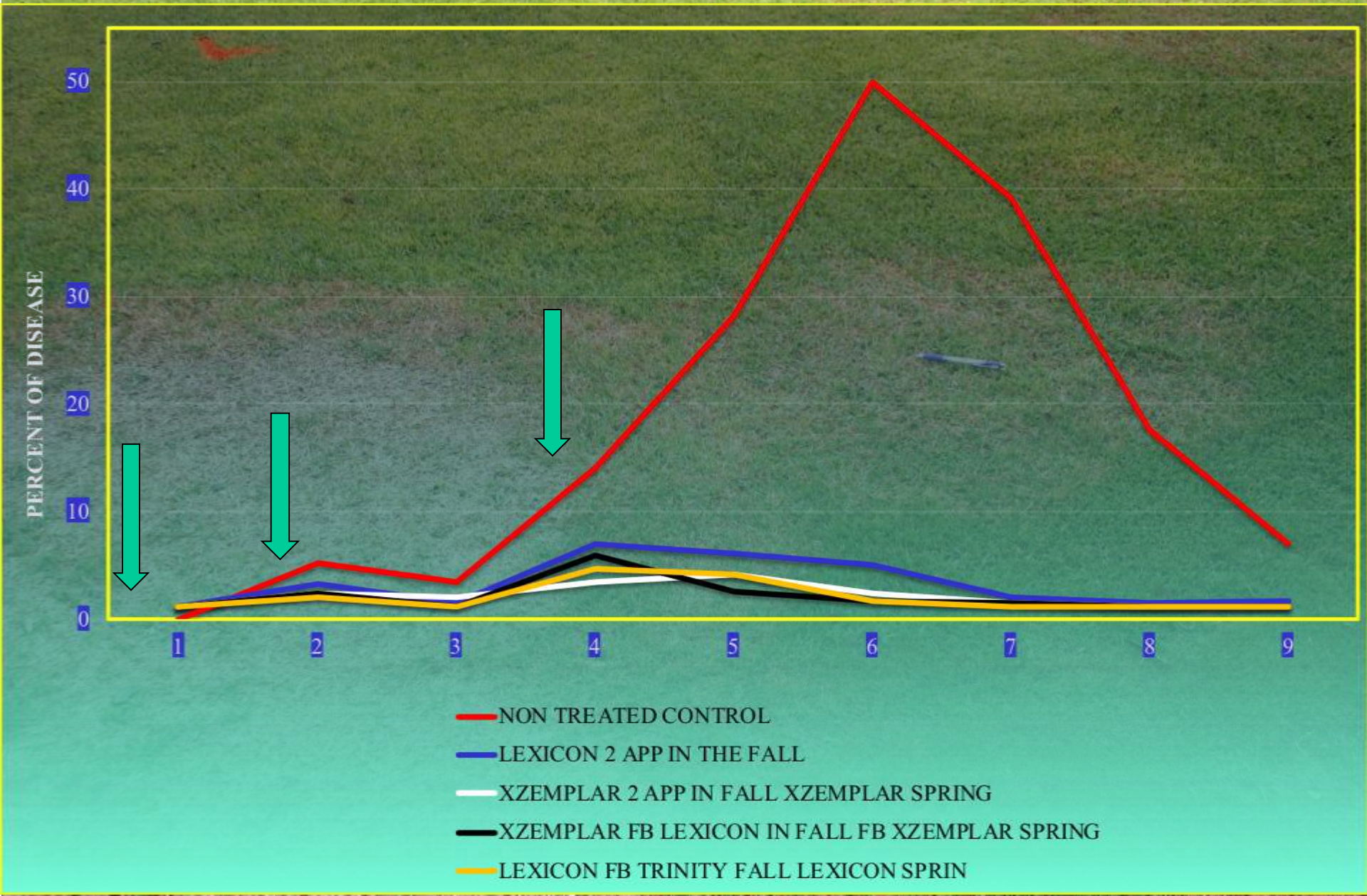
2015-2016; 2016-2017
ACTIVE FOR OVER SIX MONTHS



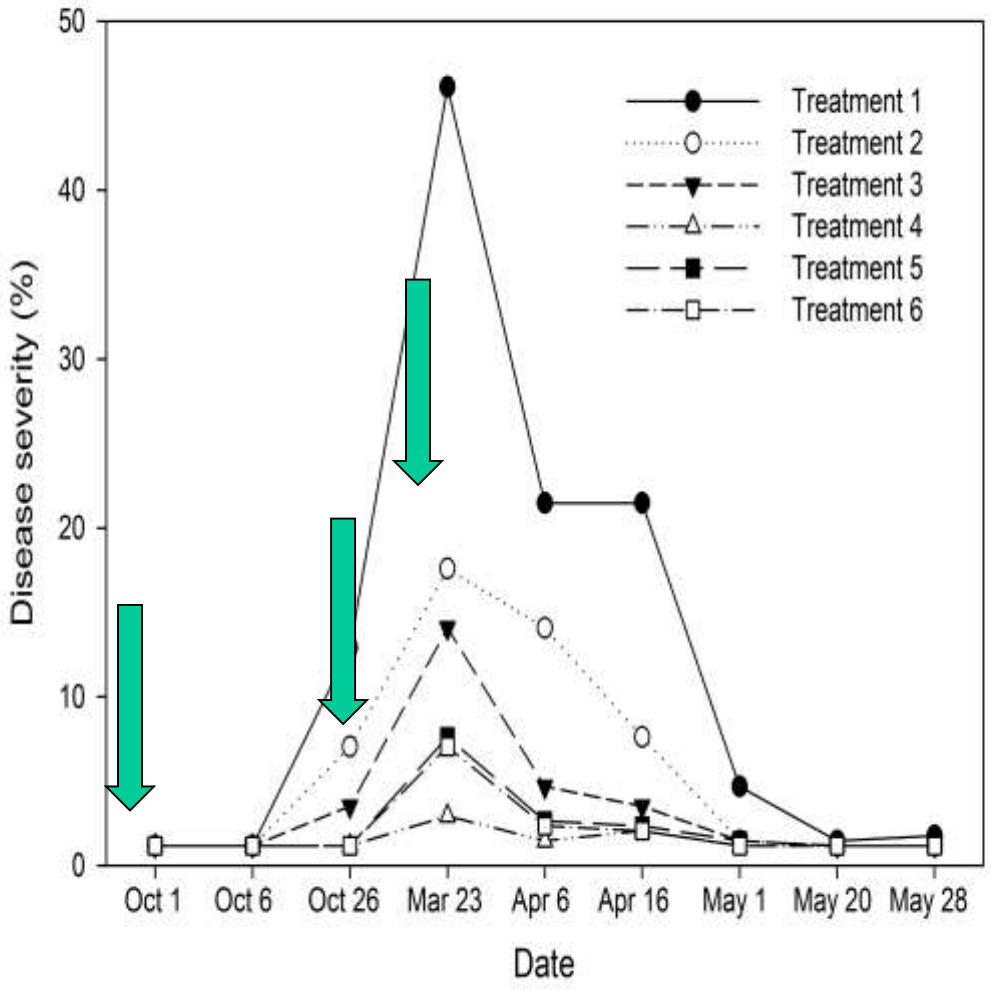


- NEW (AND USED) FUNGICIDE CHEMISTRIES; FUNGICIDE TIMING, RATES
- POST-EPIDEMIC (CURATIVE –SPRING) MANAGEMENT USING FERTILITY AND FUNGICIDES

EVALUACION DE FUNGICIDAS EN MANCHA LARGA (*RHIZOCTONIA SOLANI*) DE ZOYSIA (*ZOYSIA JAPONICA*)



EVALUACION DE FUNGICIDAS EN MANCHA LARGA (*RHIZOCTONIA SOLANI*) DE ZOYSIA (*ZOYSIA JAPONICA*)



Treatment and rate/1,000 sq ft
1. NON TREATED CONTROL
2. PROSTAR 70WG 2.2 OZ -AT GREEN UP FOLLOWED BY PROSTAR 70WG 2.2 OZ 30 DAYS LATER
3. MIRAGE 1.0 FL OZ FOLLOWED BY MIRAGE 1.0 FL OZ (28 DAYS LATER)
4. MIRAGE 2.0 FL OZ FOLLOWED BY MIRAGE 2.0 FL OZ (28 DAYS LATER)
5. PROSTAR 70WG 2.2 OZ FOLLOWED BY MIRAGE 1.0 FL OZ FOLLOWED BY MIRAGE 1.0 FL OZ AT GREENUP
6. PROSTAR 70WG 2.2 OZ FOLLOWED BY MIRAGE 1.0 FL OZ (28 DAYS LATER)

Fungicides for Large Patch (Rhizoctonia solani) suppression and turf quality on zoysiagrass

Similar trials evaluated in 2015, 2016, 2017 and 2018

Evaluated and now labeled fungicides for Large Patch
Mirage= tebuconazole
Xzemplar= fluxapyroxad)
Lexicon= fluxapyroxad + pyraclostrobin
Velista= penthiopyroxad

Several number products from several companies

POST-EPIDEMIC (CURATIVE –SPRING) MANAGEMENT USING FERTILITY AND FUNGICIDES

Two Nitrogen sources
Three Fungicide Chemical Groups (Strobilurin; DMI; Benzimidazol)
Alone or in combination

Timely fertility in combination with fungicide can speed recovery up to 5 weeks compared to fungicide alone or fertilizer alone

Improved Control Against Turfgrass-Parasitic Nematodes in Georgia

Abamectin (Divanem), fluopyram (Indemnify) and fluensulfone (Nimitz Pro G) were tested on a ultradwarf bermudagrass putting green using different rates, timings of application, product combination and cultural practices to enhance efficacy.

PPN numbers in the soil were drastically reduced using these three active ingredients. Turfgrass quality and root vigor greatly improved as well.

Meloidogyne marylandi, 200X

UGA Nematology Lab 2018

Fluopyram provided statistically significant better nematode control than the non-treated control and was especially efficacious in a root knot nematode-infested putting green, and delivered outstanding turf quality for over six months.

Results from this research facilitated the registration and labeling of two new nematicides “Divanem” and “Indemnify” and provided Georgia turfgrass managers with PPN control strategies that are consistent, promote long-term control, reduce applications, and improve turfgrass health and quality

- **Development of Seashore paspalum germplasm resistant to Sclerotinia homoeocarpa (dollar spot)**
- **Improved management of *Gaeumanomyces graminis graminis* (Take all root rot)**
- **Documentation of *Meloidogyne marylandi* as causal agent of Root Knot Nematode in bermudagrass in Georgia**
- **Ocurrence and distribution of Plant Parasitic Nematodes in Geor**