In vitro Sensitivity of "*Rhizoctonia zeae*" to 16 Different Fungicides

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Introduction

A disease of unknown etiology has become problematic in the SE US on ultradwarf bermudagrass putting greens.

The symptoms are small tan spots ranging from 2.5 cm to 10 cm in diameter that expand into necrotic or tan rings ranging from 10 cm to 45 cm in diameter.

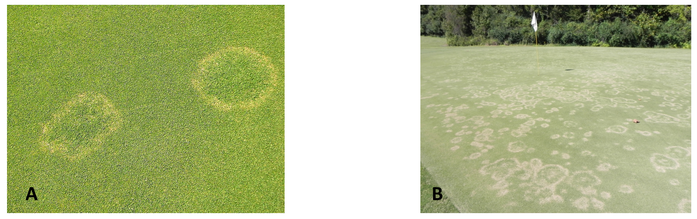

Figure 1. Symptoms of "*R. zeae*" on an ultradwarf bermudagrass putting green A. Initial symptoms of chlorotic rings B. More advanced symptoms are spots and necrotic rings

A fungus resembling *Rhizoctonia zeae* has been associated with the symptoms, yet little is known about the biology and management of this disease. Numerous fungicide efficacy trials have yielded inconclusive results for control.

Objectives

Determine the *in vitro* sensitivity of "*R. zeae*" to 16 different fungicides.

Materials and Methods

In the laboratory, each fungicide was added to PDA that was cooled to 50°C at the following concentrations 0, 0.001, 0.01, 0.1, 1, and 10 ppm (μg ml^{-1} a.i.).

Mycelia plugs were transferred from 3-day old colonies of "*R. zeae*" on PDA to amended media.

Radial growth was measured in two perpendicular directions at 24h, 48h and 72h after placement in a dark incubator.

Each concentration was replicated three times and the entire experiment was repeated two times.

The EC_{50} values of fungicides between isolates were subjected to an ANOVA (PROC GLM in SAS, version 9.4) and mean separations using the Waller-Duncan *t* test.

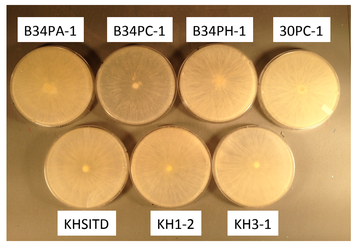

Figure 2. isolates of "*R. zeae*" used for testing *in vitro* sensitivity

Table1. fungicides used for determining *in vitro* sensitivity of "*R. zeae*"

Trade Name	Common Name	Group Name
Disarm	fluoxastrobin	QoI[1]
Insignia	pyraclostrobin	QoI
Heritage	azoxystrobin	QoI
Difenoconazole	difenoconazole	DMI[2]
Baleyton	triadimefon	DMI
Triton FLO	triticonazole	DMI
Banner Maxx	propiconazole	DMI
Torque	tebuconazole	DMI
Prostar	flutolanil	SDHI[3]
Velista	penthiopyrad	SDHI
Xzemplar	fluxapyroxad	SDHI
Affirm	polyoxin-D zinc salt	Polyoxin-D Zinc Salt
Daconil W. stik	chlorothalonil	Aniline
Iprodione	iprodione	Dicarboximide
Briskway	azoxystrobin+difenconazole	DMI+QoI
Lexicon	fluxapyroxad+pyraclostrobin	SDHI+QoI

[1]QoI=quinone outside inhibitor.
[2]DMI=demethylation inhibitor.
[3]SDHI=succinate dehydrogenase inhibitor.

Results

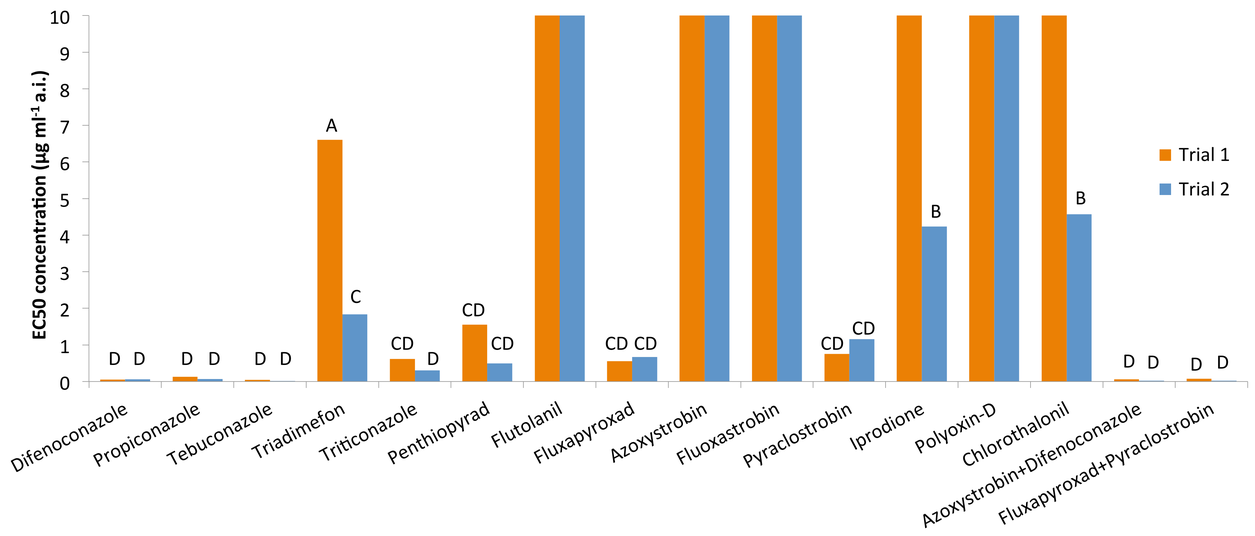

Figure 3. Sensitivity of "*R. zeae* " to 16 fungicides across two experiments. Each orange bar represents the mean EC_{50} value for seven "*R. zeae*" isolates in trial 1. Each blue bar represents the mean EC_{50} value for seven "*R. zeae*" isolates in trial 2
All the values larger than 10 μg ml^{-1} are depicted as 10 μg ml^{-1}
Values followed by the same letter are not significantly different according to Waller-Duncan *t* test

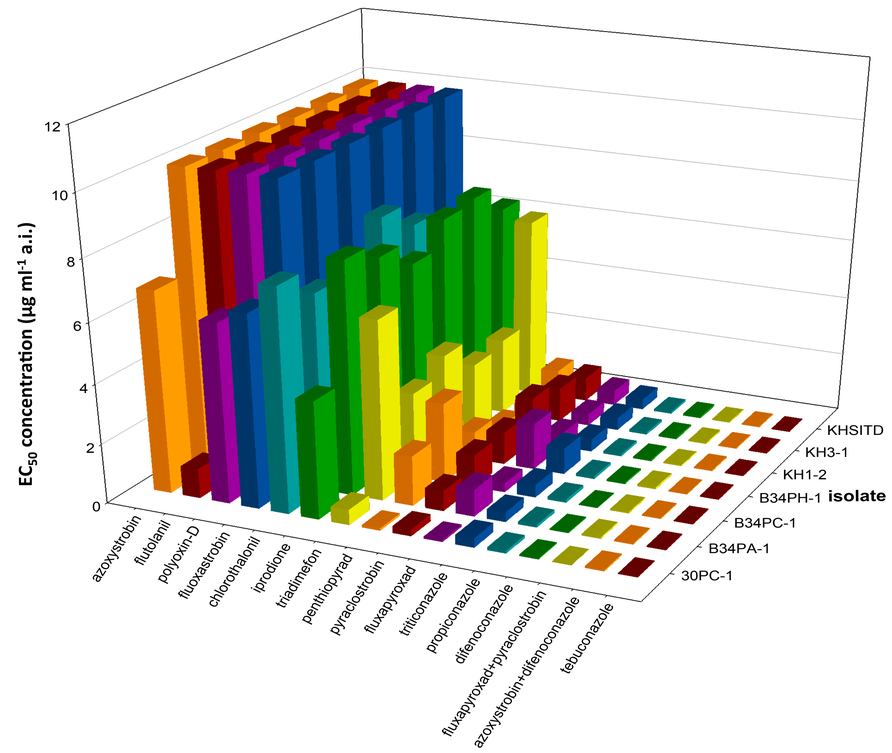

Figure 4. Sensitivity of each "*R. zeae*" isolate to each fungicide tested
EC_{50} concentrations are the means of two trials.
All the values larger than 10 μg ml^{-1} are depicted as 10 μg ml^{-1}

Conclusions

This fungus is not sensitive to flutolanil, azoxystrobin, fluoxastrobin, or polyoxin-D.

Fungicide programs should incorporate a DMI, penthiopyrad, fluxapyroxad or pyraclostrobin. Products like iprodione or chlorothalonil maybe a rotational option or tank mix partner to prevent fungicide resistance development.

More research is needed to determine specific management recommendations for this disease.

Acknowledgement

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