

DIAGNOSING TURF PROBLEMS: Is it a Disease?

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Proper diagnosis is a critical step in the management of plant diseases. Without a solid diagnosis, it's impossible to suggest or develop an adequate management strategy. As with most things, the more you know, the better equipped you'll be to take corrective action. In the case of turfgrass disease diagnosis, the more you know about the host, environmental and biotic factors that favor disease development, the greater the likelihood of making a correct diagnosis. The following five-step approach is but just one of many approaches available for diagnosing turfgrass problems. Be open-minded and don't make a situation fit into a predetermined disease.

1. Define the problem. Gather as much information as possible about the situation such as grass species, cultivar or variety; age of the stand; recent fertilizer or pesticide applications made; cultural practices implemented; weather trends; irrigation practices; use of growth regulators; history of problems; etc. It is essential to correctly identify the plant affected and to be familiar with its healthy state and characteristics.

Be sure to take seasonal effects into account. For example, rough bluegrass (*Poa trivialis*) turning brown during the heat of summer (going dormant) or zoysia grass (*Zoysia japonica*) turning brown after frost or cool temperatures in the fall are normal responses to the environment. Creeping bentgrass (*Agrostis stolonifera*) going brown in May is another story.

Know your hosts and how they change with the seasons, only then can you determine that a problem exists.



Photos courtesy of Joe Rimelspach

Why is there brown areas in this lawn?

2. Examine the entire turfgrass plant community. Don't jump right into examining the affected individual plant or area. Observe the entire plant community. For example, if you're making a trip to a lawn to examine for a potential disease, take notice of other lawns and turf areas along the way. Make a few calls to other turf managers within close proximity.

Once at the affected lawn or section of the lawn with problems, take a minute to look at the entire lawn and surrounding turf. Take note of light conditions, wind direction, slope of the land, air movement, soil conditions, etc. Then, focus your attention on the affected plant(s) or area. Examine the leaves, stems, crowns and roots. Be thorough in making observations and avoid a snap diagnosis.

3. Look for patterns – diseases don't occur in straight lines! Is only a single plant affected? Is the problem restricted to a certain area or a single species? Are the symptoms randomly distributed, or can you see distinct patterns or clear lines of demarcation between healthy and affected plants? Is the damage occurring in a pattern consistent with recently performed maintenance practices?

Random patterns are often indicative of diseases or insect pests, whereas uniform damage, such as streaks or lines or

damage over a large area, is indicative of an abiotic (chemical, physical or mechanical) culprit.

4. Timing of events: How did the problem develop? Did it appear suddenly or over time? Has the damage spread or stayed in the same location? Does the damage coincide with changes in the weather?

Progressive development and spread of a problem over time is often associated with a pest or pathogen. Acute damage or that which occurs suddenly is more typically caused by abiotic factors such as environmental stress, mechanical damage (caused by mowers) or fertilizer/chemical injury.

5. Look for evidence of a pathogen or pest activity. Specifically, look for key diagnostic signs or symptoms that are indicative of pathogens or insect pests. For instance, the presence of large numbers of fruiting bodies or mycelium might lead one to suspect a fungal infection. If you've gathered sufficient background information and nothing strikes you as being obvious, such as a chemical misapplication, and you've eliminated the possibility of pathogens and insect pests, retrace your steps and focus your diagnosis on abiotic factors.

This is where things get tough, and you may need to enlist the services of a plant pest or disease diagnosis laboratory to help narrow the range of probable causes. Whenever possible, include photographs or digital images to aid the diagnostician in their task.

Turfgrass diseases

Most turfgrass diseases are caused by fungi and fungal-like organisms (oomycetes such as *Pythium*). One convenient, albeit not absolute, way to classify turfgrass diseases is to

do so based on the part of the plant being attacked (i.e., foliage, foliage and crowns, crowns and roots). Table 1 lists the major diseases caused by fungi and oomycetes. There is no economically important turfgrass diseases caused by a bacterium or viruses in lawns in Ohio. In rare cases nematodes may cause significant damage to lawns in Ohio. The impact of nematode feeding on cool-season grasses in temperate regions is not as well understood.

Disease prevention and control

As pressures mount to reduce inorganic fertilizer and pesticide inputs on turfgrass, interest has increased regarding the development and use of integrated pest management (IPM) programs that forego or limit the use of pesticides. Certain fungicides are not labeled for use on home lawns or residential turfgrass. So read the label carefully and follow all guidelines.

The first line of defense to prevent or minimize disease is through the selection of disease-resistant turfgrass species/cultivars and certified seed. Information regarding disease-resistant turfgrass can be obtained by contacting local seed distributors, extension specialists and via the National Turfgrass Evaluation Program (NTEP, <http://www.ntep.org>). The use of genetically resistant turfgrass should be considered when establishing or renovating turfgrass areas or when overseeding.

The second line of defense is the use of cultural management practices that favor turfgrass health over pathogen activity. Cultural practices related to seedbed preparation prior to establishment are critical for seedling and root diseases such as *Pythium* damping-off and the patch diseases.

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Table 1. Turfgrass Diseases Caused by Fungi and Oomycetes

FOLIAR DISEASES	FOLIAR & CROWN DISEASES	CROWN & ROOT DISEASES
Dollar spot (<i>Sclerotinia homoeocarpa</i>)	Anthraxnose (<i>Colletotrichum graminicola</i>)	Dead Spot (<i>Ophiosphaerella Agrostis</i>)
Gray leaf spot (<i>Pyricularia grisea</i>)	Brown patch (<i>Rhizoctoniasolani</i>)	Bermudagrass decline (<i>Gaeumannomyces Graminis var.graminis</i>)
Gray snow mold (<i>Typhula</i> species)	Leaf spot/melting out (<i>Bipolaris</i> , <i>Drechslera</i> and <i>Exserohilum</i> species)	Fairy ring (numerous Basidiomycete fungi)
Pink patch (<i>Limonomyces roseipellis</i>)	* <i>Pythium</i> blight (<i>Pythium aphanidermatum</i>)	Necrotic ring spot (<i>Ophiosphaerella korrae</i>)
Pink snow mold/ Microdochium patch (<i>Microdochium nivale</i>)	Red leaf spot (<i>Drechslera erythrospila</i>)	Seeding disease and Daming-off (* <i>Pythium</i> , <i>Fusarium</i> <i>Microdochium</i> and <i>Rhizoctonia</i> species)
Powdery mildew (<i>Erysiphe graminis</i>)	Yellow patch (<i>Rhizoctonia cerealis</i>)	Spring dead spot (<i>Gaeumannomyces Graminis var. graminis</i> , <i>Ophiosphaerella narmari</i> , <i>O. Korrae</i> and <i>O. herpotricha</i>) Summer patch (<i>magnaporthe poae</i>)
Red thread (<i>laetisaria fuciformis</i>)		Take-all patch (<i>Gaeumannomyces Graminis var. avenae</i>)
Rust (<i>Puccinia</i> species)		
Smut (numerous genera)		
*Yellow tuft or Downy mildew (<i>Sclerophthora amacrospora</i>)		

*Oomycete diseases

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Under certain situations, it may be possible to modify poor quality soil conditions under existing turfgrass swards through the use of core aeration and organic matter topdressing programs.

Disease management in established turfgrass swards is often achieved by modifying cultural management practices such as mowing, watering, fertilization, tree pruning, topdressing and core aeration. Intensively managed turfgrass is often predisposed to environmental and biotic stresses, so it's crucial that agronomic practices be timed to optimize turfgrass health. By providing growing conditions that favor plant growth over pathogen development or activity, it's possible to minimize or avoid disease. Plant pathologists have developed a simple model called "The Disease Triangle". Practices that influence the temperature, moisture and fertility status of the turfgrass have the greatest impact on disease development.

Fungicide applications are often essential where there is a demand for high-quality turfgrass during environmental periods that favor pathogen growth. In general, fungicides are most effective when applied prior to the onset of disease symptoms (preventive applications). Fungicides applied after the onset of disease symptoms are typically made to slow or stop pathogen activity and to protect asymptomatic or healthy turfgrass (post infection applications). Note: the pathogen is not killed or eliminated with post infection applications.

Other considerations for effective use of fungicides include: selection of an effective fungicide product; use of proper application – if liquid the water volume is important (i.e., minimum of 2 gallons per 1,000 square feet); and nozzle selection for liquid applications. In the case of dry / granular products often more time is required to enter the turf plant to suppress the disease or to prevent infection. Remember preventative applications or applications at the early onset of a disease are the most effective. Always read and follow label recommendations when applying fungicides.

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