



Pathogen Personalities

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Turfgrass pathogens have personalities. If you can imagine pathogens as people with personalities, it could help you to address them when they rear their ugly heads. Pathogens, whether they are fungi, bacteria, viruses or nematodes, have unique personalities. Pathogens are a lot like unwelcome guests that mess up your house, eat all your food and give you a headache. Understanding pathogen personalities will help you politely nudge the unwelcome guest out of your world. Knowing what makes your guest uncomfortable will make managing them easier. This 'personification of pathogens' technique can be used as a mnemonic device or may just give you a different tactical perspective.

First, we should ask the question, "Why do we have turf diseases any-

way?" One answer could be that Mother Nature is just trying to have her way. Some say we should just let Mother Nature take her course, let turf diseases happen, let the fittest survive and the weak be taken out of the gene pool. I don't think many of you would have jobs with that attitude. Since there would be no need for turf pathologists, I am not in favor of that either. We can get a better understanding of diseases by pretending to be a pathogen.

Have you ever wondered what it would be like being a fungal pathogen? Your main goal in life is to perpetuate your DNA by creating offspring. Every function, structure and chemical reaction that takes place in you fulfills some function which has survival value. It is in that sense that everything you do has a purpose.

You could move around either by air or water, or you could be one of those soil-borne pathogens that spends most of its life essentially swimming in the root zone.

Personality is defined as the totality of distinctive traits of an individual (3). As a pathogen you have a unique personality that others recognize in your environment. Your personality describes who, when, where and how you eat turfgrass plants. This latter part of pathogen personality is the most important aspect for turfgrass managers. Recognizing your enemy and understanding the pathogen personalities will aid in managing these unwelcome guests.

Table 1 illustrates common turfgrass pathogens of Wisconsin golf courses. The pathogens can be grouped according to what type of

TABLE 1. Turfgrass pathogen personalities while visiting Wisconsin golf courses.

Ecological Group ¹	Fungus	Disease	Plant Part	Taxonomic Group ²	Wisconsin Severity ³	Ranking ⁴
Obligate Parasites	nematodes	nemas	roots	animals	W - M	NR
Facultative Parasites	<i>Lanzia/Moellerodiscus</i>	Dollar spot	foliage	Ascomycete	S	# 1
primary colonists	<i>Pythium</i>	Pyth. Blight	tissue non-specific	Oomycete	S	# 5
(poor competitors)	<i>Rhizoctonia</i>	Brown Patch	tissue non-specific	Basidiomycete	S	# 3
	<i>Typhula</i>	Snow Mold	tissue non-specific	Basidiomycete	S	# 2
secondary colonists	<i>Bipolaris</i>	Leaf Spot	tissue non-specific	Ascomycete	M	# 5
(good competitors)	<i>Exserohilum</i>	Leaf Spot	tissue non-specific	Ascomycete	M	# 5
	<i>Colletotrichum</i>	Anthrachnose	tissue non-specific	Ascomycete	W - S	# 4
	<i>Microdochium</i>	Pink snowmold	tissue non-specific	Ascomycete	M - S	# 4
Facultative Saprophytes	<i>Gaeumannomyces</i>	Take-all	roots/crowns	Ascomycete	S	# 4
	<i>Leptosphaeria</i>	Necrotic Ring Spot	roots/crowns	Ascomycete	S	# 4
	<i>Magnaporthe</i>	Summer Patch	roots	Ascomycete	M	# 6
	<i>Drechslera</i>	Leaf Spot	tissue non-specific	Ascomycete	M	# 5
Obligate Saprophytes	<i>Agaricus</i>	Fairy Rings	thatch, roots			
	<i>Coprinus</i> etc.		foliage	Basidiomycete	W - M	NR

1 Ecological Groups: obligate parasites=do not grow or multiply when not in contact with host; facultative parasite(fp)=lives primarily as saprophyte but can be pathogenic (opportunistic), fp-primary colonists=can move through soil and litter, rapid movement of cytoplasm, poor competitors, fp-secondary colonists=good competitors, restricted movement through soil and litter, quickly sporulates between food bases; facultative saprophyte=best equipped to be pathogens, decline rapidly when host not present, mostly pathogenic but can be saprophytic; obligate saprophyte=decomposer.

2 Taxonomic group: Nematodes are animals and the fungi are either oomycetes (egg or water fungi), ascomycetes (sac fungi) or basidiomycetes (mushroom fungi).

3 Wisconsin severity: W=weak; M=moderate; S=strong. 4 Ranking: relative importance (1, 2), #1=most important to NR=not ranked.

food they prefer to eat. The ecological groups are obligate parasites (OP), facultative parasites (FP), facultative saprophytes (FS) and obligate saprophytes (OS).

An OP is defined as an organism that can survive only on or in living tissues. The OPs have evolved a complex relationship with their hosts. These parasites don't want to kill their host because that would mean the end of the free lunch. OPs are kind of like the college graduate who moves back home with his parents, promising to pay rent when he is back on his feet. He eats a lot of carbohydrates and it is hard to get rid of him.

The facultative groups can best be remembered if you substitute "can be" for facultative. A facultative parasite is an organism that is usually a saprophyte but "can be" a parasite. I have separated the FPs into either primary or secondary colonists. The primary FPs are poor competitors and are thus probably more affected by biological control methods. These primary colonists are loud mouths among friends and shy in crowds because they dislike competition. The secondary FPs are good competitors and multiply like rabbits. These secondary colonists produce many spores and move from food source to food source quickly. The secondary

colonists are the all-around jocks who love competition, have lots of sex and therefore produce lots of offspring.

A facultative saprophyte is an organism that usually is a parasite but "can be" a saprophyte. These FS vegetarians prefer fresh, crisp greens and not the old decaying stuff. Most of the listed FS pathogens are root pathogens that are very difficult to control. These FS pathogens can experience a decline such as the "take-all decline" phenomenon. Lastly, the obligate saprophytes are those organisms that are solely decomposers.

The fungi are grouped into taxonomic groups based on their sex lives. The Oomycetes like to do it in the water (hydrophiles). The ascomycetes produce a sac-like sexual structure and the basidiomycetes produce a mushroom-like sexual structure. The tissues that these pathogens attack, the Wisconsin severity and the relative rankings complete the personalities illustrated in Table 1.

The pathogens not only have a culinary preference but they also have a particular time of year that they invite themselves into your turf world. I have created a "Wisconsin Bratwurst Turfgrass Disease Calendar" to show when these

pathogens are most active (Figure 1). This calendar idea is not new but I have tried to adjust it for Wisconsin. The activity windows will be different throughout the state of Wisconsin and the window for anthracnose basal rot is not well understood. The host specificity for the pathogens is also presented.

Yes, turfgrass pathogens have personalities. Pathogens, whether they are fungi, bacteria, viruses or nematodes, have unique personalities. Understanding pathogen personalities of these unwelcome guests will help you make them uncomfortable in your turf world. Utilizing the psychology of phytopathogens is an important part of turfgrass disease management.

Literature cited

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FIGURE 1. Turfgrass disease calendar for golf courses based in Madison, Wisconsin. Turfgrass hosts: (1) Bentgrass, Kentucky Bluegrass, (2) Bentgrass, (3) Kentucky Bluegrass, (4) Annual Bluegrass

