Managing Dollar Spot on Golf Courses with Good Cultural and Chemical Practices

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Dollar Spot
Dollar Spot

Pathogen: *Sclerotinia homoeocarpa*

*(Rutstroemia spp. or Poculum spp.)*

Grasses Affected: Annual Bluegrass, Bahiagrass, Bentgrass, Bermudagrass, Centipede grass, Fine-leaved Fescue, Kentucky Bluegrass, Ryegrasses, Tall Fescue, Zoysia grass
Dollar Spot

Conditions Favoring Disease:

- Overwinters as Sclerotia / Mycelium
- Resumes Growth at 15 °C
- Optimum Disease 21 – 29 °C
- High RH (> 85% Night)
- Thick Thatch (> 1.3 – 1.9 cm)
- Low Soil Moisture
- Extended Dew
- Low N Fertility
Cultural Management of Dollar Spot

- Maintain balanced N,P,K fertility
- Maintain adequate N when dollar spot is active
- Light, frequent N applications
- Avoid drought stress
- Do not irrigate toward dusk
- Remove dew by mowing, poling, or rolling
- Remove trees to provide good air circulation
- Aerify to reduce compaction and thatch
Dragging fairways

Image courtesy Keith Happ
Dollar Spot Suppression Agrostis stolonifera Green
Clarke, et. al. - Rutgers University - 2005

Denotes significant differences between treated and untreated turf
DewCure (prevents due formation) applied 14 d intervals
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 (Dernoeden, 2003)

- Some biocontrol agents have been shown to reduce dollar spot in the field (Enterobacter cloacae and Bacillus subtilis)

- Microbial products containing Trichoderma harzianum (Root Shield), Bacillus licheniformis (Ecoguard), and Pseudomonas aureofaciens strain TX-1 can reduce dollar spot but often not to commercially acceptable levels alone

- Use new improved bentgrass cultivars whenever possible
<table>
<thead>
<tr>
<th>Bentgrass Cultivar Classification of Dollar Spot Resistance*</th>
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<tbody>
<tr>
<td><strong>Most Tolerant</strong></td>
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<tr>
<td>007</td>
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<tr>
<td>1-3M</td>
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<tr>
<td>Benchmark DSR</td>
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<td>Declaration</td>
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<td>Kingpin</td>
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<td>Pennlinks II</td>
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<td>Memorial</td>
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*Table developed from data from NTEP and bentgrass trials at Rutgers University
Chemical Control of Dollar Spot

I. Benzimidazoles
   - Senator WSP

II. Demethylation Inhibitors
   (Sterol Inhibitors)
   - Banner MAXX, Eagle, Premis, Triton

III. Dicarboximides
   - Rovral GT

IV. Nitriles
   - Daconil Flowable, Daconil Ultrex

V. Carboximides
   - Cadence

VI. QoI (strobilurins)
   - Insignia
Control of Dollar Spot on Agrostis stolonifera Green: University of Kentucky 2001

Myclobutanil 0.73 kg ai/ha
Boscalid 0.28 kg ai/ha
Boscalid 0.38 kg ai/ha (28 d)
Pyraclostrobin 0.3 kg ai/ha
Trifloxystrobin 0.23 kg ai/ha
Untreated Control

DAT 14
DAT 7
Control Dollar Spot Control on Agrostis stolonifera Fairway – Rutgers 2007

Applied 23 May – 25 July (21 d)
and 23 May - 1 Aug (14 d)

Rated on 23 August
14 day = 22 DAT
21 day = 29 DAT
Improving Fungicide Performance

Predictive Models

Water Volume / Dew Removal

Dollar Spot

Water pH / Wash-Off

Nozzle Selection
How Does Water Volume and Dew Removal Affect Fungicide Efficacy?
Effect of Dew Removal on Fungicide Effectiveness for control of Dollar Spot

- Contact fungicide (e.g., chlorothalonil @ 4.5 kg ai/ha) provided better dollar spot control when dew was removed in the morning.
- Dew prevents contact fungicides from spreading over the leaf to provide complete protection. (McDonald and Dernoeden, 2007)
Effect of Dew Removal on Fungicide Effectiveness for Control of Dollar Spot

- Propiconazole (0.23 kg ai/ha)
- Dew had **no effect on the efficacy of this penetrant fungicide**
- 21 days after last treatment. (Agrostis green)
For contacts, use 407-814 L water/ha was optimum for dollar spot control.

Under very severe dollar spot, use maximum fungicide rates and 814 L water/ha.

Remove dew to improve the performance of contact fungicides (e.g., chlorothalonil), but not DMI fungicides (e.g., propiconazole).

The tank mixture of contact (chlorothalonil) and penetrant (propiconazole) provided better disease control than either applied alone under high disease severity.
What Impact does Nozzle Selection have on Fungicide Efficacy?
Nozzle Types

XR and XRC TeeJet
TwinJet
Turbo TeeJet
TurfJet
Al TeeJet (Air Induction)
Turbo TwinJet
Raindrop

Flat Fan" Spray Pattern
Hollow Cone" Spray Pattern
Nozzle Coverage

Water sensitive paper – turns blue when it makes contact with water

Raindrop

TurfJet

XR nozzle

Air-induction

50 GPA = 1.15 gallons per 1000 sq. ft.
Drift Control

Excellent

- Raindrop
- TurfJet
- Air-induction
- Turbo TeeJet
- XR nozzle

Poor
AI/AIC TeeJet Nozzles

- Advantages
  - Good coverage
  - Uses Venturi-air technology
  - Drift control
    - Even at very high pressure
  - Works best at >40psi
  - Canopy penetration
- Disadvantages
  - Not useable at low pressures (<30 psi)
  - Wear tolerance
Air-induction

Spray Solution

Air

Spray Solution
What Impact does Water Volume and Nozzle Type have on Fungicide Efficacy?
Impact of Water Volume and Nozzle Type on Dollar Spot Control - 2005

204 L water/ha (chlorothalonil@ 4.3 kg ai/ ha)

Number of lesion Centers

<table>
<thead>
<tr>
<th>Nozzle Type</th>
<th>Al</th>
<th>Turbo</th>
<th>XR</th>
<th>Rain D</th>
<th>Untr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
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Fidanza: Research Conducted for Rutgers Field Day - 2005
Impact of Water Volume and Nozzle Type on Dollar Spot Control - 2005

407 L water/ha (chlorothalonil@ 4.3 kg ai/ ha)

Number of lesion Centers

Nozzle Type

Research Conducted for Rutgers Field Day
Impact of Water Volume and Nozzle Type on Dollar Spot Control - 2005

814 L water/ha (chlorothalonil@ 4.3 kg ai/ ha)

Number of lesion Centers

Nozzle Type

Fidanza: Research Conducted for Rutgers Field Day - 2005
Impact of Simulated Rainfall
Dollar Spot Control: Rutgers 2009

- Five Fungicide Treatments
  - Chlorothalonil (4.5 kg ai/ha)
  - Iprodione (2.3 kg ai/ha)
  - Triticonazole (0.61 kg ai/ha)

- Half inch rainfall treatments were applied
  - Immediately following application (1.3 cm irrigation within 5 minutes)
  - Four hours after application
  - 24 hours after application
  - None
EFFECT OF SIMULATED RAINFALL ON DOLLAR SPOT CONTROL WITH IPRODIONE 2.3 kg ai/ha

NO WATER immediately following
EFFECT OF SIMULATED RAINFALL ON DOLLAR SPOT CONTROL WITH IPRODIONE 2.3 kg ai/ha

1.3 cm water after 4 hours
Summary

- All fungicide treatments reduced dollar spot when compared to untreated.
- All fungicides were impacted by simulated rainfall.
- Chlorothalonil (contact fungicide) was most affected by rainfall immediately following application.
- Iprodione (localized penetrant) appeared to be the best treatment when irrigation was applied 4 hours after treatment.
What Impact of Water pH on Fungicide Efficacy?
What is the Impact of pH on the Control of $-Spot$?

- Most pesticides stable at pH 4 to 6
- Some fungicides “decompose” pH > 7.
  - alkaline hydrolysis
  - loss of pesticide efficacy
  - examples:
    - Polyoxin D (Endorse) fungicide
    - Thiophanate methyl (Cleary’s 3336)

- Refer to product MSDS sheet for pH stability information
Impact of Water pH on Dollar Spot Control with Cleary 3336 50W @ 2 oz/M - 2007

Dollar Spot (♯ Infection Centers)

Water Carrier pH

Rutgers, bentgrass green, July 19, 2007.
Impact of Water pH on Dollar Spot Control with chlorothalonil@ 4.3 kg ai/ha - 2006

Water Carrier pH

Dollar Spot (# Infection Centers)

Bellewood GC, Agrostis fairway, July 11, 2006  Fidanza (PSU)
Impact of Water pH on Dollar Spot Control with propiconazole @ 0.23 kg ai/ha - 2006

Dollar Spot (# Infection Centers)

Water Carrier pH

Bellewood GC, bentgrass fairway, July 11, 2006  Fidanza (PSU)
And Last but not Least,

Should You Rethink the Timing of Your Fungicide Program for the Control of Dollar Spot on Fairways?
Photo July 7, 2004
Dr. Mike Boehm,
Ohio State Univ

#5 Fairway– No early spring applications
Photo July 7, 2004

Dr. Mike Boehm,
Ohio State Univ

#5 Fairway – with one early spring application

<table>
<thead>
<tr>
<th>Treatment and rate / 1000 sq ft</th>
<th>6 June</th>
<th>20 June</th>
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<tbody>
<tr>
<td>Curalan 50EG 1.0 oz</td>
<td>1 a</td>
<td>10 a</td>
</tr>
<tr>
<td>Banner MAXX 1.3ME 1.0 fl oz</td>
<td>6 ab</td>
<td>14 a</td>
</tr>
<tr>
<td>Emerald 70 WG 0.13 oz</td>
<td>9 a-c</td>
<td>19 a</td>
</tr>
<tr>
<td>Bayleton 2SC 1.0 fl oz</td>
<td>11 a-c</td>
<td>19 a</td>
</tr>
<tr>
<td>Chipco 26GT 2SC 2.0 fl oz</td>
<td>18 b-d</td>
<td>30 ab</td>
</tr>
<tr>
<td>Daconil Ultrex 82.5WDG 1.8 oz</td>
<td>33 c-e</td>
<td>54 b</td>
</tr>
<tr>
<td>Insignia 20WG 0.5 oz</td>
<td>46 de</td>
<td>56 b</td>
</tr>
<tr>
<td>Untreated Check</td>
<td>89 f</td>
<td>87 c</td>
</tr>
</tbody>
</table>

1 Treatments were applied on 13 April, 2006. (6 June = 7.7 WAT; 20 June = 9.7 WAT)
Delaying the Initial Outbreak and Severity of Dollar Spot on Fairways with an Early Spring Application of Fungicides?

- **One Early Spring Application** - with an effective dollar spot fungicide or a tank mixture of two good dollar spot fungicides after the “Second True Mowing” of the season
I hope that you Enjoyed this Seminar –
Are There any Questions?

Rutgers Turfgrass Research Field Days: (turf.rutgers.edu)
- July 26, 2011 (Golf Research – New Brunswick, NJ)
- July 27, 2011 (Landscape Turf Res. – Adelphia, NJ)