

The background of the slide features a large, faint, circular watermark of the Rutgers University seal. The seal contains the text "RUTGERS UNIVERSITY" and "EST. 1823" around a central emblem.

RUTGERS

New Jersey Agricultural
Experiment Station

Organic Turfgrass Management: Disease Control Strategies

January 8, 2020

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turf.rutgers.edu

First Line of Defense

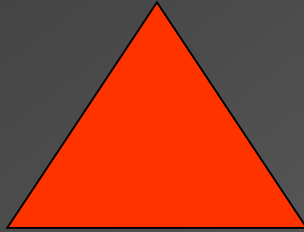
Use the best adapted and disease tolerant species & varieties!

Turfgrass Species	Use Varieties Tolerant to these Diseases
Kentucky bluegrass	Summer patch & Rust
Perennial ryegrass	Gray leaf spot & Dollar spot
Tall fescue	Brown patch
Fine fescues	Red thread & Dollar spot
Hard fescues	Summer Patch

www.turf.rutgers.edu

Primary Cultural Practices

Mowing



Fertilization

Irrigation



MUST do these well to maximize plant health and tolerance to diseases.

Primary Cultural Practices

Mow at the optimum height and frequency.

Fertilize properly for plant vigor and health – for example, both deficient and excess N encourage diseases

Maintain optimum soil pH – both low and high soil pH can enhance certain diseases

Light intensity and quality can influence surface wetness and plant vigor

Deficient and excess irrigation can also influence disease



Dollar Spot of Cool- & Warm-Season Turf

Causal agent : 4 *Clarireedia* species

(Previously *Sclerotinia homoeocarpa* F.T. Bennett)

Host

All cool- and many warm-season turfgrasses



Disease Calendar for Landscape Turf in New Jersey

Dr. Bruce Clarke, Rutgers University

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Disease	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Anthracnose					High	High	High	High	High			
Brown patch						High	High	High	High			
Cool-season brown patch	High	High	High	High	High					High	High	High
Dollar spot					High	High	High	High	High	High		
Gray leaf spot							High	High	High	High		
Leaf spot and melting-out			High	High	High	High						
Necrotic ring Spot				High	High	High			High	High	High	







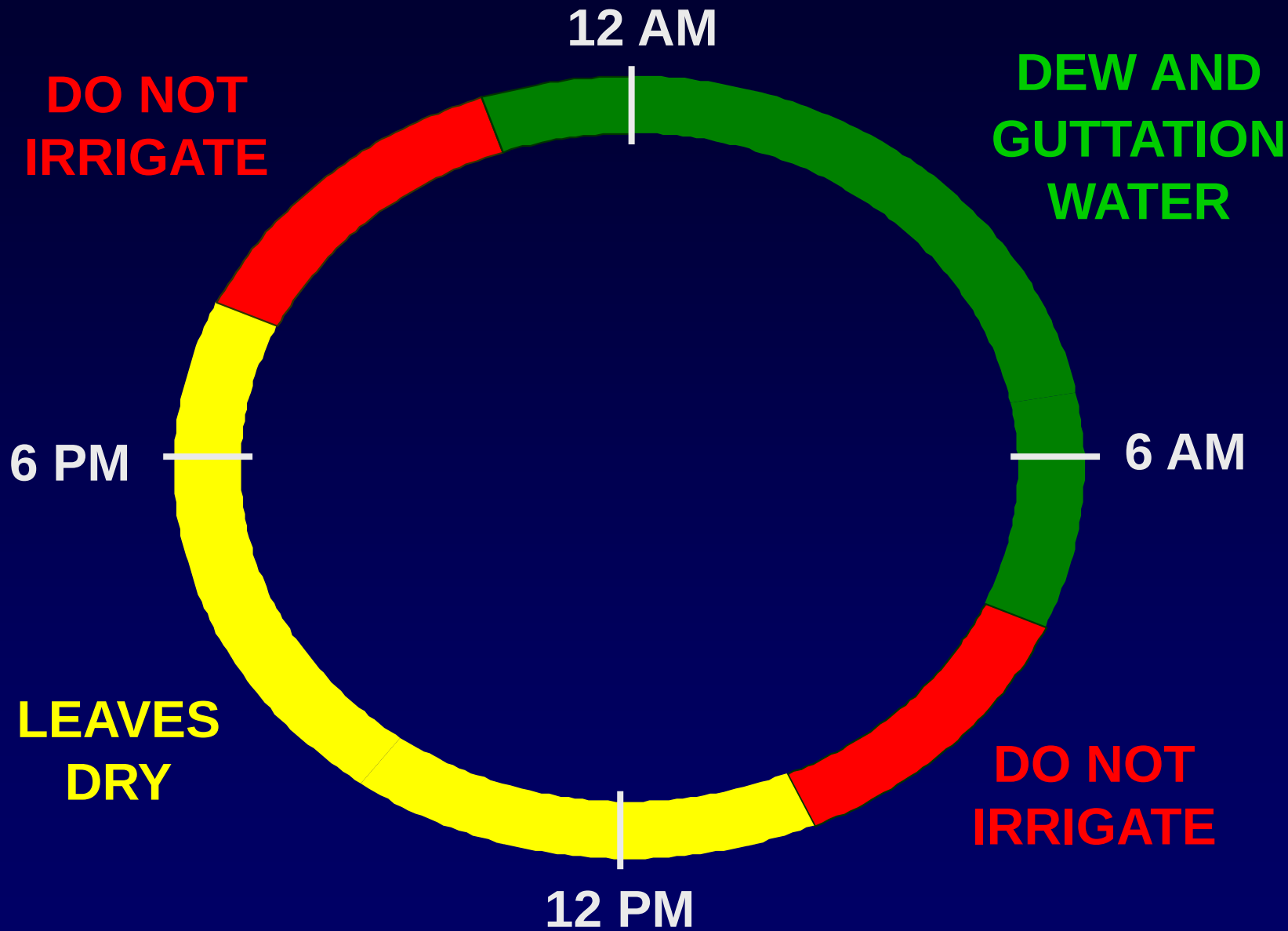
Dollar Spot

Conditions Favoring Disease :

- Overwinters as Sclerotia / Mycelium
- Resumes Growth at 59 °F
- Optimum Disease 70 – 84 °F
- High RH (> 85% Night)
- Thick Thatch (> 0.5 – 0.75 in.)
- Low Soil Moisture
- Extended Dew
- Low N Fertility

Best Management of Dollar Spot

- **Maintain balanced N,P,K fertility**
- **Maintain adequate N when dollar spot is active
(organic fertilizers and compost can reduce
disease severity / enhance microbes)**
- **Proper water management / Avoid drought
stress**
- **Limit leaf wetness / Do not irrigate toward dusk**
- **Remove trees to provide good air circulation**
- **Aerify to reduce compaction and thatch**



Management of Dollar Spot- continued

- Organic fertilizers and composts can reduce dollar spot but this is due more to increased N availability than to enhanced microbial activity in the soil
- Microbial products containing *Trichoderma harzianum* (Root Shield), *Bacillus licheniformis* (Ecoguard) can reduce dollar spot but often not to commercially acceptable levels alone; OMRI Listed
- Use new improved turfgrass cultivars whenever possible (www.turf.rutgers.edu; RU Turf Proc.)

Making a Compost Tea

www.dep.state.pa.us/dep/deputate/airwaste/wm/recycle/Tea/tea1.htm

Compost tea is made by soaking or steeping compost in water.

1. Keep aerated while steeping
2. Add molasses for food/primer (easily degraded carbon)
3. Other recipes add biostimulants, soluble nutrients, etc.
4. Should smell sweet and earthy, if foul do not use
5. Strain and use immediately

Compost tea is applied either as a foliar application (sprayed on the leaves) or applied to the soil

Biological Disease Control

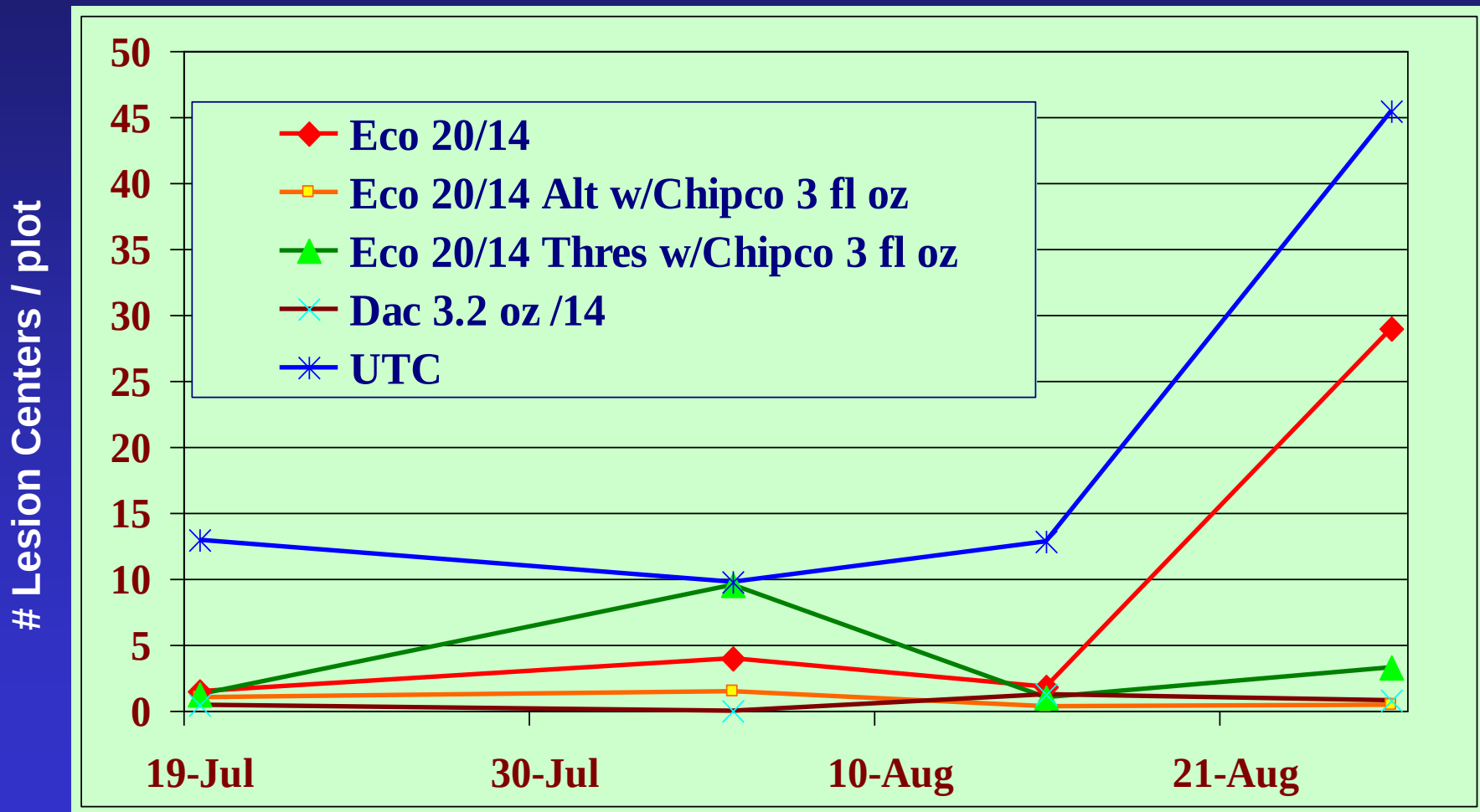
Considerable Research

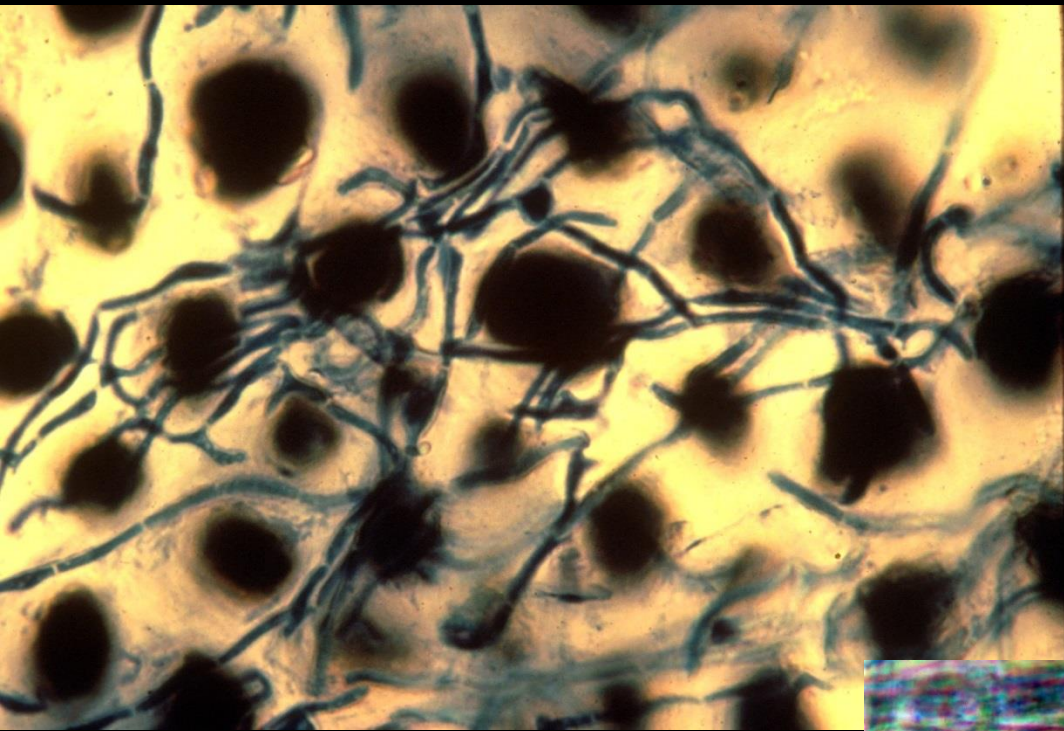
- Biological control agents (bacteria) such as *Pseudomonas aureofaciens* and *Bacillus licheniformis*
- Control acceptable at low to moderate disease pressure
- Control unacceptable at high disease pressure unless used daily – high costs
- These agents used in combo with synthetic fungicides could reduce fungicide use – but this is not organic

Commercial Organic Disease Control Products for Turf in USA

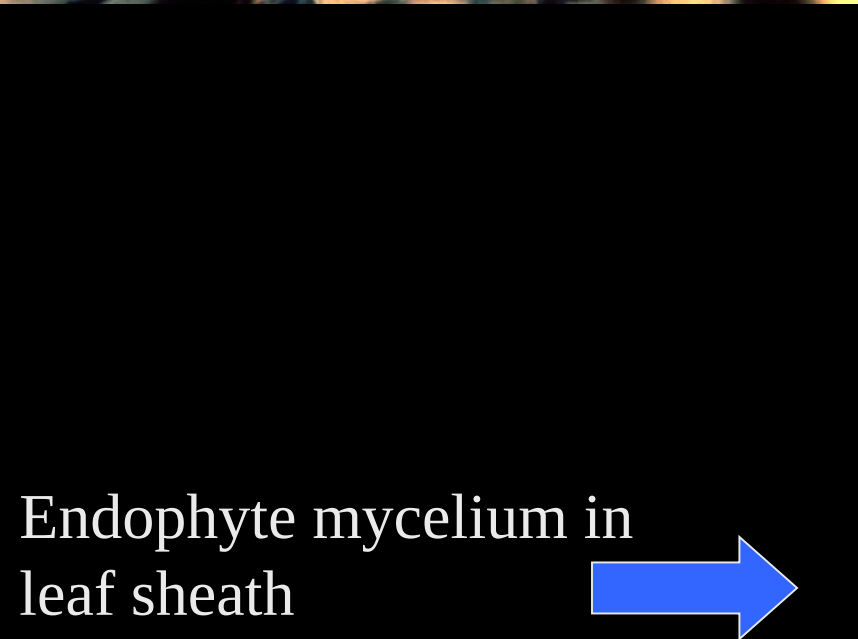
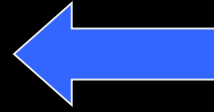
Organism	Trade Name	Status	OMRI Listed
<i>Trichoderma harzianum</i>	Turf Shield (BioTrek)	Registered 1996	Yes
<i>Gliocladium catenulatum</i>	Primastop	Registration Application 5/97	Yes
<i>Pseudomonas aureofaciens</i>	SpotLess	Registered 1999	No
<i>Streptomyces lydicus</i>	Actinovate	Registration Application 10/00	Yes
<i>Bacillus subtilis</i>	Companion Rhapsody	Registered 2003	Yes
<i>Bacillus licheniformis</i>	Ecoguard	Registered 2003	Yes
<i>Typhula phacorrhiza</i>	-----	Registered 2010	No

Efficacy of *Bacillus licheniformis* for the Control of Dollar Spot in Crenshaw Creeping Bentgrass

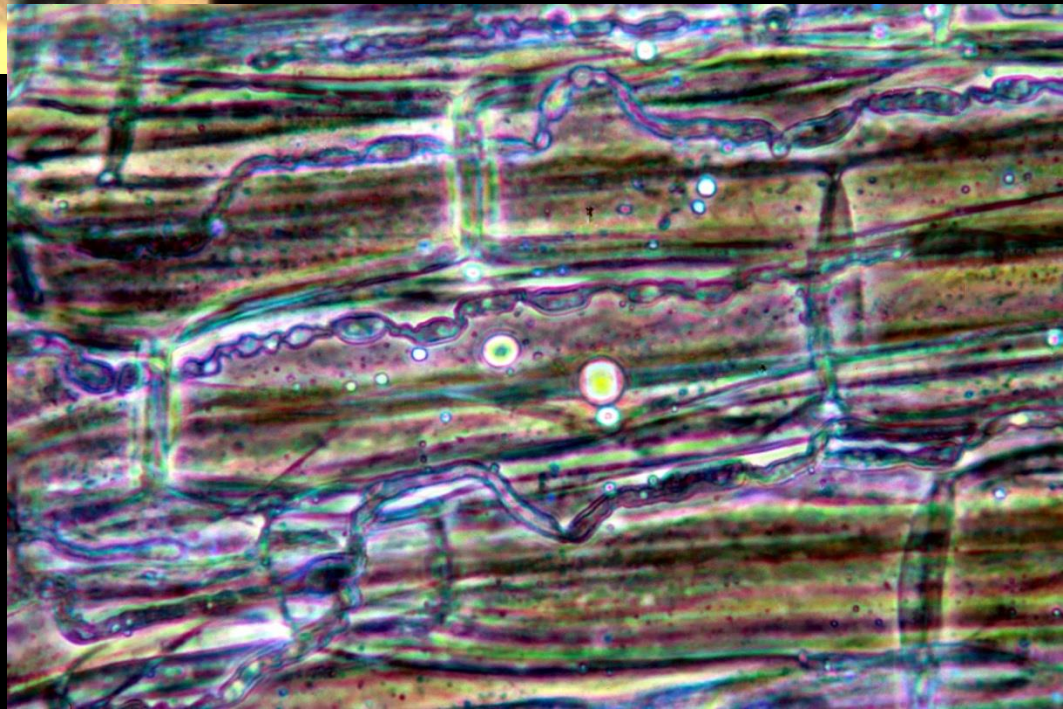




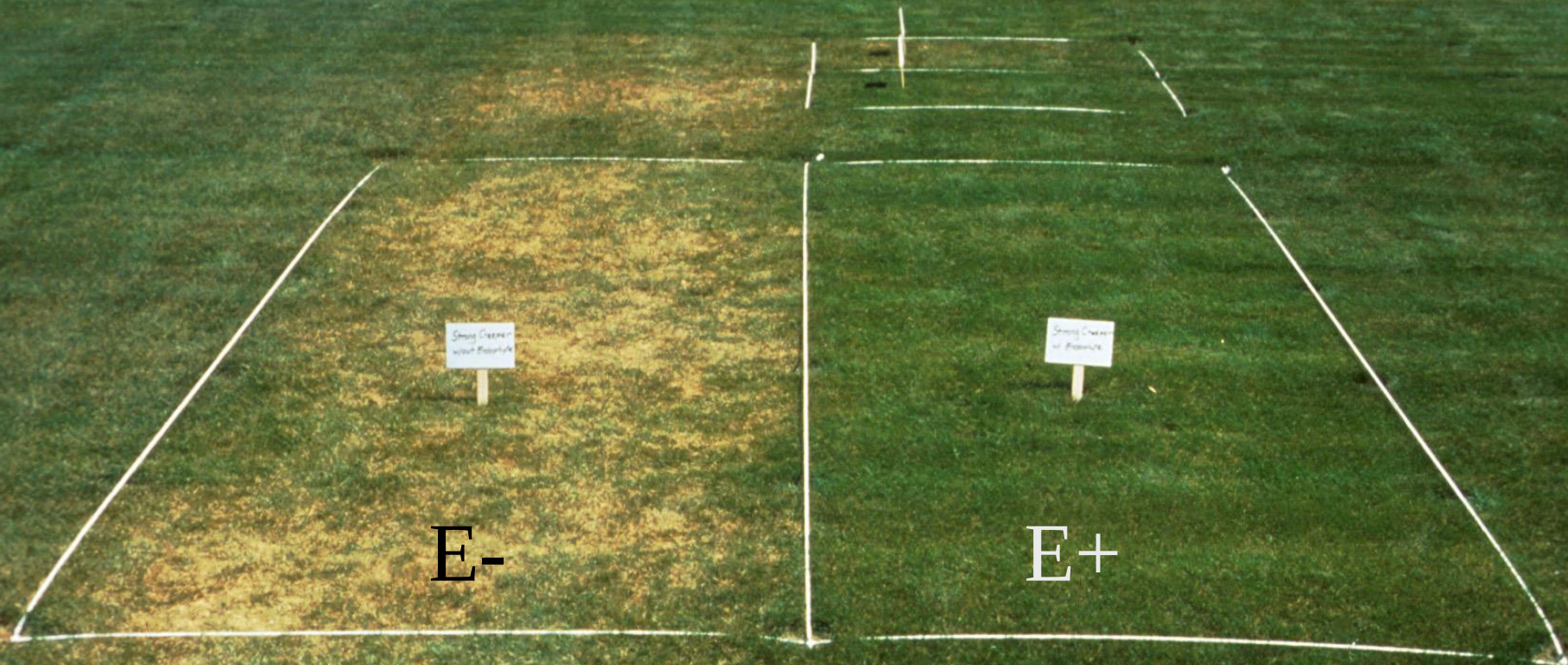
Endophyte mycelium in seed



Endophyte mycelium in
leaf sheath



Dollar spot on creeping red fescue



Dollar Spot Ratings taken 2013 on the 2010 Kentucky Bluegrass Test , Adelphia, NJ (www.Turf.Rutgers.edu).

Cultivar or selection	Dollar Spot 2013	Cultivar or selection	Dollar Spot 2013
1. Noble	8.3	42. Moonshine	7.3
4. Voyager II	8.3	43. Diva	7.3
6. Blue Note	8.0	46. Monte Carlo	7.3
12. A04-74	7.7	50. America	7.3
20. Moonlight	7.7	56. Solar Eclipse	7.0
23. Lakeshore	7.7		
25. Bedazzled	7.7		
27. Shamrock	7.7	318. Jump Start	2.3
28. Bewitched	7.3	322. Ulysses	2.3
41. Sonoma	7.3	333. SR 2109	1.3

LSD at 5% = 2.1

Summer Patch

Causal Organism :

Magnaporthiopsis poae

Magnaporthiopsis meyeri-festucaae

Susceptible Hosts :

Annual Bluegrass

Poa annua

Kentucky Bluegrass

Poa pretensis

Fine Fescue

Festuca spp.

Disease Calendar for Landscape Turf in New Jersey

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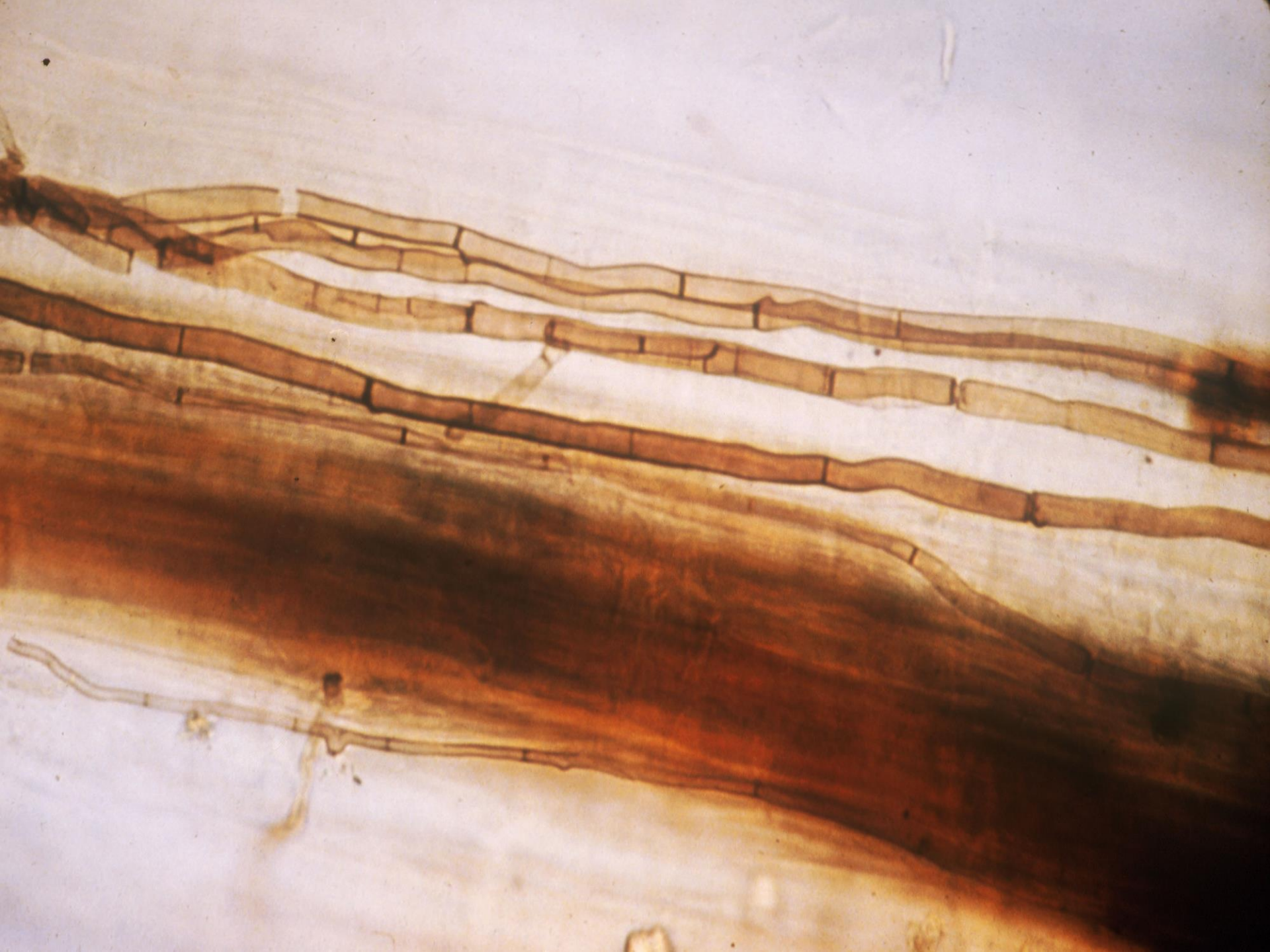
Disease	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Powdery mildew								High	High	High		
Pythium blight						High	High	High	High			
Red thread			High	High	High	High	High	High	High	High		
Rust							High	High	High	High		
Snow mold	High	High	High	High	High					High	High	High
Stripe smut					High					High		
Summer patch						High	High	High	High	High		

Characteristics of Fine Fescues (*Festuca* spp.)

Species	Lawn Mowing Height	Summer Patch Disease Tolerance	Dollar Spot Disease Tolerance
Hard Fescue	$> 2 \frac{1}{2}$	Poor	Good
Chewings Fescue	$\frac{1}{2} - 3$	Good	Fair
Strong Creeping Red Fescue	> 2	Good	Poor







Conditions Favoring Summer Patch Infection

- **Soil Temps $\geq$ 65 F @ 2 inch depth**
- **Excessive Soil Moisture**
- **Soil Compaction / Poor Drainage**
- **High Soil pH**

Conditions Favoring Symptom Expression

- Hot (> 80 F [27 C]), Humid Weather
- Excessive Soil Water (especially heavy rainfall followed by hot weather)
- Low Mowing Height
- Soil Compaction / Poor Drainage / High Soil pH

Impact of Cultural Practices on Summer Patch Development

- ◆ **Compaction**
- ◆ **Manganese deficiency**
- ◆ **Nitrogen fertility**
- ◆ **Soil and rhizosphere pH**



Manganese Treatments

Manganese

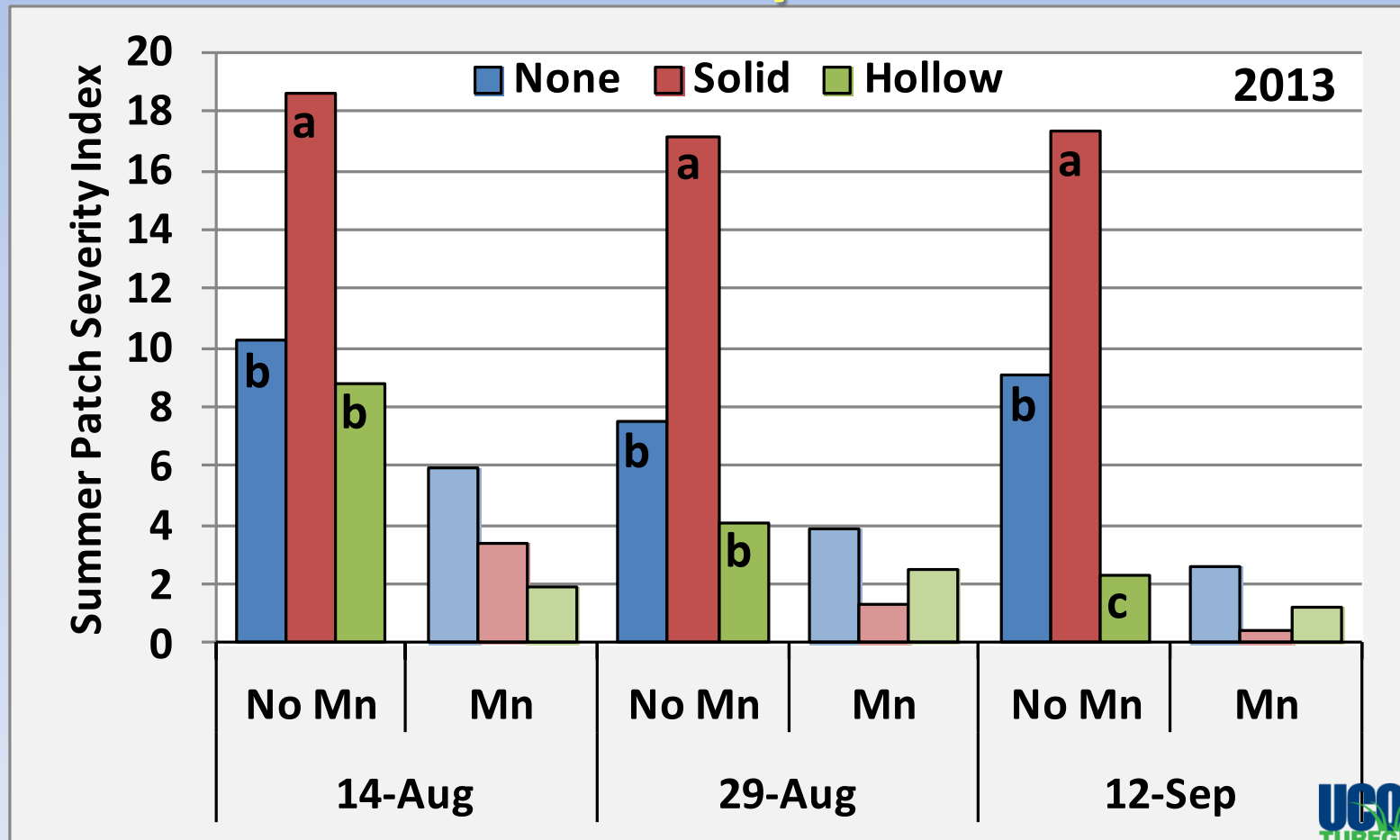
None

6 lbs Mn A⁻¹

- Applied as MnSO₄ in 1 gal 1000 ft⁻²
- Monthly applications May to Sept 2012-13
- Field irrigated before and after application

Summer Patch Affected by Cultivation and Manganese Fertility

--- Within Compaction ---



Sources of Nitrogen

- Urea
- Sulfur - Coated Urea
- Ammonium Sulfate
- Ammonium Chloride

Calcium Nitrate <

Potassium Nitrate <

Nutralene <

Nitroform <

NO
No N
FEEVER

A photograph of a grassy field with several irregular patches of bare, light-colored soil. A small, rectangular, light-colored label is placed in the center of the frame. The label contains the text "4 lb N/M Ca" on the first line and "NO₃" on the second line. The grass is green and appears to be a common lawn grass. The soil patches are scattered across the field, with one prominent patch in the upper right and another in the lower right.

4 lb N/M Ca
NO₃

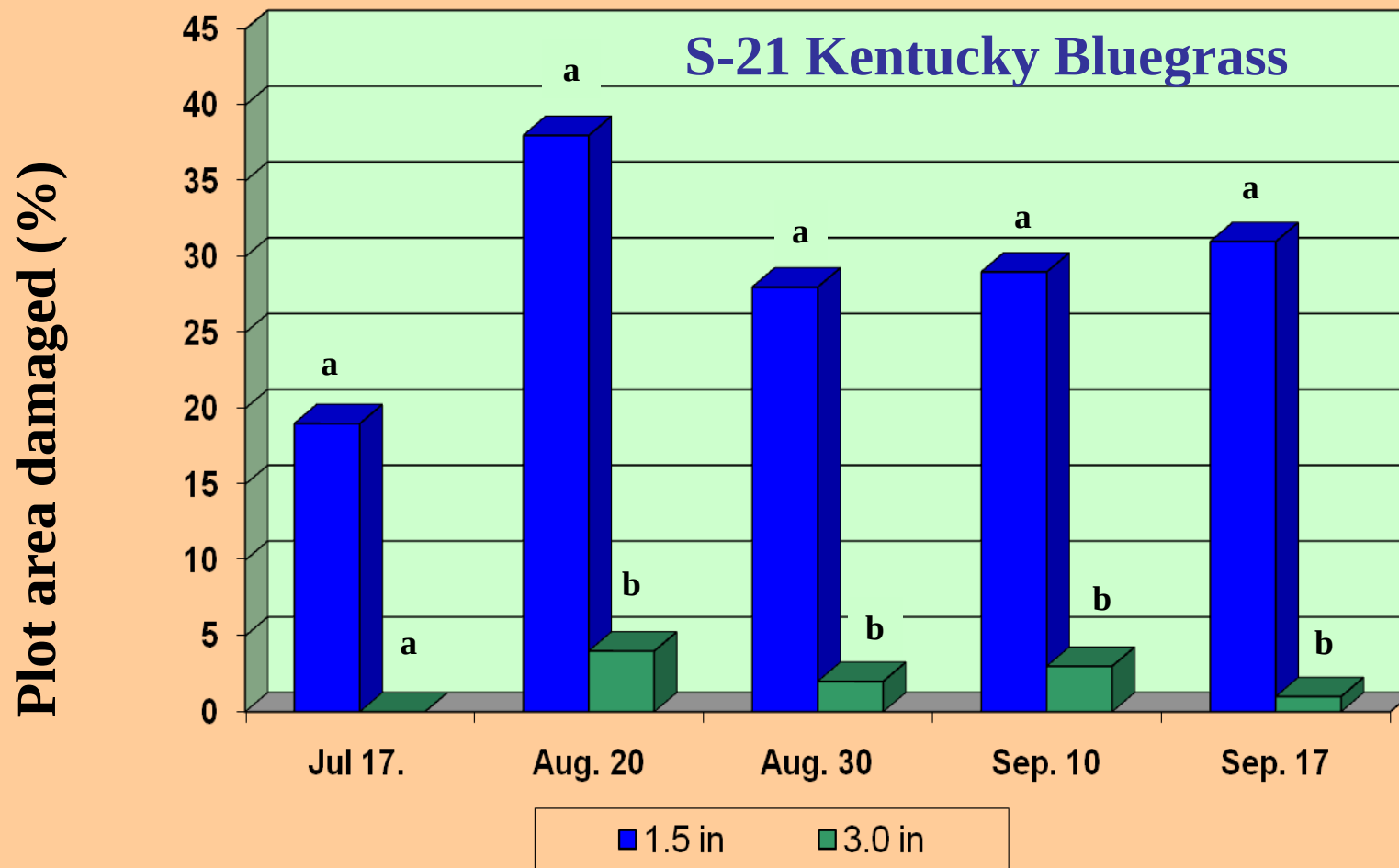
Thompson, et.
al., 1998

A photograph of a lush green lawn with a white identification tag in the center. The tag has two lines of text: "4 lb N/M" and "Am. Sulfate". The grass is dense and green, with some small patches of brown or dry grass visible. In the top right corner, there is a small pile of dry leaves or mulch.

4 lb N/M
Am. Sulfate

Thompson et. al, 199

Mowing Height on Summer Patch University of Maryland University

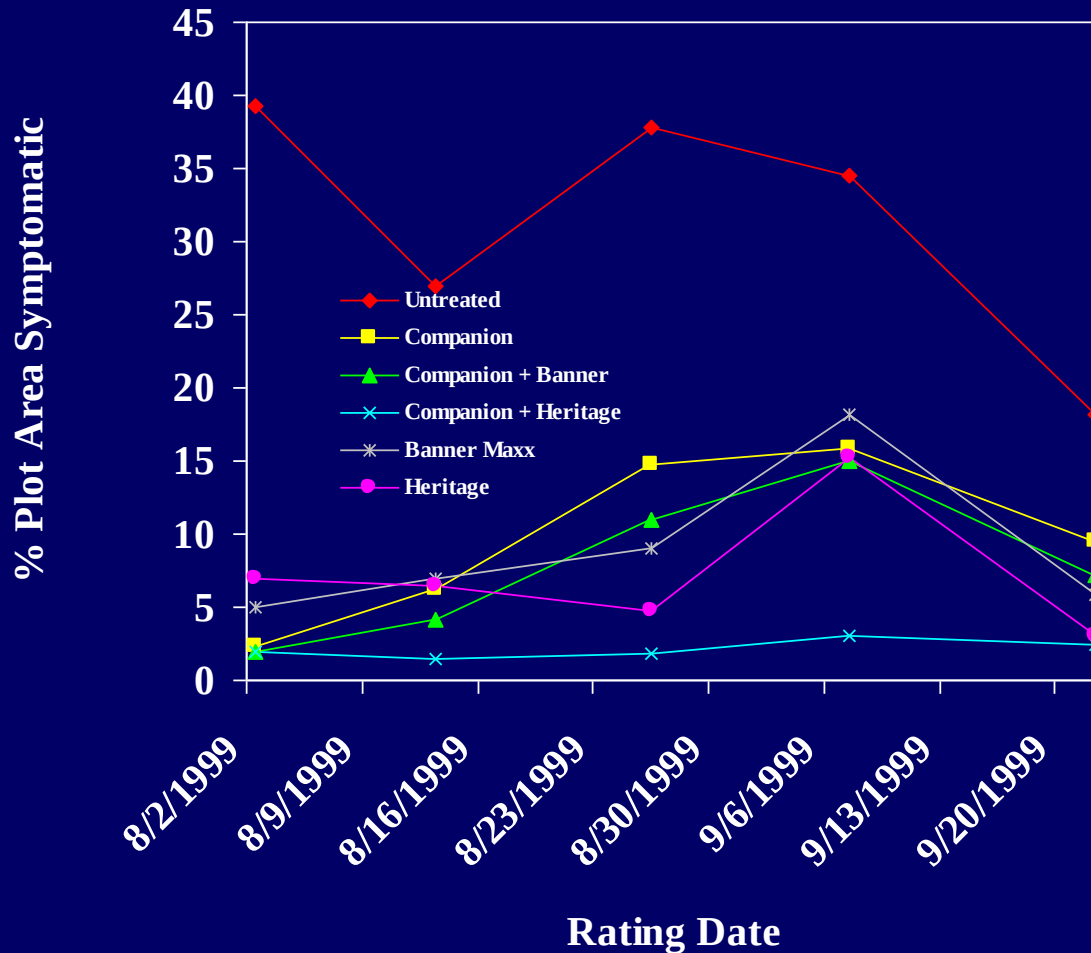


Means followed by the same letter for each date are not significantly different at $P=0.05$ level.

Summer Patch Management

- ◆ Aerify and Improve Drainage
- ◆ Raise Mowing Height during Heat Stress
- ◆ Overseed with Perennial Ryegrass, Tall Fescue, or Bentgrass
(www.turf.rutgers.edu)
- ◆ Fertilize with Acidifying N Sources,
Avoid N Sources that increase pH
- ◆ Maintain pH at or Below 6.0

Suppression of Summer Patch by the Commercial Biological Control Product, Companion



Majumdar et al., 2000

Gray Leaf Spot

- ♦ Causal agent: *Pyricularia grisea*
- ♦ Susceptible turfgrass species:
 - ♦ St. Augustinegrass
 - ♦ perennial ryegrass
 - ♦ annual ryegrass
 - ♦ tall fescue
 - ♦ kikuyugrass
 - ♦ **fine fescues (Sept 2018)**



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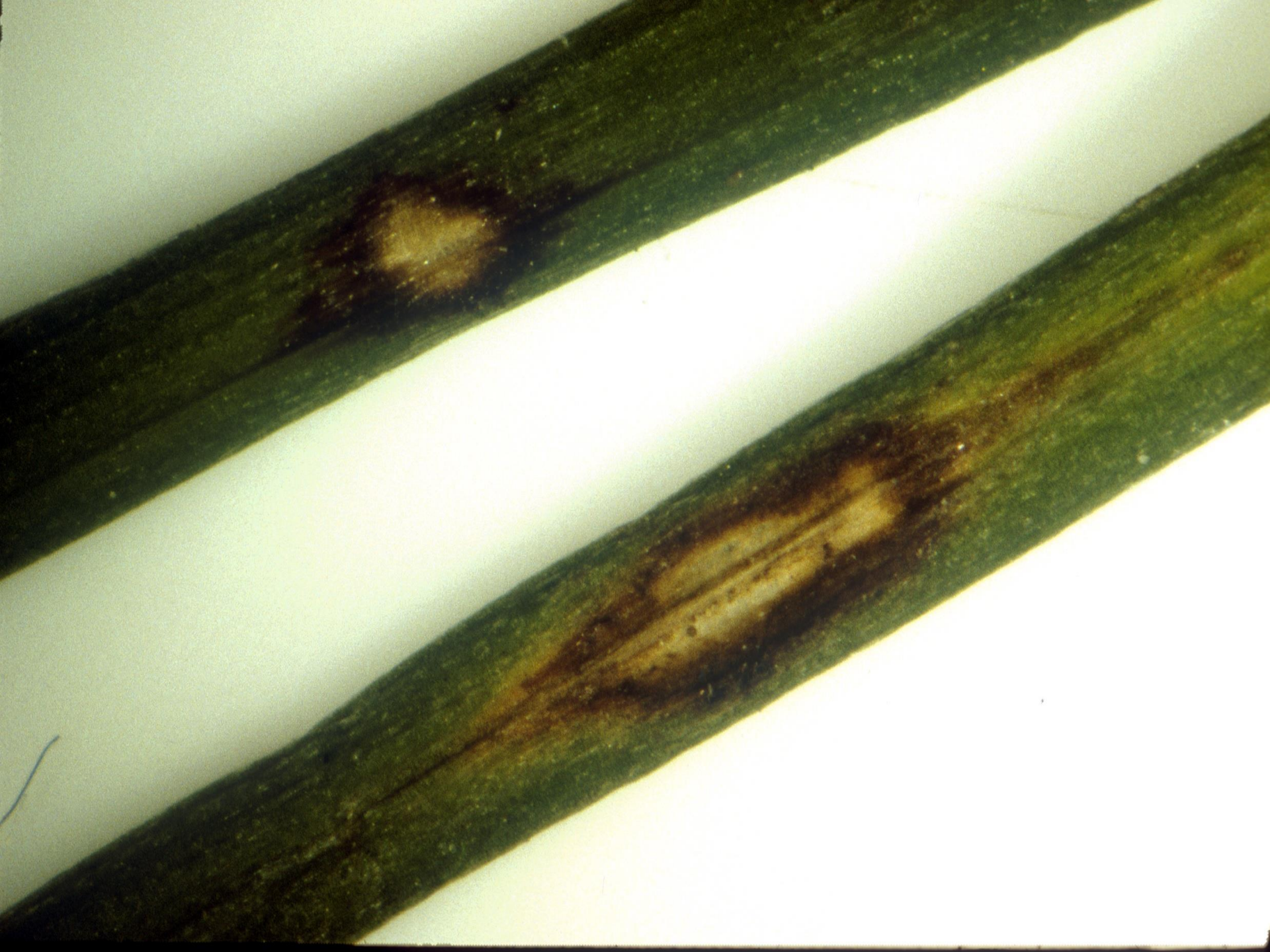
turf.rutgers.edu

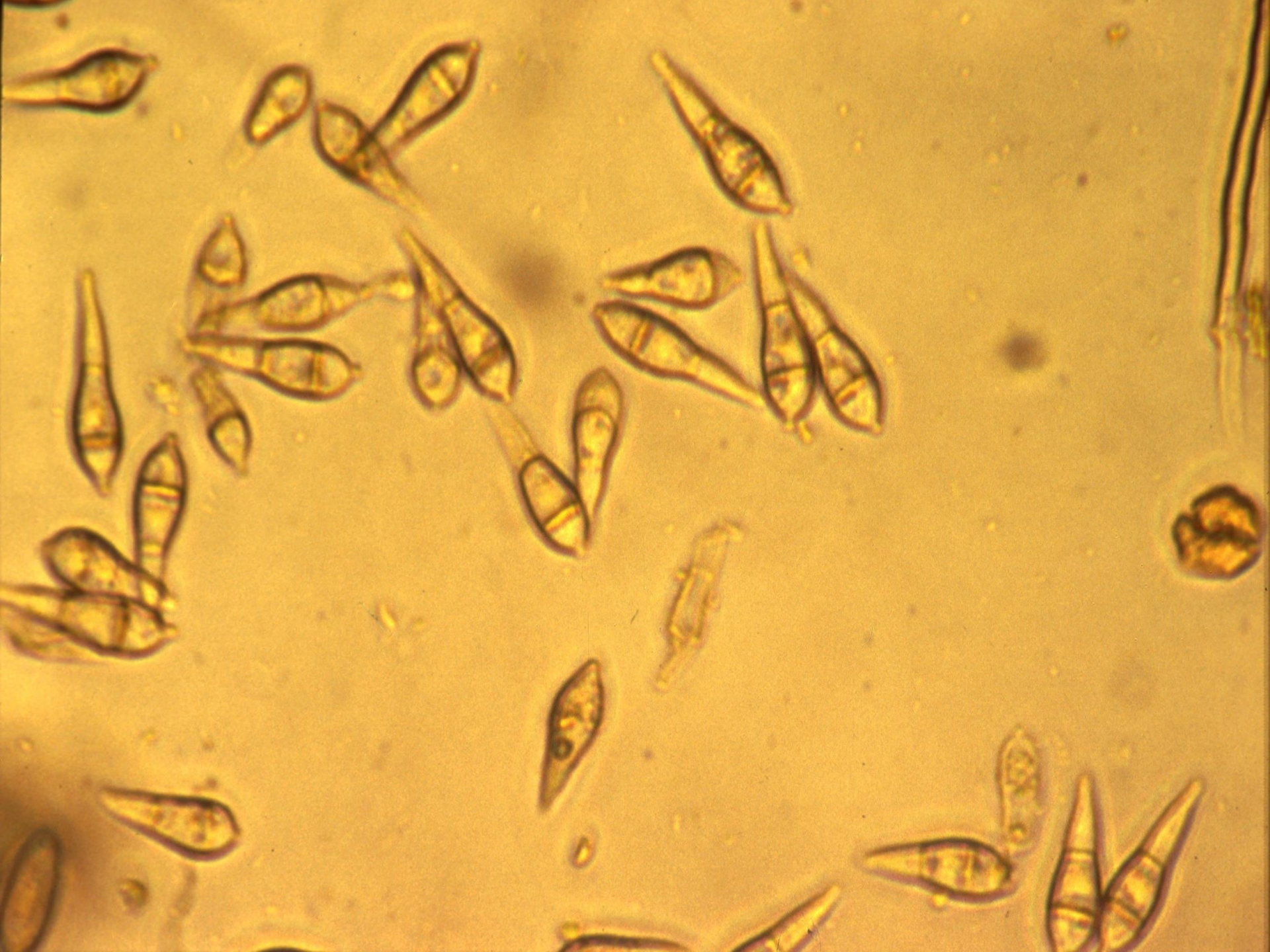
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Conditions Favoring Gray Leaf Spot

- ◆ 65° - 90 °F Day Temp
- ◆ Optimum when night temp > 65 °F Temp
- ◆ High Humidity, young turf (4-5 weeks)
- ◆ Prolonged Leaf Wetness (9-24 hrs)
- ◆ South-Facing Slopes without Shade
- ◆ High Cutting Ht , High Nitrogen

Gray Leaf Spot

Photo: Cynthia Williams



Spring seeded “Sun and Shade” mix

Gray Leaf Spot



Photo: Cynthia Williams

Dollar spot or brown patch-like thinning appears

Gray Leaf Spot



Photo: Cynthia Williams

Severe disease resulted in complete failure of the turf area

Management Practices Affect GLS

- ❖ Severity of GLS typically increases with increasing nitrogen (N) rate above 0.25 lb N 1000 ft²
- ❖ N source has been reported to affect GLS in PRG and TF
 - Quick release N sources can increase the severity of GLS
 - slow release N sources may not enhance disease
- ❖ GLS appears to be more severe @ lower pH (< 6.0)
Unlike summer patch, ammonium sulfate increases GLS, compared to calcium nitrate

Gray Leaf Spot Results

Cultivar Evaluations





'Ph D' Blend

'Paragon GLR'

Gray Leaf Spot Disease on Perennial Ryegrass



<http://njaes.rutgers.edu/pubs/publication.asp?pid=FS1048>



Gray Leaf Spot Tolerant Perennial Ryegrass Cultivars

Blend and Seed with Resistant Cultivars

- 1G2
- 1G2
- All*Star 3
- Apple GL
- Charismatic II GLR
- Dart
- Derby Xtreme
- DP-1
- Exacta II GLSR
- Fiesta \$
- GL-2
- Harrier
- Manhattan 5 GLR
- Palace
- Palmer IV
- Palmer V
- Panther GLS
- Paragon GLR
- Prelude GLS
- Primary
- Protégé GLR
- Regal 5
- Repell GLS
- Revenge GLX
- Secretariat II GLSR
- SR 4600
- Stellar GL

1st Report of Gray Leaf Spot on Fine Fescue New Brunswick, NJ: Sept 2018



Modifying Cultural Practices can Minimize Gray Leaf Spot in Perennial Ryegrass

- ❖ Limit N to 0.1 to 0.25 lb nitrogen / 1000 sq ft July-Sept
- ❖ Avoid Quick release N sources $\geq$ 0.25 lb N/1,000 sq ft
- ❖ Don't irrigate as dusk approaches.
- ❖ Maintain a standard mowing height in fairways.
- ❖ Remove clippings.
- ❖ Delay seeding until mid- to late – September
- ❖ Maintain soil pH ($\geq$ 6.0)



Thank you for listening!