Fairy Ring Prevention and Management in Golf Course Putting Greens

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Symptoms Induced by Fairy Ring Fungi

- **Type I**
  - **kills grass or badly damages it**
- **Type II**
  - **rings of dark green or quickly growing turf**
- **Type III**
  - **mushrooms produced in a ring pattern**

Fairy ring fungi do not infect turf, they grow on thatch and soil.

Type II fairy ring symptom

Initial Type I fairy ring symptoms

Type I fairy ring symptom

Type III fairy ring symptoms

Type I fairy ring symptoms

Type I fairy ring symptoms

Agaricus arvensis

Agaricus campestris

Agrocybe pediades

Bovista dermoxantha

Bovista plumbea

Calocybe carnea

Calvatia cyathiformis

Camarophyllus pratensis

Campanella subdendrophora

Chlorophyllum molybdites

Clarulinopsis corniculata

Clitocybe infundibuliformis

Clitocybe rivulosa

Collybia butryacea

Coprinus comatus

Coprinus kubickae

Cyathus stercoreus

Dentinum repandum

Hebeloma crustuliniforme

Hydnellum suaveolens

Hydnum compactum

Hygrocybe coccinea

Hygrocybe psittacina

Hygrocybe reae

Hygrophoropsis aurantiaca

Lactarius insulsus

Lactarius piperatus

Lactarius torminosus

Lepista nuda

Lepista personata

Lepista sordida

Leucoagaricus naucinus

Leucopaxillus giganteus

Lycoperdon marginatum

Lycoperdon perlatum

Lycoperdon pusillum

Lycoperdon spp.

Macrolepiota procera

Marasmius graminum

Marasmius oreades

Marasmius siccus

Marasmius rotula

Marasmius urens

Melanoleuca melaleuca

Melanolueca grarmopodia

Nolanea staurospora

Panaeolina foenisecii

Panaeolus campanulatus

Paxillus involutus

Scleroderma verrucosum

Suillus grevillei

Trechispora alnicola

Tricholoma columbetta

Tricholoma panoeolum

Tricholoma terreum

Vascellum curtisii

Vascellum pratense

Puffball species are most common on sand-based putting greens in the United States.

Conditions Favoring Fairy Ring

- sandy soils, newly constructed greens
- excessive thatch and organic matter accumulation
- extremes in soil moisture
- nutrient deficiency, especially nitrogen

Fairy ring symptoms are most evident in under-fertilized turf

Excessive thatch accumulations enhance fairy ring.

Some fairy ring fungi may release toxins into the profile.

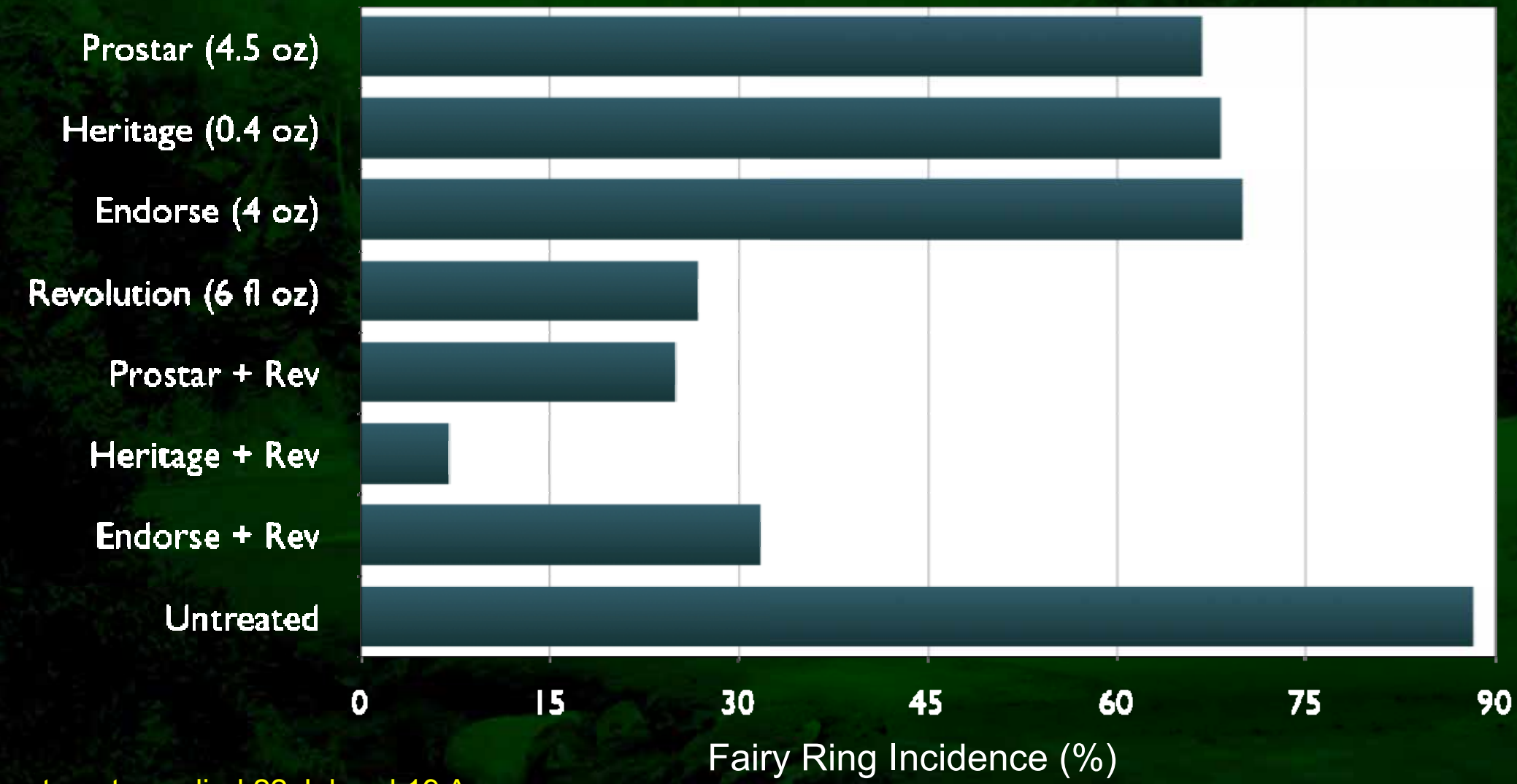
Fungicides Labeled for Fairy Ring Control

- azoxystrobin (Heritage)
- flutolanil (ProStar)
- metconazole (Tourney)
- polyoxin D (Endorse)
- pyraclostrobin (Insignia)
- triadimefon (Bayleton)

Control of Fairy Ring with Fungicides

- fungicide performance is highly variable from location to location
- fungicides alone will not provide curative suppression of symptoms
  - must be applied in conjunction with cultural practices for curative suppression
- fungicides should be considered a long-term preventative approach

Curative Control of Type II Fairy Rings



reatments applied 22 Jul and 19 Aug
ata collected 2 Sep
idanza and Bagwell, F&N Reports, 60:T024

Curative Suppression of Fairy Ring Symptoms

- **Type I**
  - cultivate and/or use wetting agents to re-wet soil profile
- **Type II**
  - mask ring symptoms with nitrogen or iron
- **Type III**
  - remove mushrooms

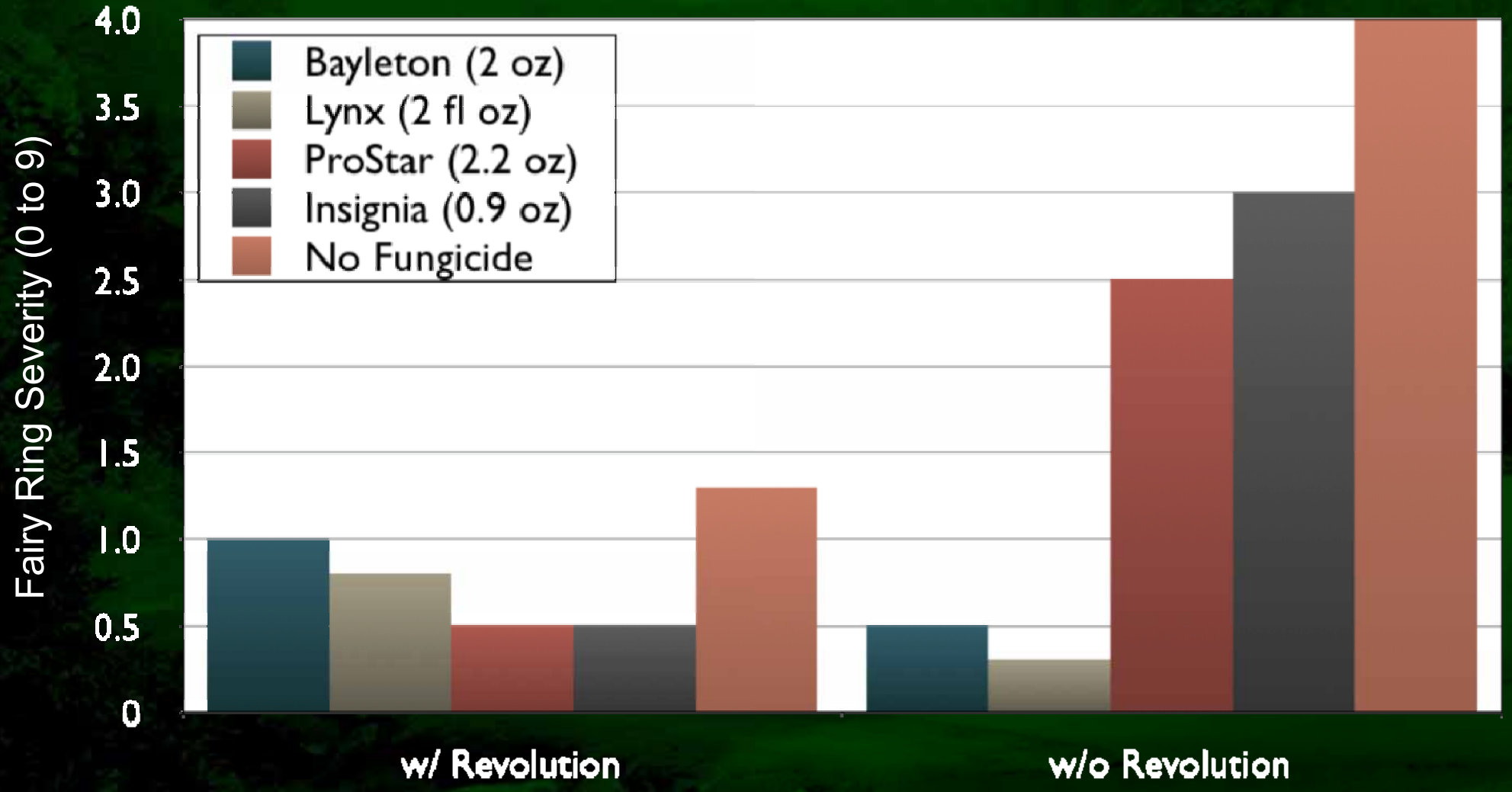
Depth is important!

Apply management practices to the infested zone.

DMIs for Fairy Ring Control: Background

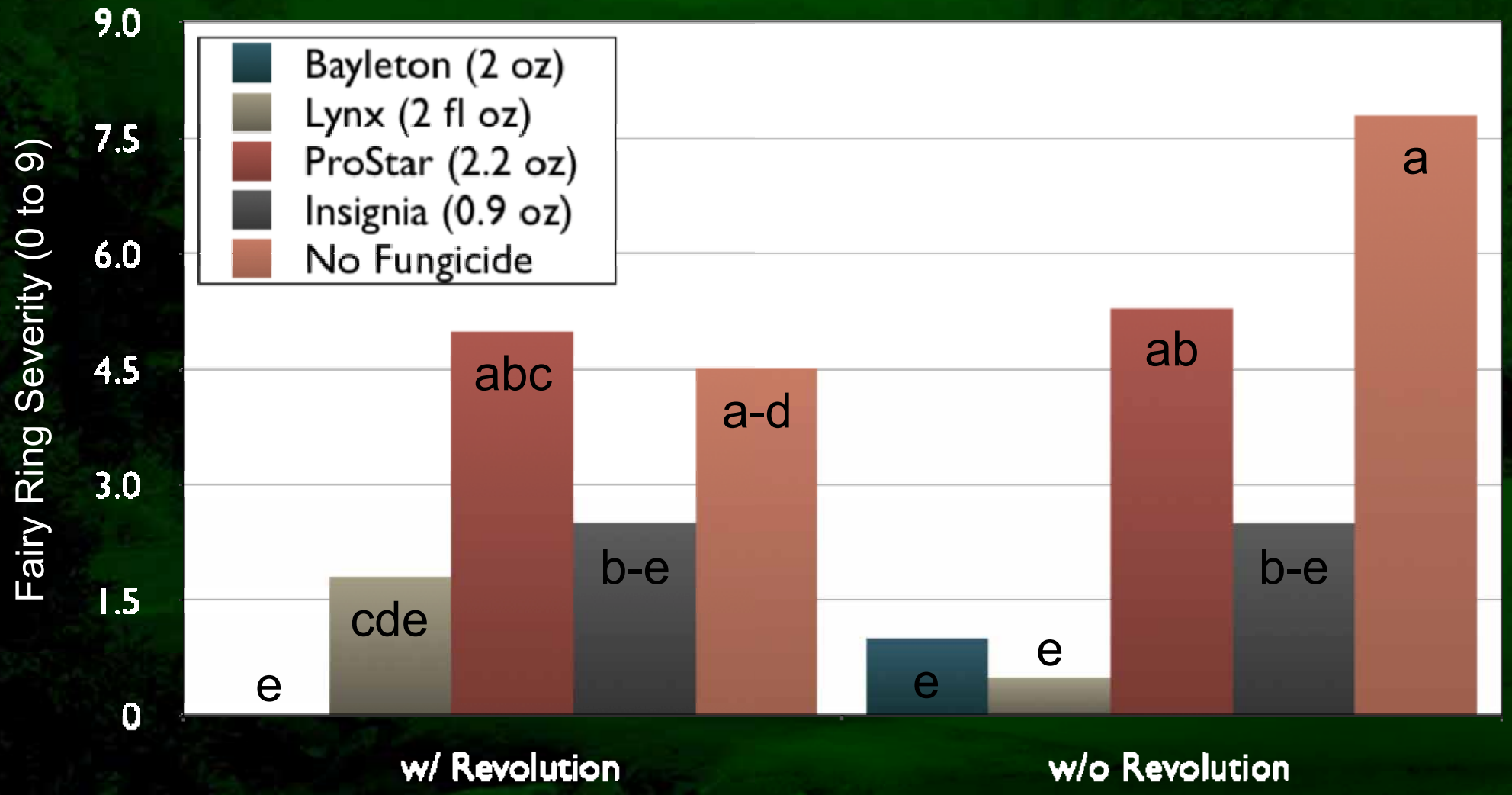
- fairy ring activity observed during development of triadimefon
- superintendents in Gulf Coast states have been using Bayleton for preventative fairy ring control
- Bayleton received 2(ee) label for fairy ring control in 17 states in Feb. 2006
- how do DMIs compare to other chemistries for preventative control?
- do soil surfactants influence preventative control?

Prevention of fairy ring caused by *Vascellum pratense* in creeping bentgrass (June 22, 2006)



All treatments applied twice in March and April
Treatments were watered in immediately with 0.25" of irrigation
Revolution applied at 6 fl oz/M

Prevention of fairy ring caused by *Vascellum pratense* in creeping bentgrass (July 11, 2006)



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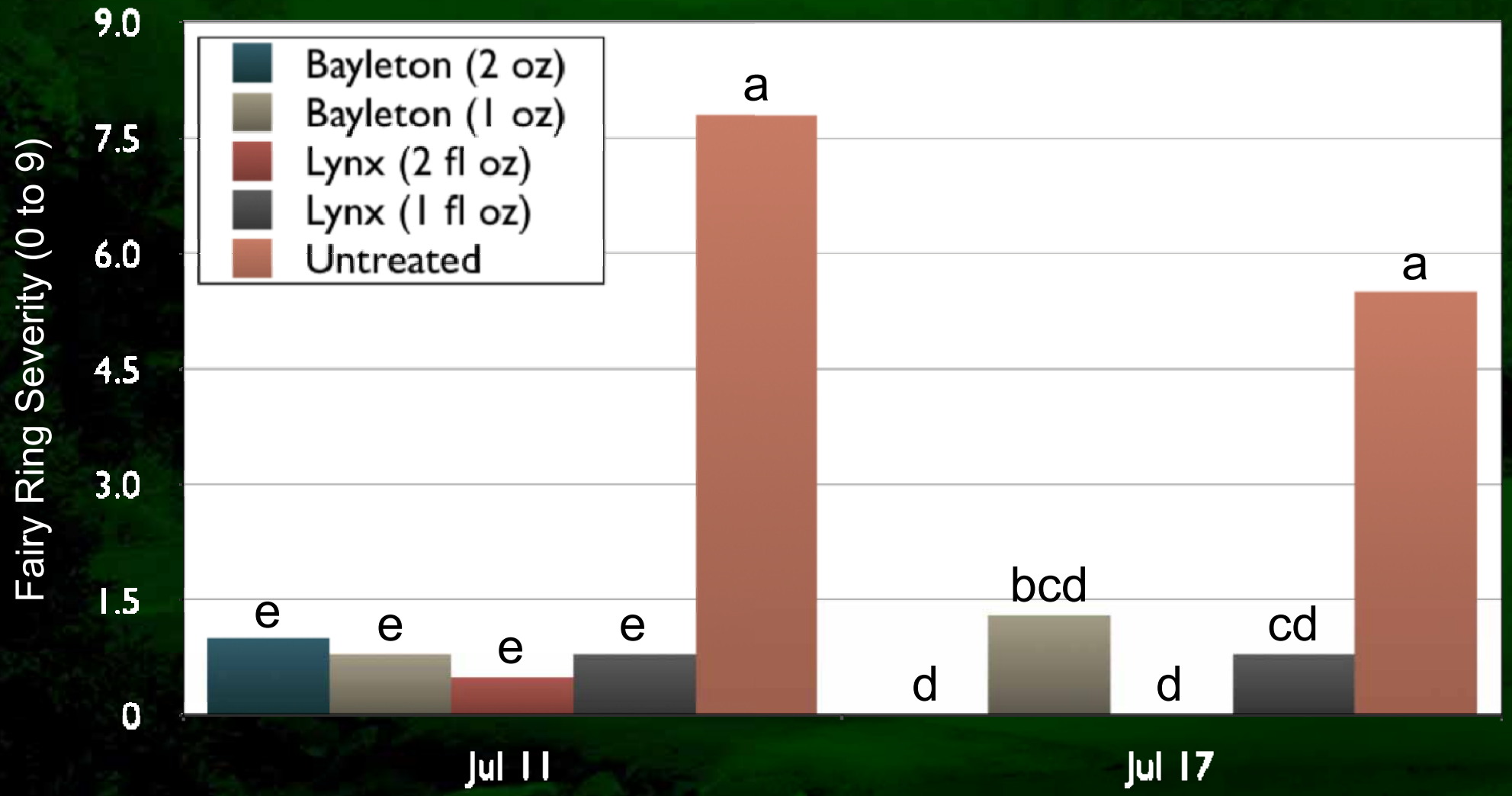
evolution applied at 6 fl oz/M

Untreated Control

Insignia + Revolution (0.9 + 6 oz) applied 3/22 and 4/19

Bayleton (2 oz) applied 3/22 and 4/19

Prevention of fairy ring caused by *Vascellum pratense* in creeping bentgrass (July 11, 2006)



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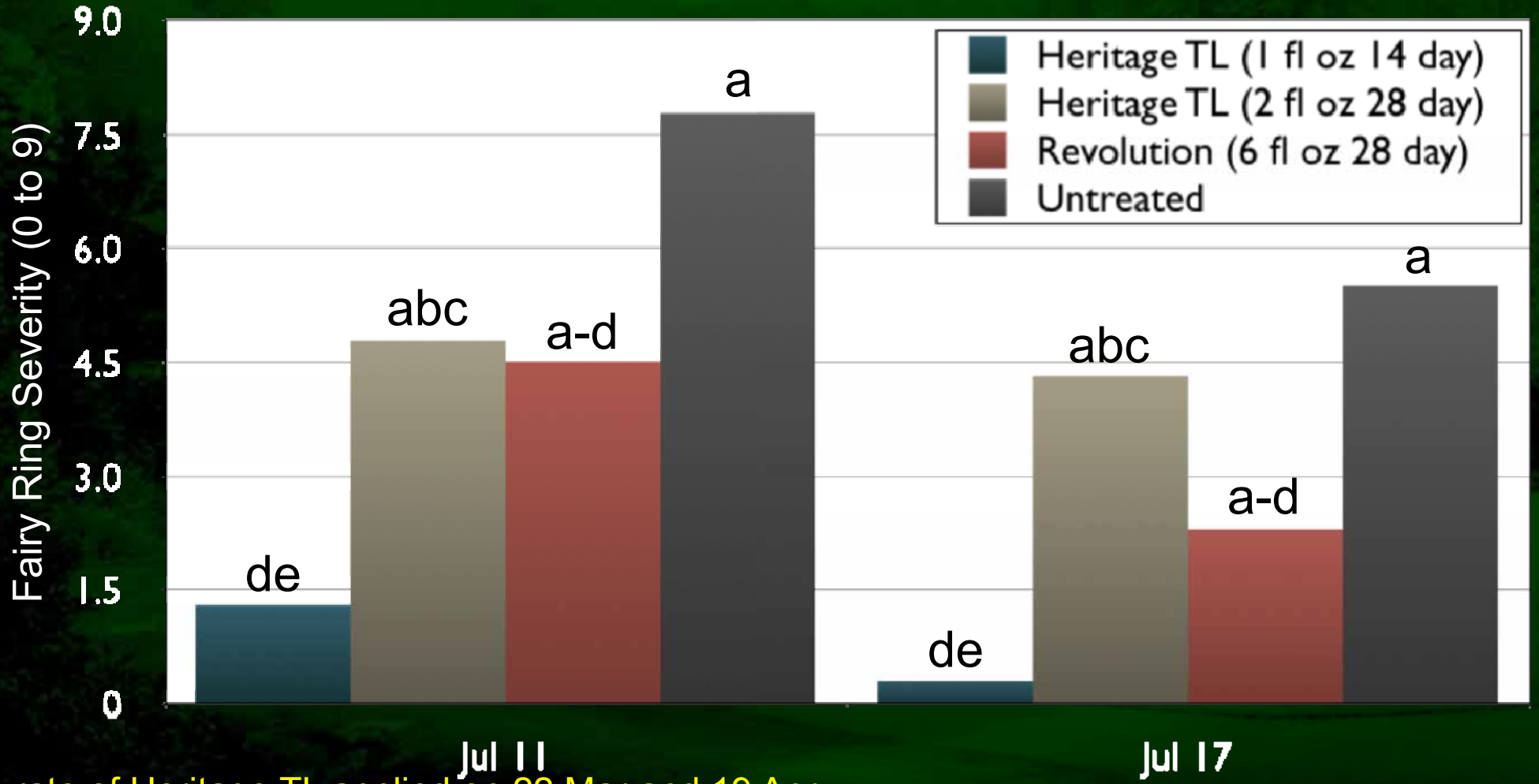
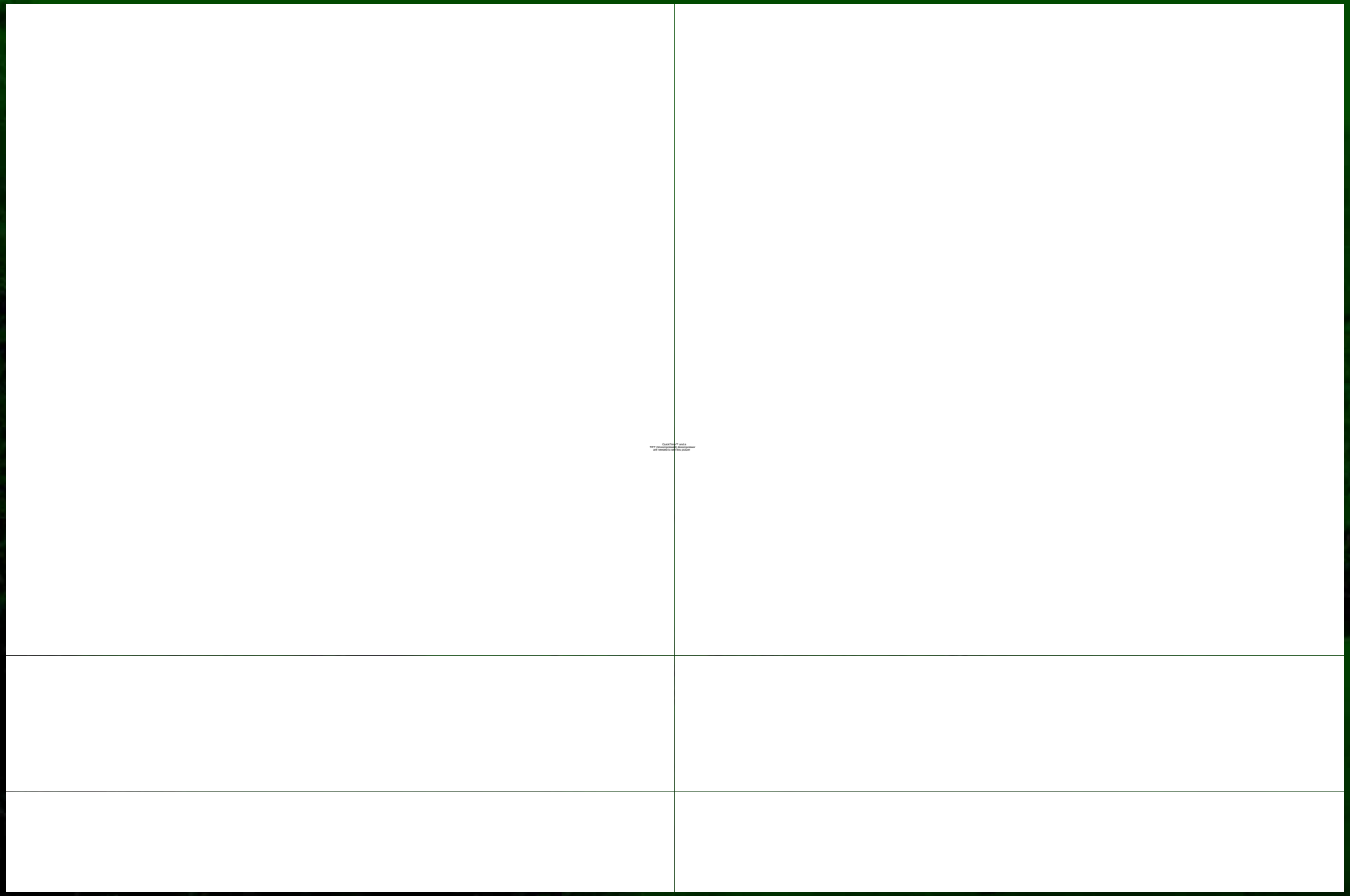
Revolution applied at 6 fl oz/M

Comparison of Heritage Application Schedules for Fairy Ring Prevention



fl oz rate of Heritage TL applied on 22 Mar and 19 Apr
fl oz rate of Heritage TL applied on 22 Mar, 5 Apr, 19 Apr, and 3 May
Revolution (6 fl oz) tank-mixed with Heritage applications on 22 Mar and 19 Apr
Treatments were watered in immediately with 0.25" of irrigation

Heritage TL + Revolution (2 + 6 fl oz, 28 day)



Heritage TL (1 fl oz, 14 day) + Revolution (6 fl oz, 28 day)

Many questions remain...

- Are all fairy ring species sensitive to the DMIs?
- What is the optimal timing for preventative applications?
- Which application rate and number of applications will provide season long control?

Preventative Control of Turfgrass Root Diseases

- **Application Timing is Based on Soil Temperature**

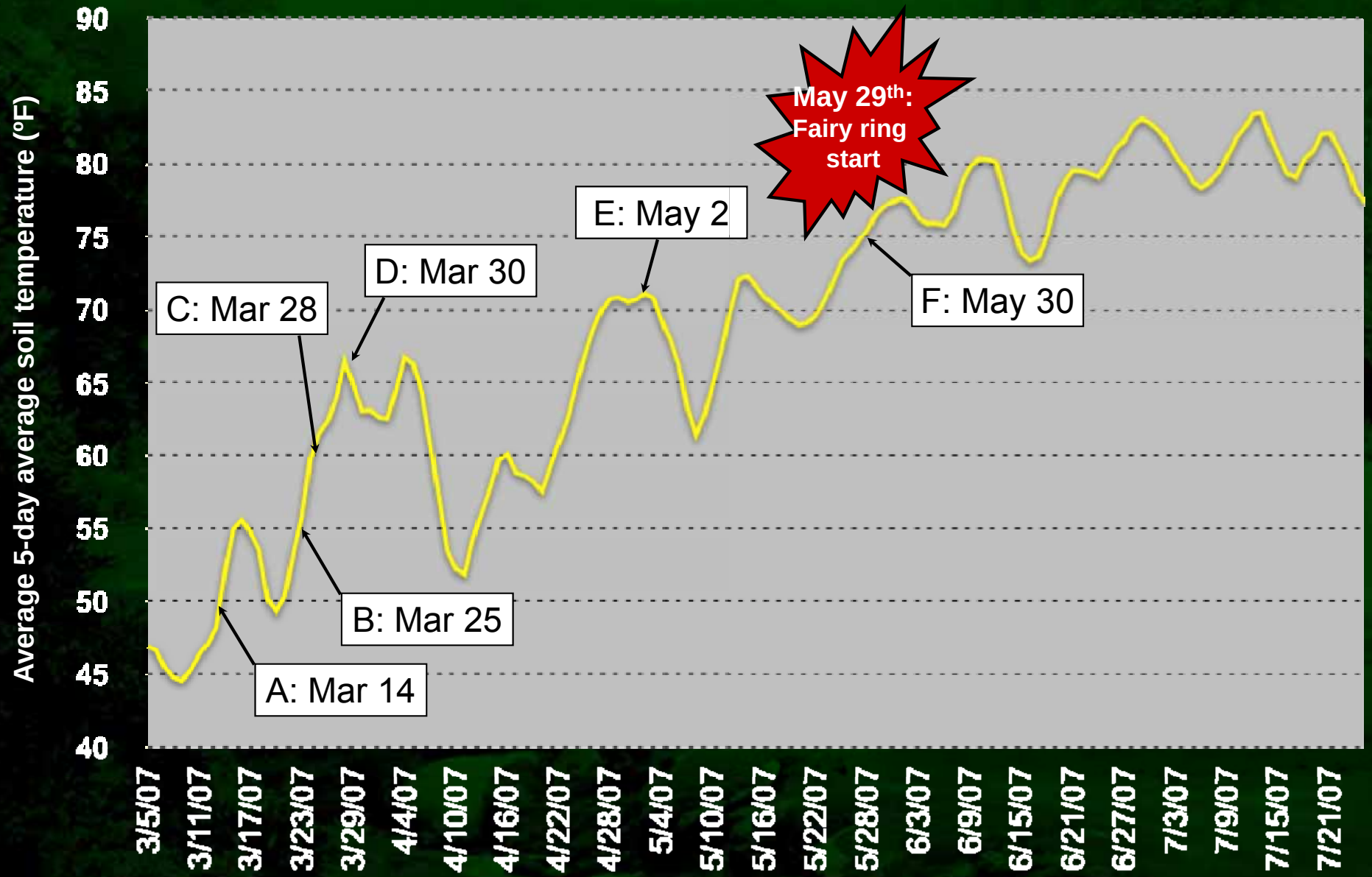
  - ✓ **Spring Dead Spot:** apply in fall when soil temperatures are between 60°F and 80°F
  - ✓ **Summer Patch:** initiate applications in spring when soil temperatures are above 65°F
  - ✓ **Take-all Patch:** apply in fall and spring when soil temperatures are between 40°F and 60°F
  - ✓ **Fairy Ring:** ??????

Rate and Timing of DMIs for Fairy Ring Prevention

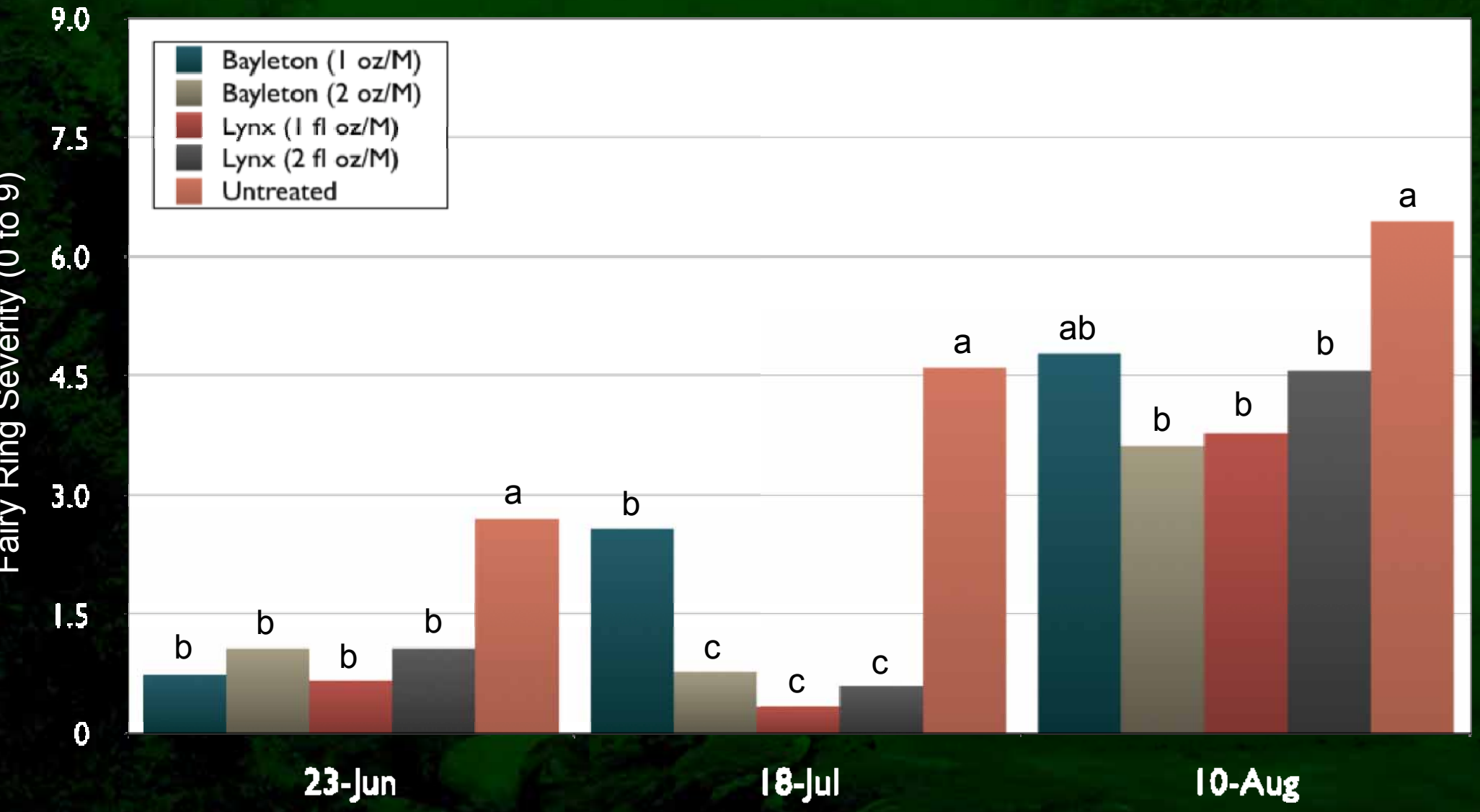
- **Fungicide / Rate**
  - **Bayleton - 1 oz/1000 ft^2**
  - **Bayleton - 2 oz/1000 ft^2**
  - **Lynx - 1 fl oz/1000 ft^2**
  - **Lynx - 2 fl oz/1000 ft^2**
- **Soil temperature at initiation (5-day average)**
  - **50°F**
  - **55°F**
  - **60°F**
  - **65°F**
  - **70°F**
  - **75°F**

- USGA putting green established in 2004 with ‘A-1’ creeping bentgrass
- all treatments watered-in immediately with 0.25” of irrigation
- Cascade soil surfactant (8 fl oz/1000 ft^2) applied on 3/20, 5/2, and 7/25

Five-day Average Soil Temperature, 2007

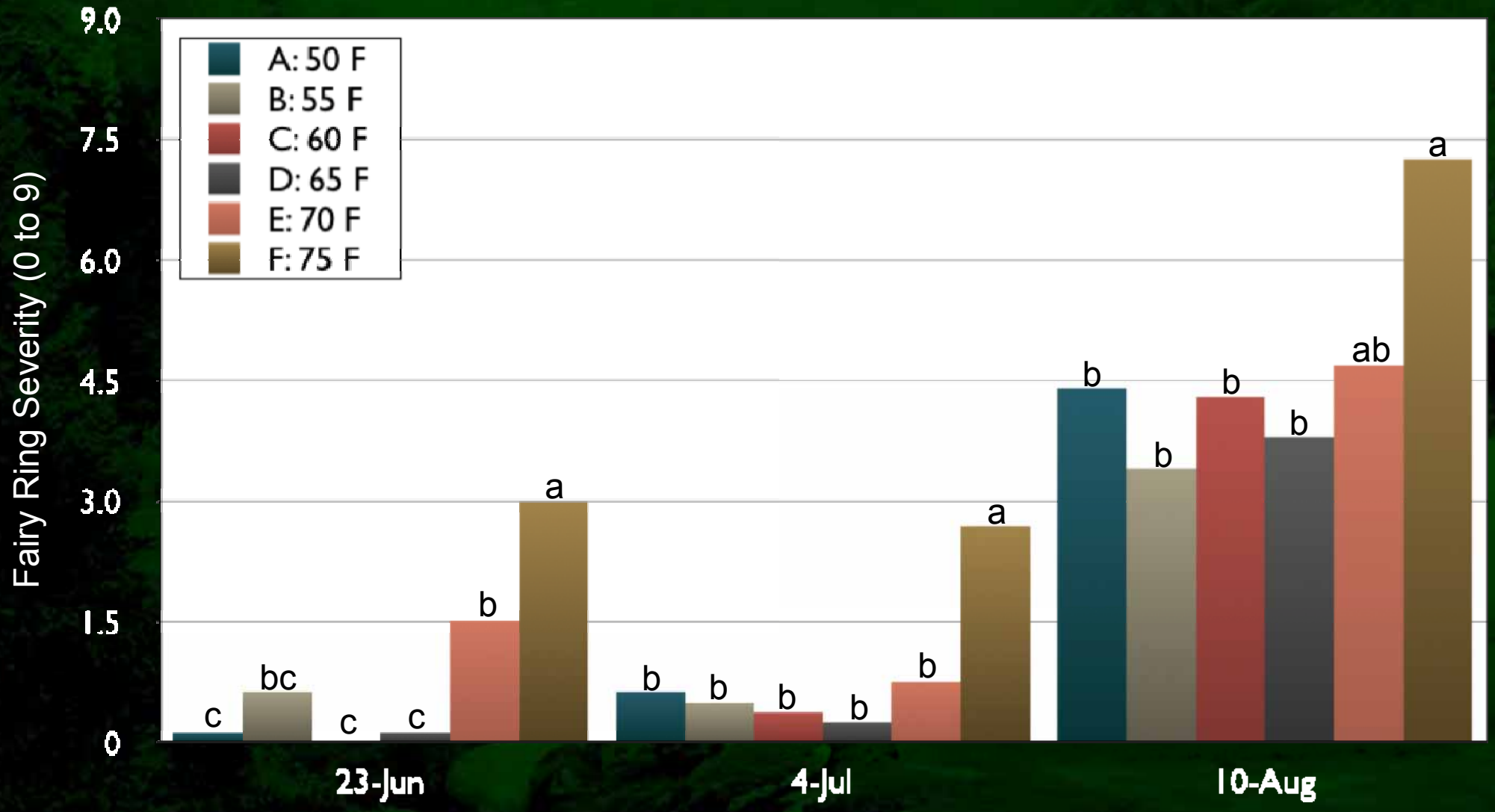


Prevention of fairy ring caused by *Vascellum pratense* in 'A-1' creeping bentgrass, 2007

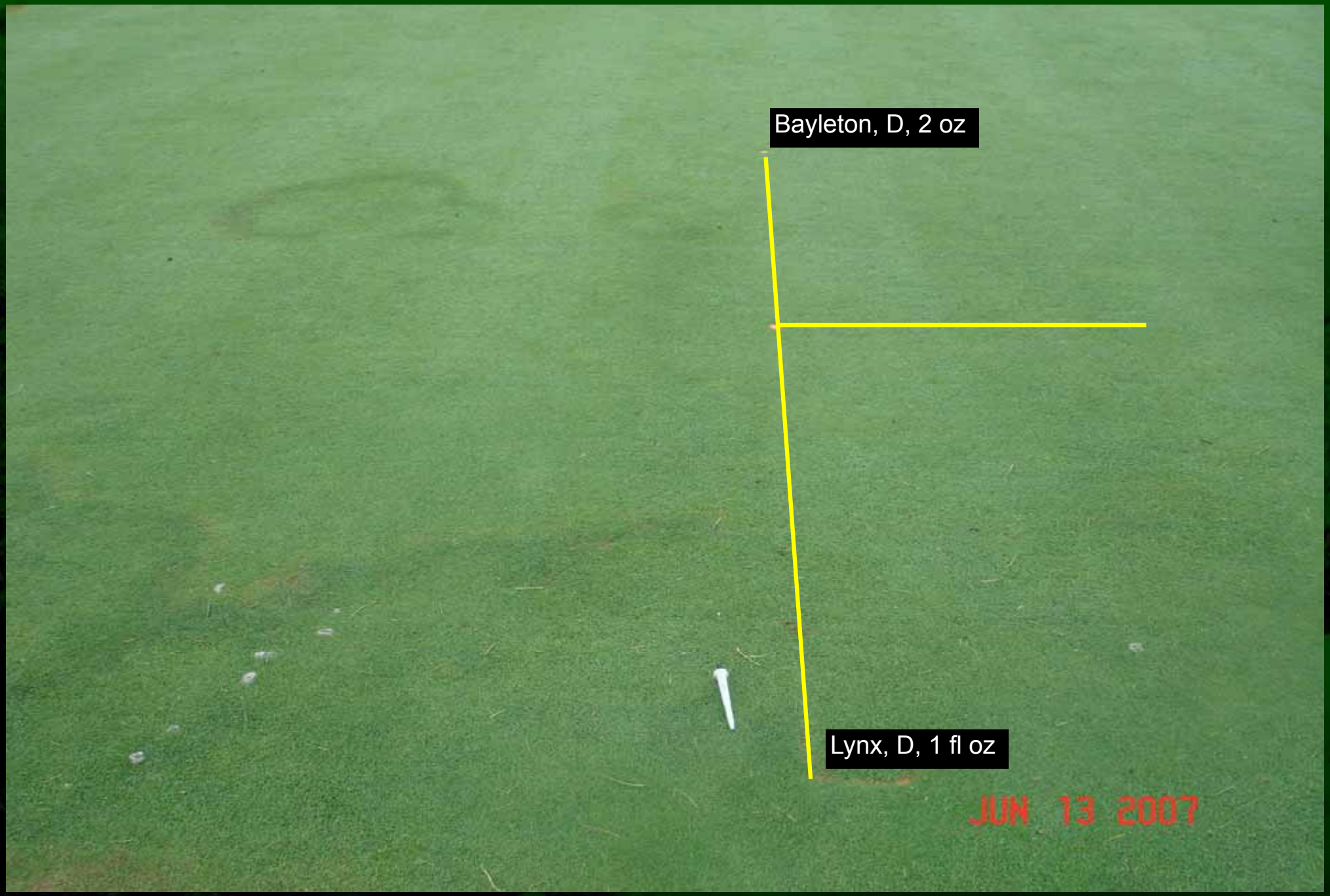


**Data is averaged across all application timings

Prevention of fairy ring caused by *Vascellum pratense* in 'A-1' creeping bentgrass, 2007

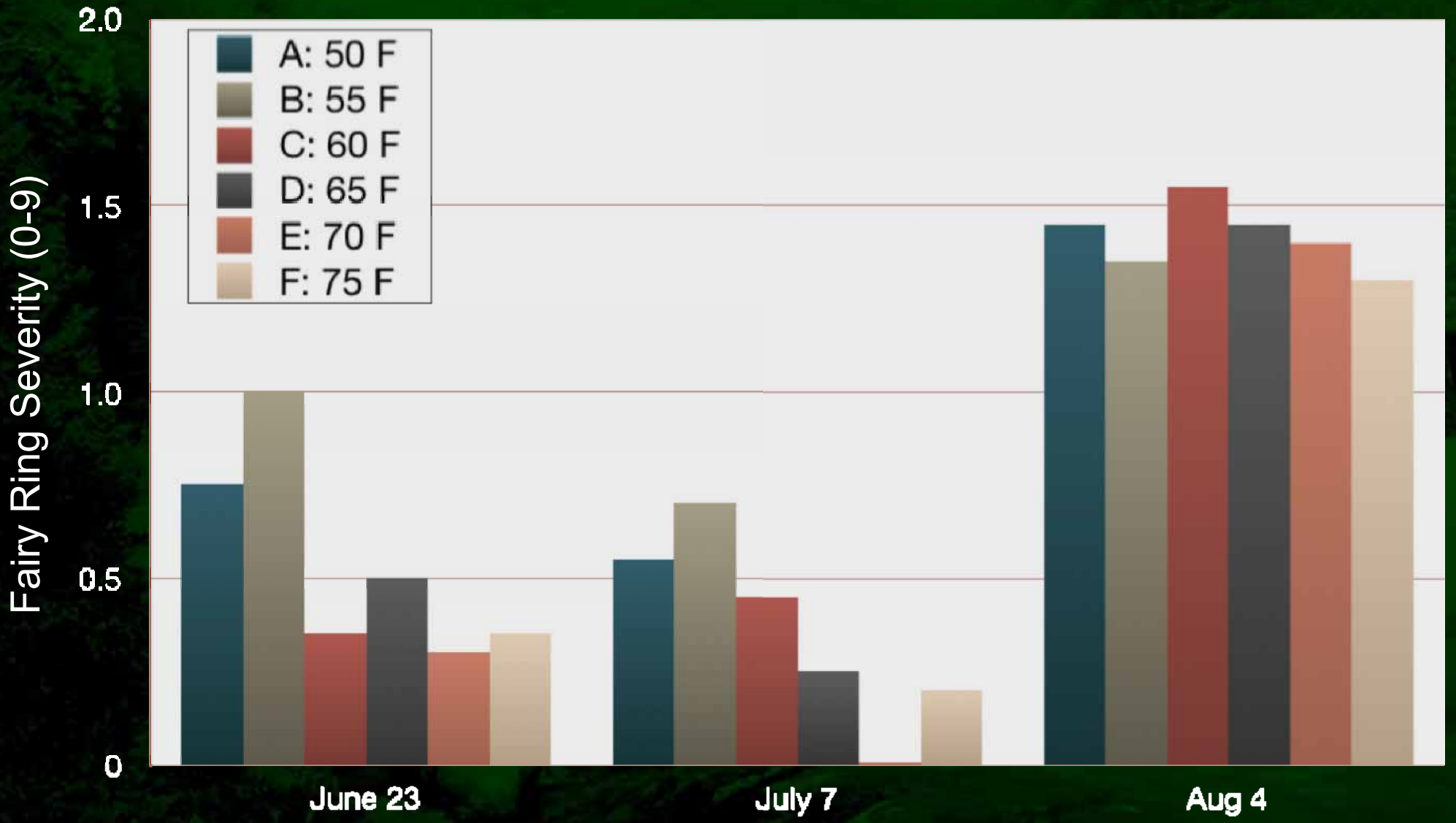


**Data is averaged across all fungicides and rates

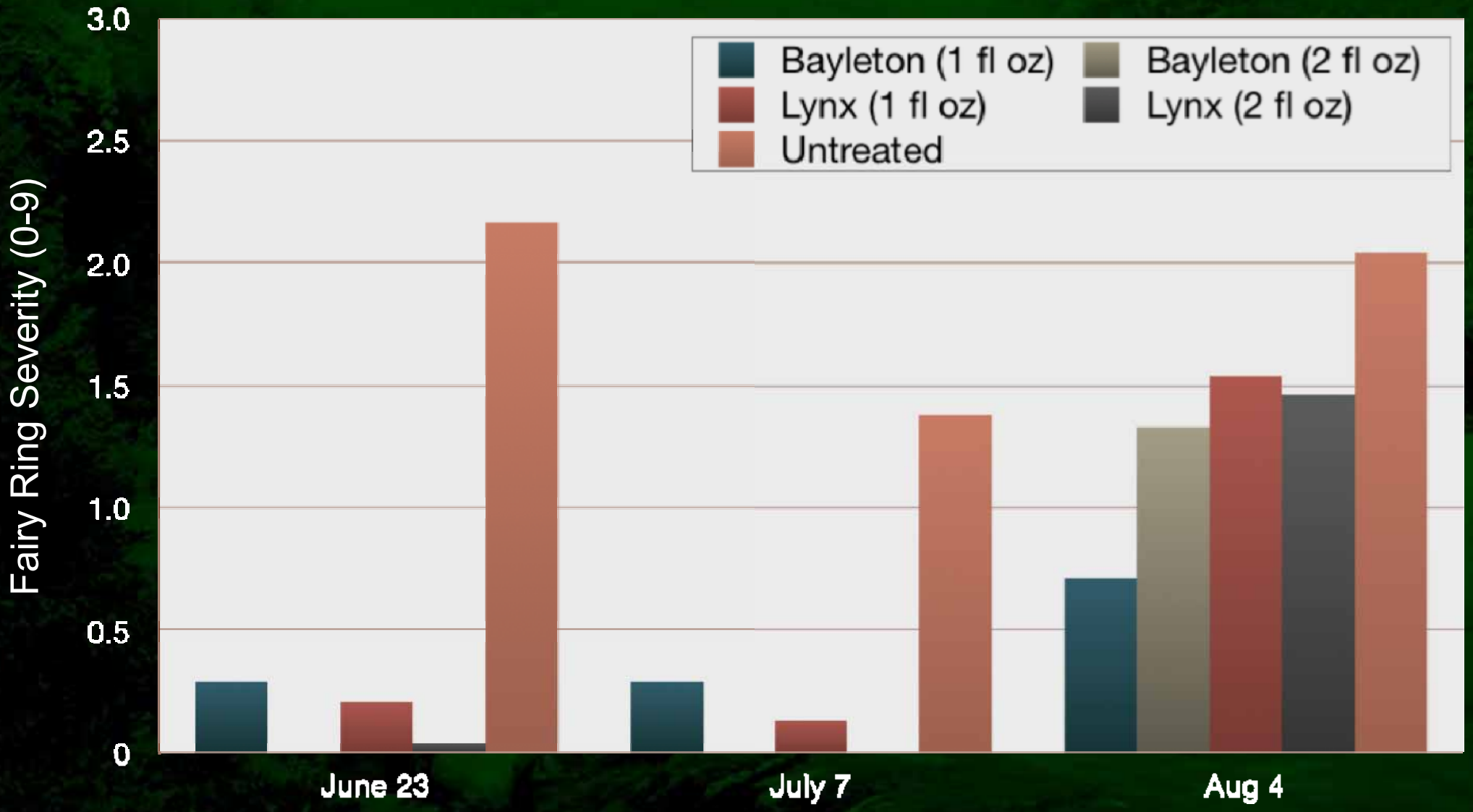

Bayleton, D, 2 oz
Lynx, D, 1 fl oz
JUN 13 2007


June 22, 2007
Bayleton, D, 1 oz
Untreated

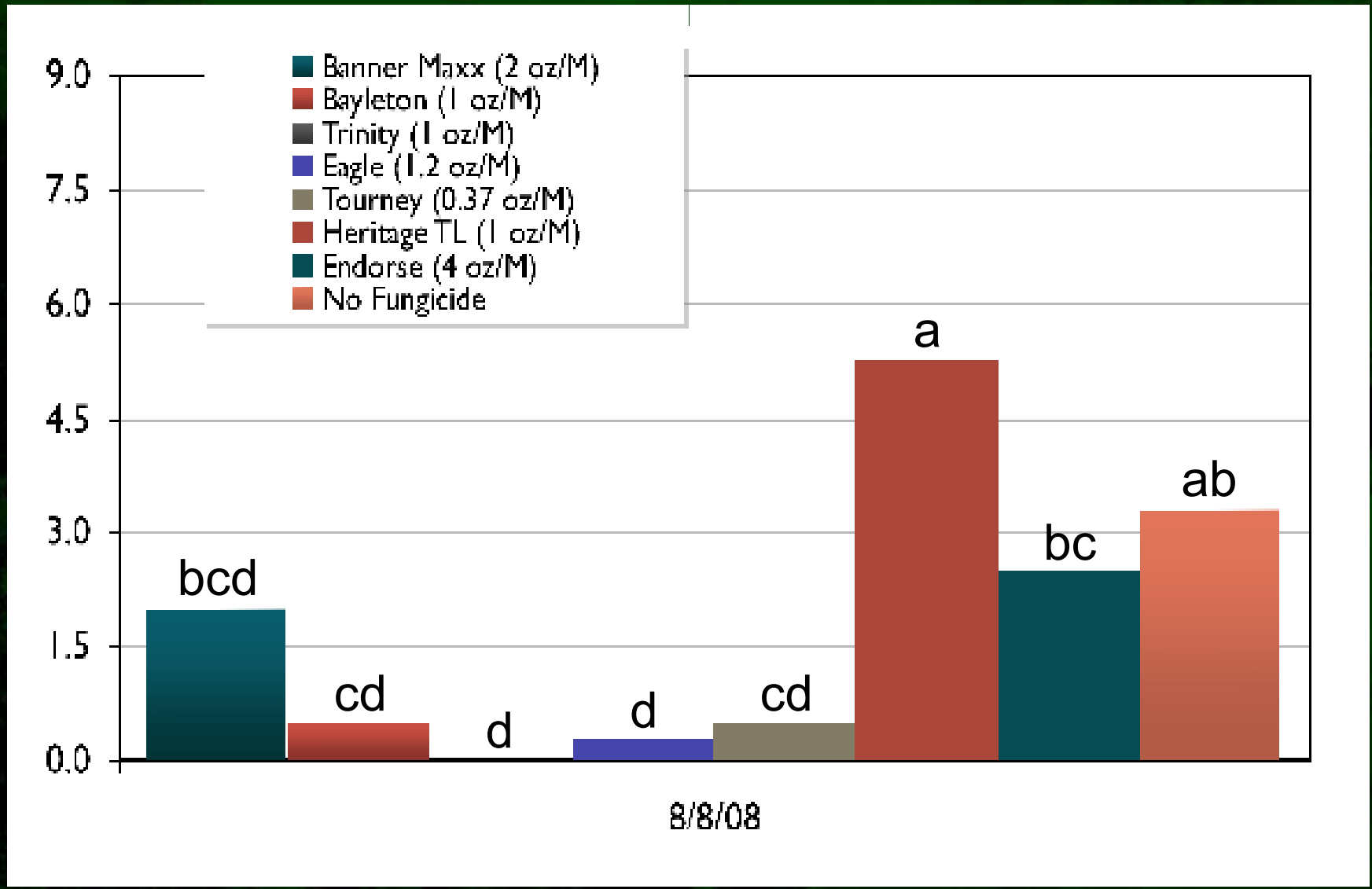
Prevention of fairy ring caused by *Vascellum pratense* in 'A-1' creeping bentgrass, 2008



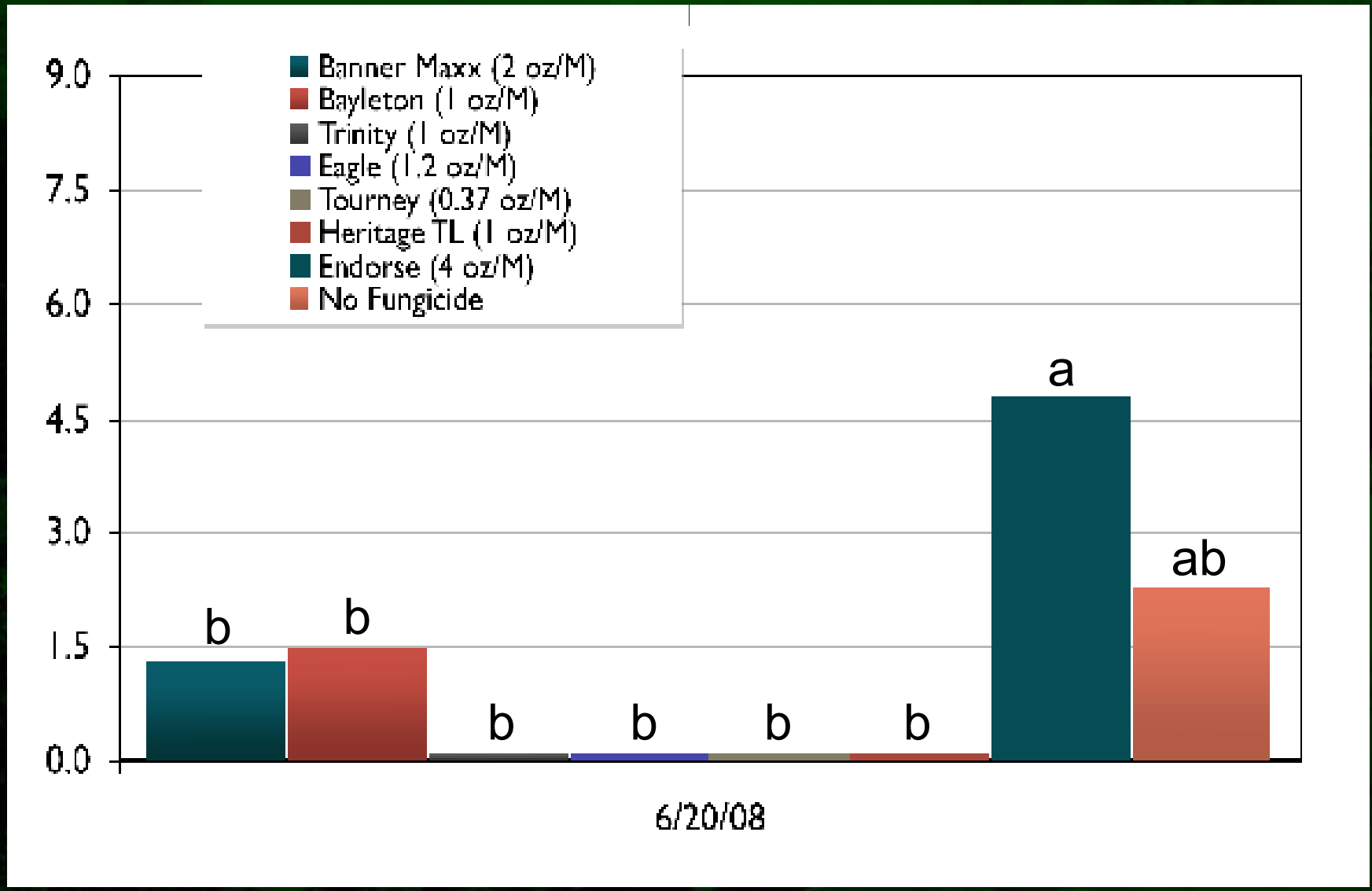
Prevention of fairy ring caused by *Vascellum pratense* in 'A-1' creeping bentgrass, 2008



Fairy ring prevention in creeping bentgrass, 2008



Fairy ring prevention in bermudagrass greens, 2008



Refining Fungicide Recommendations

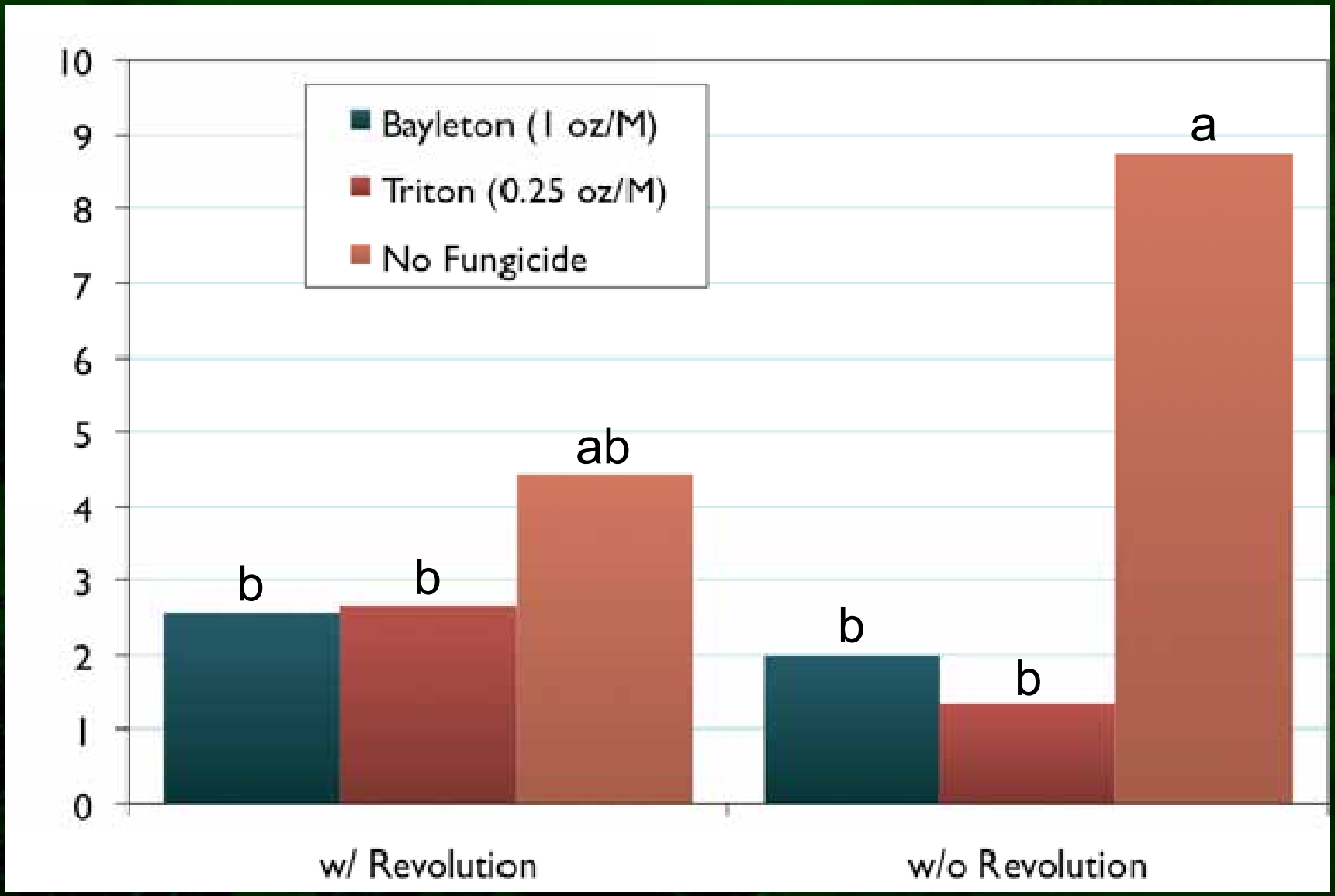
- How do wetting agents influence performance of preventative applications?
- Does post-application irrigation improve preventative control?
- If so, does irrigation need to be applied immediately?

Refining Fungicide Recommendations

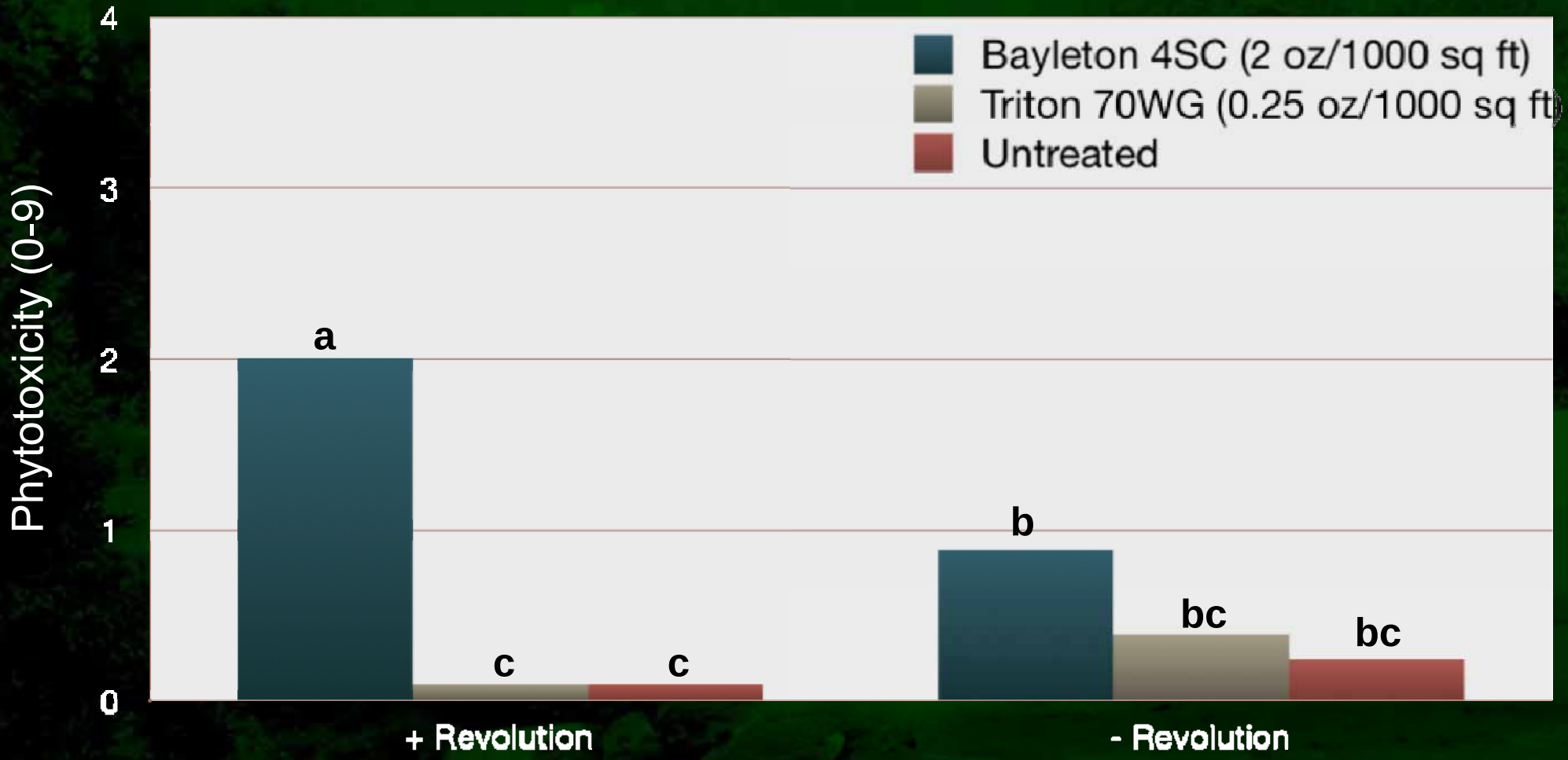
- **Irrigation**
- immediately after application
- 10 hours after applicaton
- **Fungicide**
- Bayleton (1 oz)
- Trinity (0.25 oz)
- None
- **Wetting Agent**
- Revolution (6 fl oz)
- None

- creeping bentgrass putting green
- split-split-plot, randomized complete block
- applied in late March and late April
- fairy ring symptoms assessed throughout summer

Impact of Revolution on Fairy Ring Control



Phytotoxicity - Tank-mixing Revolution (6 oz/1000 sq ft), 2008



Treatments applied on March 28 & April 25
Data collected on May 27
Bars with same letter are not significantly different according to LSD (∞=0.05).

Conclusions: Preventative Fairy Ring Control

- the most common fairy ring pathogens in sand-based putting greens are the puffball species *Lycoperdon pusilum* and *Vascellum pratense*
- DMI fungicides provide effective prevention of these fungi
- two applications when soil temperatures are between 55°F and 65°F
- some injury noted from DMI applications – use low label rates, ensure turf is actively growing and risk of hard frost is minimal

Conclusions: Preventative Fairy Ring Control

- tank-mixing with soil surfactant may slightly reduce efficacy of DMI fungicides and increase the potential for phytotoxicity
- other fungicides (Heritage, Insignia, ProStar) require tank-mixing with a soil surfactant and re-application during the season
- low rate (1 fl oz) of Heritage TL on 14 day interval more effective than high rate (2 fl oz) on 28 day interval
- all applications should be watered-in within 12 hours after application for best results

Acknowledgements

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