2008–2009 GCSAA CHAPTER COOPERATIVE RESEARCH PROGRAM PROGRESS REPORT

# Management and Biology of Brown Ring Patch on Annual Bluegrass

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## A. REPORT ABSTRACT

Brown Ring Patch caused by Waitea *circinata var circinata* is a new, invasive pathogen of turfgrass in the U.S. Experiments were initiated in 2008 to address the key issues of chemical and cultural management, population structure and origin and the basis of resistance to certain classes of fungicides. In field experiments, it was shown that certain fungicides are most effective for the control of the disease. It appears that Headway and Endorse fungicides provide excellent curative activity against the disease, but have short residual activity. Certain DMI-fungicides (Trinity, Triton and Tourney) and ProStar appear to take a longer period of time to control the disease, but offer a high level of control with a long residual period. Repeated applications of fungicides also appear to give better control than single applications. Nitrogen appears to have a significant effect on decreasing disease development when 1 lb/1,000 sq ft was applied in nitrate, ammonium or urea form. Primo MAXX (0.125 fl oz/1,000 sq ft) appeared to cause a slight increase in disease in some cases. However, applications of nitrogen in combination with Primo MAXX appeared to provide the best disease control and turf color. Currently, population analyses using AFLP and determination of the molecular basis of fungicide resistance are being performed. Based on the results of 2008 field experiments, best management practices for brown ring patch include (i) application of nitrogen and Primo MAXX to reduce disease severity and improve turf color, (ii) application of Headway or Endorse for quick acting curative control, and (iii) application of certain DMI-fungicides or ProStar for long lasting control.

## B. PROJECT RATIONALE

*Waitea circinata var circinata* was recently discovered as a new, invasive pathogen of turfgrass in the U.S. affecting high value golf course putting greens (de la Cerda et al. 2007, Chen et al. 2007). Previously only found as a turfgrass pathogen in Japan causing "Brown Ring Patch" (Toda et al. 2005), it was only first detected by the Turf Disease Diagnostic Lab at UC Riverside from golf courses in Washington and California beginning in 2003. Since then, it has been detected at over 50 locations in California, Oregon, Washington and Nevada and most recently in Illinois, Ohio, Pennsylvania, New York, New Jersey, Connecticut, Maine, Rhode Island and Massachusetts (Figure 1).

Little is known about the biology, origin or method of spread in the U.S. for this pathogen and there is very limited information on effective control measures. Recent work in the Douhan and Wong

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*(Continued from page 15)*

FIG. 1

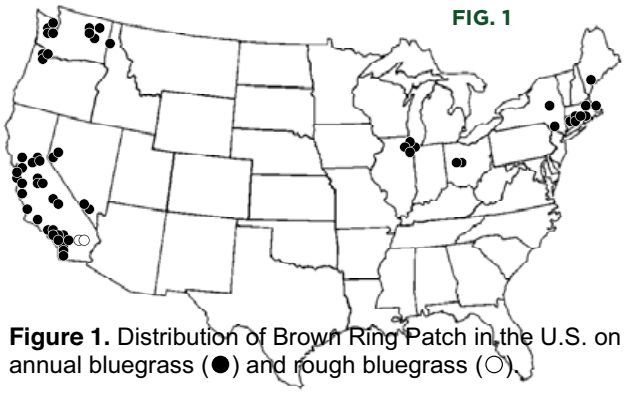

**Figure 1.** Distribution of Brown Ring Patch in the U.S. on annual bluegrass (●) and rough bluegrass (○).

labs has confirmed its identity using morphological and molecular methodologies (de la Cerda et al. 2007). It appears that the pathogen is closely related to two known pathogens of turfgrass, Rhizoctonia zeae (telemorph: *Waitea circinata var zeae*) and *Rhizoctonia oryzae* (*Waitea circinata var oryzae*) (Figure 2), but appears to be a separate species that had not been found as a pathogen of turfgrass until now. *Waitea circinata var circinata* appears to be able to cause damage to turf over a wide range of temperatures, having been observed at approximately 15 to 35°C daytime temperatures. Symptoms are manifested as circular rings several cm to a meter in size that causes yellowing and necrosis of turf that is often difficult to recover from (Figures 3 & 4). This wide temperature range is uncommon for many *Rhizoctonia* diseases (Burpee and Martin 1992) and this pathogen has been problematic for many golf courses as a year-round disease.

There is no information available on the origin or spread of the disease. Information on the basic biology of the pathogen (reproduction, temperature and humidity requirements) would greatly help forecast periods of disease susceptibility. Understanding the population structure of the pathogen would also help potentially determine its origin and method of spread (Milgroom 1996; Milgroom and Peever 2003). Recent work in the Douhan and Wong labs has shown that the pathogen is widespread in multiple states.

Practically, fungicidal control of this pathogen has been problematic. Often, repeated fungicide applications are required to halt the disease. Recent work by the Wong Lab has already identified that this pathogen is completely resistant to benzimidazole fungicides and potentially QoI-resistant isolates have already been identified from California populations (Rios et al. 2006). Laboratory trials have shown that fungicide timing is crucial for the control of the pathogen. In these tests, preventive applications of fungicides provided near complete control while curative applications provided only 20 to 78% control (Wong and Kaminski 2007). The role of nitrogen in the management of this disease is unknown. Nitrogen is known to increase the severity of R. solani (Brown Patch) (Cubeta and Vilgalys 1997), but its effects are not well documented for other *Rhizoctonia* diseases (Couch 1995). Anecdotally, many of the locations with chronic Brown Ring Patch have been using low nitrogen fertility programs to increase ball roll and greens speed. Lack of recovery due to inadequate fertility seems to be a plausible reason for the increased severity of the disease at these locations.

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