**Rapid blight disease**

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**What is rapid blight?**

- “Rapid blight” disease symptoms often appear quickly and disease increases rapidly
- It has been observed on over 100 golf courses in 11 states and in the United Kingdom
- Disease is most problematic on several cool season turfgrasses including *Poa trivialis*, *Lolium perenne*, *Poa annua*, and *Agrostis* sp.

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**Symptoms of disease**

Symptoms of disease are an initial water-soaked appearance and rapid collapse of small patches; patches soon coalesce to form large dead areas

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**Advanced symptoms of rapid blight**

Turf starts to die in patches with varying patterns – circular, in high traffic areas or in mow patterns

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**Causal organism of rapid blight – Labyrinthula terrestris**

Distinctive spindle-shaped vegetative cells of *Labyrinthula* are consistently observed in tissue of symptomatic plants

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**Causal organism of rapid blight**

- forms colonial networks
- one nucleus per cell observed in all cultures
- cells divide by fission

![Dividing cell](image)
**Causal organism of rapid blight**

*Labyrinthula terrestris* is the first known species of *Labyrinthula* to be a pathogen of a terrestrial plant

- it is very unusual and exhibits gliding motility within a network of filaments

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**How is rapid blight controlled?**

- Tolerant varieties of turfgrasses
- Cultural practices
- Reduce salinity of irrigation water
- Chemical fungicides

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**How is rapid blight controlled?**

**Chemical applications for control of rapid blight**

- Fungicide trials under “normal” disease pressure alone and often better in combination:
  - mancozeb
  - pyraclostrobin (Insignia)
  - trifloxystrobin (Compass)

- Other fungicides do not have efficacy:
  - chlorothalonil (Daconil Zn)
  - azoxystrobin (Heritage TL)
  - chemicals used for control of oomycetes (*Pythium*) such as metalaxyl-M (Subdue)

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**2003-2004 fungicide trial – selected results**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Rating (1 = highest disease, 9 = no disease)</th>
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<tbody>
<tr>
<td>Compass 0.2 oz mix with Fore 6.0 oz</td>
<td>8.6</td>
</tr>
<tr>
<td>Insignia 0.9 oz</td>
<td>8.3</td>
</tr>
<tr>
<td>Insignia 0.5 mix with Fore 6.0 oz</td>
<td>8.4</td>
</tr>
<tr>
<td>Insignia 0.5 alternate with Fore 6.0 oz</td>
<td>8.3</td>
</tr>
<tr>
<td>Fore 8.0 oz</td>
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<td>Insignia 0.5 oz</td>
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</tr>
<tr>
<td>Control untreated</td>
<td>3.9</td>
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</table>

[http://cals.arizona.edu/pubs/crops/az1359/contents.html](http://cals.arizona.edu/pubs/crops/az1359/contents.html)

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**Situation for trials in 2005-06**

- Tifway 419 overseeded with Poa trivialis “Laser” on October 25
- First mow Nov 5
- Irrigation water at 4.0 dS/m (over 2400 TDS)
- Rapid blight history
- Disease observed the first week of December
2003-2004 fungicide trial – selected results

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2003-04 fungicide trial – other observations

- other products also had some efficacy
  - Bordeaux mixture
  - copper hydroxides
- Longer lasting protection with Insignia and Insignia combined with Fore

Results lead to a program approach in 2005 to determine length of efficacy and possibility of reduced applications

2005-06 fungicides trials – reduced application strategies

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Strategy</th>
<th>Rating Jan 13, 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insignia 0.9 oz (Nov 4, Nov 30)</td>
<td>extended interval preventive</td>
<td>7.7 a</td>
</tr>
<tr>
<td>Insignia 0.9 oz (Nov 4, Nov 23)</td>
<td>early preventive then curative</td>
<td>7.1 ab</td>
</tr>
<tr>
<td>Insignia 0.5 + Fore (Nov 4, Nov 30)</td>
<td>extended interval preventive, tank mix</td>
<td>6.3 ab</td>
</tr>
<tr>
<td>Insignia 0.9 + Fore 6 oz (Nov 10, Nov 23)</td>
<td>curative, tank mix</td>
<td>5.6 bc</td>
</tr>
<tr>
<td>Fore 6 oz (Nov 4, Dec 14), Insignia 0.5 oz (Nov 16, Dec 28)</td>
<td>extended preventive, alternate</td>
<td>4.7 c</td>
</tr>
<tr>
<td>NT control</td>
<td>no treatment</td>
<td>1.4 d</td>
</tr>
</tbody>
</table>

Why no 2004 fungicide trial results? RAIN

- rapid blight is salinity driven
  - rain events and irrigation with low salinity water can reduce or eliminate disease
  - lab results indicate that as salinity increases, the severity of disease increases
  - lab results show that plants stressed with a non-ionic osmotic agent (PEG) at the same degree as with an ionic osmotic agent (NaCl) do not become infected

Situation for trials in 2005-06

- Tifway 419 overseeded with Poa trivialis “Laser” on October 20
- First mow Nov 3
- Irrigation water at >5.0 dS/m (over 3200 TDS)
- Rapid blight history
- Disease observed at first mow on some parts of the golf course
Results of salinity trials in the laboratory

0.5 dS/m

1.4 dS/m

4.0 dS/m

all plants were infected, plants irrigated with 0.5 dS/m water were not symptomatic

Effects of PEG and NaCl induced stress and disease development

The role of salt stress (ionic or osmotic stress) and stress from water depletion (non-ionic stress) was studied using small hydroponic systems in the lab

- in replicated trials, all plants growing in solution adjusted with NaCl were infected within 7 days and dying within 10 days
- no inoculated plants in the PEG (polyethylene glycol) solution were infected
- plants growing in KCl had very low or no infection

Small hydroponic system for effects of solutions on infection by L. terrestris

PEG (non-ionic stress) and KCl (ionic stress at same osmotic stress as PEG) – no symptoms

NaCl (ionic stress at same osmotic stress as PEG and KCl) – symptoms within 7 days

Isolation of L. terrestris from Bermudagrasses

<table>
<thead>
<tr>
<th>Site</th>
<th>Variety of Bermudagrass/ winter over-seed</th>
<th>Previous record of rapid blight</th>
<th>% roots positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>practice green</td>
<td>MS Supreme/ Poa trivialis Laser</td>
<td>yes</td>
<td>17</td>
</tr>
<tr>
<td>driving range</td>
<td>Tifway 419/ None</td>
<td>NA</td>
<td>10</td>
</tr>
<tr>
<td>not over-seeded</td>
<td>Tifway 419/ Lolium perenne Brightstar SLT</td>
<td>yes</td>
<td>42</td>
</tr>
<tr>
<td>fairway</td>
<td>Tifway 419/ Lolium perenne Brightstar SLT</td>
<td>no</td>
<td>10</td>
</tr>
<tr>
<td>green</td>
<td>Champion Dwarf/ Poa trivialis Laser</td>
<td>yes</td>
<td>7</td>
</tr>
<tr>
<td>practice green</td>
<td>Champion Dwarf/ Poa trivialis Laser</td>
<td>no</td>
<td>5</td>
</tr>
</tbody>
</table>

Other hosts for L. terrestris

- We do not know where L. terrestris originated
  - has it been here and not detected or misdiagnosed?
- L. terrestris is associated with many different grasses (also infects rice, barley, wheat in lab trials)
  - we have shown in the lab and from field isolations that Bermudagrass is a good host

http://cals.arizona.edu/pubs/crops/az1359/az13593d3.pdf
http://cals.arizona.edu/pubs/crops/az1359/az13593d4.pdf

Can we control rapid blight by treating Bermudagrass during the summer or before overseeding?

Applications to Bermudagrass about 2 months before over-seeding (per 1000 ft²)
- “Disper-Sul” sulfur at 10 lb and 20 lb actual S
- mancozeb at 6 oz every two weeks
- organics to reduce salinity
- gypsum, one application 100 lb
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<td>7.7 a</td>
</tr>
<tr>
<td></td>
<td>preventive</td>
<td></td>
</tr>
<tr>
<td>Disper-Sul 20 lb S (Aug 4)</td>
<td>preventive on</td>
<td>7.3 ab</td>
</tr>
<tr>
<td></td>
<td>Bermudagrass</td>
<td></td>
</tr>
<tr>
<td>Fore 6 oz (from Aug 4 every 2</td>
<td>on Bermuda and</td>
<td>4.3 c</td>
</tr>
<tr>
<td>weeks)</td>
<td>overseed, every 14 days</td>
<td></td>
</tr>
<tr>
<td>*Disper-Sul 10 lb S (Aug 4)</td>
<td>preventive on</td>
<td>4.0 c</td>
</tr>
<tr>
<td></td>
<td>Bermudagrass</td>
<td></td>
</tr>
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<td>NT control = gypsum 1x</td>
<td></td>
<td>1.4 d</td>
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*shorter term control significantly better, rating Nov 16 was 7.1-9

### Continued research
- Determine role of specific salts in growth of *Labyrinthula terrestris*
- Determine the distribution in symptomless grasses
- Increase options for control measure
  - target effective cultural practices
  - make sure the fungicides can do their job
- Treatments of Bermudagrass before overseed

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*Labyrinthula terrestris*

perennial rye

? KCl

NaCl

Irrigated with KCl 4.0 dS/m

Irrigated with NaCl 4.0 dS/m

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sulfur on Bermuda

NT control fungicide