



Rhizocs of Turf

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The fungus *Rhizoctonia solani* was the first turfgrass fungal pathogen that I studied. It was also the focus of my masters degree at Clemson University, South Carolina under the tutelage of Dr. Bruce Martin. Needless to say, I have a strange fondness for this fungus. *Rhizoctonia solani* is the cosmopolitan pathogen that causes Rhizoctonia blight. It has been recorded as a disease of more than 100 grass species including 12 species of turfgrasses (5, 15). Since F.W. Taylor coined the term "brown patch" for the turfgrass disease caused by *R. solani*, there have been many gains in the understanding of this pathogen and disease. However, until recently *R. solani* was believed to be the sole representative of the genus to function as a turfgrass pathogen. Recently characterized Rhizoctonia species pathogenic to turfgrasses include *R. oryzae*, *R. zeae* and *R. cerealis*. In this article I will introduce you to these turf Rhizocs.

Rhizoctonia solani was first identified as a turf pathogen in 1916 (15). The story leading to its identification began when Fred W. Taylor transplanted a Connecticut-grown red fescue sward around his home near Philadelphia (14). The grass looked great in Connecticut, but quickly deteriorated in the heat of Philadelphia. In the summer of 1914, the turf began to die in large "brown patches" (7). Mr. Taylor went to Washington for help and found the assistance of C.V. Piper and R. A. Oakley of the Arlington turf gardens. Two years later, Piper identified the causal agent of the "brown patches" as the fungal pathogen *R. solani* (15). However, some did not readily accept that the fungus was the cause of the brown patch symptom, and in 1926 John Monteith (1923 UW Plant Pathology graduate #54) offered proof to convince golf course superintendents that the disease was not caused by spiders; that the web-like threads were the mycelium of the fungal pathogen *R. solani* (12, 13). Today Rhizoctonia blight is still one of the most damaging diseases of the cool-season turfgrasses ranging from the Midwest to the East Coast including tall fescue, perennial ryegrass and creeping bentgrass (16).

Close observation of the *R. solani*-like fungi associated with typical and atypical Rhizoctonia blight symptoms has revealed that some isolates may be morphologically similar to *R. solani*, but in reality, are quite distinct species (2, 3, 6, 9, 11). In 1980, Burpee reported that *R. cerealis*, a binucleate species, was the causal agent of yellow patch disease (2). The few yellow patch cases that I have seen in Wisconsin were ephemeral and caused little damage. However, that doesn't mean that it can't cause significant damage.

The multinucleate species *R. zeae* and *R. oryzae* together with other unidentified Rhizoctonia and Rhizoctonia-like fungi also have been suggested as turf pathogens, but their significance remains undetermined (1, 4, 8, 9). *Rhizoctonia zeae* has been associated with

Rhizoctonia blight of tall fescue in North Carolina (9, 11). *Rhizoctonia oryzae* is not recognized as an important turfgrass pathogen in the U.S., but occurrences of *R. oryzae* causing disease have been reported (11, 17). Damage caused by both *R. zeae* and *R. oryzae* has been associated with summer temperatures of 28 to 32C.

In the summers of 1994 and 1995, I isolated *R. zeae* from leaves taken from bronze patches from two different locations. Although *R. zeae* was isolated, the patches were diagnosed as take-all, which is caused by the root infecting fungus *Gaeumannomyces graminis* var. *avenae* (Gga). Take-all is usually referred to as a complex, which means that there are sometimes more than one pathogen present. The *R. zeae* that was isolated probably came in after the Gga had weakened the plant by destroying the root system. In a growth chamber study at 32C, the *R. zeae* isolates were not very aggressive on the bentgrass

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varieties Penncross, Penneagle, Pennlinks. This suggests that the *R. zeae* isolates are weakly pathogenic.

It is imperative to correctly identify the *Rhizoctonia* spp. responsible for a turfgrass disease prior to implementation of control measures. Otherwise, control may be ineffective, since these fungi have been found to be differentially susceptible to prescribed fungicides (10). There are many contact and systemic fungicides that are labeled for and provide good control of *Rhizoctonia* blight, especially when applied on a preventive schedule. Care should be taken when choosing a fungicide because PCNB, chlorothalonil and iprodione have been observed to have activity against *R. solani*, *R. zeae* and *R. oryzae*, whereas benzimidazole type fungicides, such as benomyl and thiophanate methyl, are efficacious only on *R. solani* (10).

Today we know that the evil Rhizoc that attack turf include *R. solani*, *R. zeae*, *R. oryzae* and *R. cerealis*. *Rhizoctonia solani* is Wisconsin's most aggressive Rhizoc while the others are either mildly aggressive or undetermined. What will the next century's scientists tell us about these fungi? Hopefully advancements will be made in our understanding of these fungi and the diseases that they cause so that fungicide usage on golf courses will decrease. Unfortunately, until we learn more about these evil villains they will continue to cause damage.

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