

# Turfgrass Disease Diagnosis

Proper sample preparation is the first step in the process of disease diagnosis.

BY DR. STEVE KAMMERER

When lumped with all other day-to-day tasks, disease management can be one of the most challenging problems that face golf course superintendents. Sometimes when problems arise on turfgrasses, an unknown “disease” is the presumed culprit. Sample diagnostics can be useful in identifying the primary potential pathogens and when they are most likely to be infecting. This information is critically important in designing an agronomic program for prevention of diseases. This article is

a short guide to taking the right steps to diagnosing problems associated with pathogens and extrapolating the results of a turfgrass diagnosis summary.

## TURFGRASS DISEASE SYMPTOMS VERSUS INFECTION

Diseases of turfgrass are symptoms of infection by a biotic (living) agent. Not all diseases of turfgrass are caused by fungi. Plant parasitic nematodes are also classified as causing disease in

turf. Interestingly enough, fungal pathogens and the diseases they cause have been documented as being more likely in turfgrass damaged/stressed by nematode feeding. The time period between infection and the appearance of visible symptoms can be short, as in the case of *Pythium* blight (*Pythium aphanidermatum*) and dollar spot (*Sclerotinia homoeocarpa*). Long infection periods that precede disease symptom expression exist with the diseases take-all patch and bermudagrass decline (*Gaeumannomyces*



It is important to search for both above-ground symptoms and below-ground symptoms before submitting a sample.



Plating the samples on growing media will help identify causal pathogens.

graminis varieties). In the case of leaf and sheath spot (*Chrysorhiza* / *Rhizoctonia zea*), sometimes called “mini-ring,” while infection may be rapid and progress for months, no obvious visible symptoms may be apparent until stresses that slow turfgrass growth favor the growth of the pathogen over the host (the turfgrass).

### FIRST STEPS TO FIELD DISEASE DIAGNOSIS

First, get out your disease guides. The *Turfgrass Disease Compendium* by the American Phytopathology Society (APS) is a great guide that describes the biology of the pathogens along with pictures. Second, invest in a good handheld field macroscope, and get down on your hands and knees. Dissect a portion of the affected turfgrass. Take pictures and notes of symptoms where they are occurring. Close-up pictures are critical, where you can literally see the individual turfgrass leaves. You cannot assume that all the symptoms in one area or all over the golf course are due to just one pathogen. Third, cut into the soil and observe the roots and soil profile. Many fungal pathogens of turfgrass are soil-borne and most active right at or below the soil surface, whereas the

symptoms may appear on the above-ground tissue.

### STEPS FOR PREPARING A SAMPLE FOR LABORATORY DIAGNOSIS

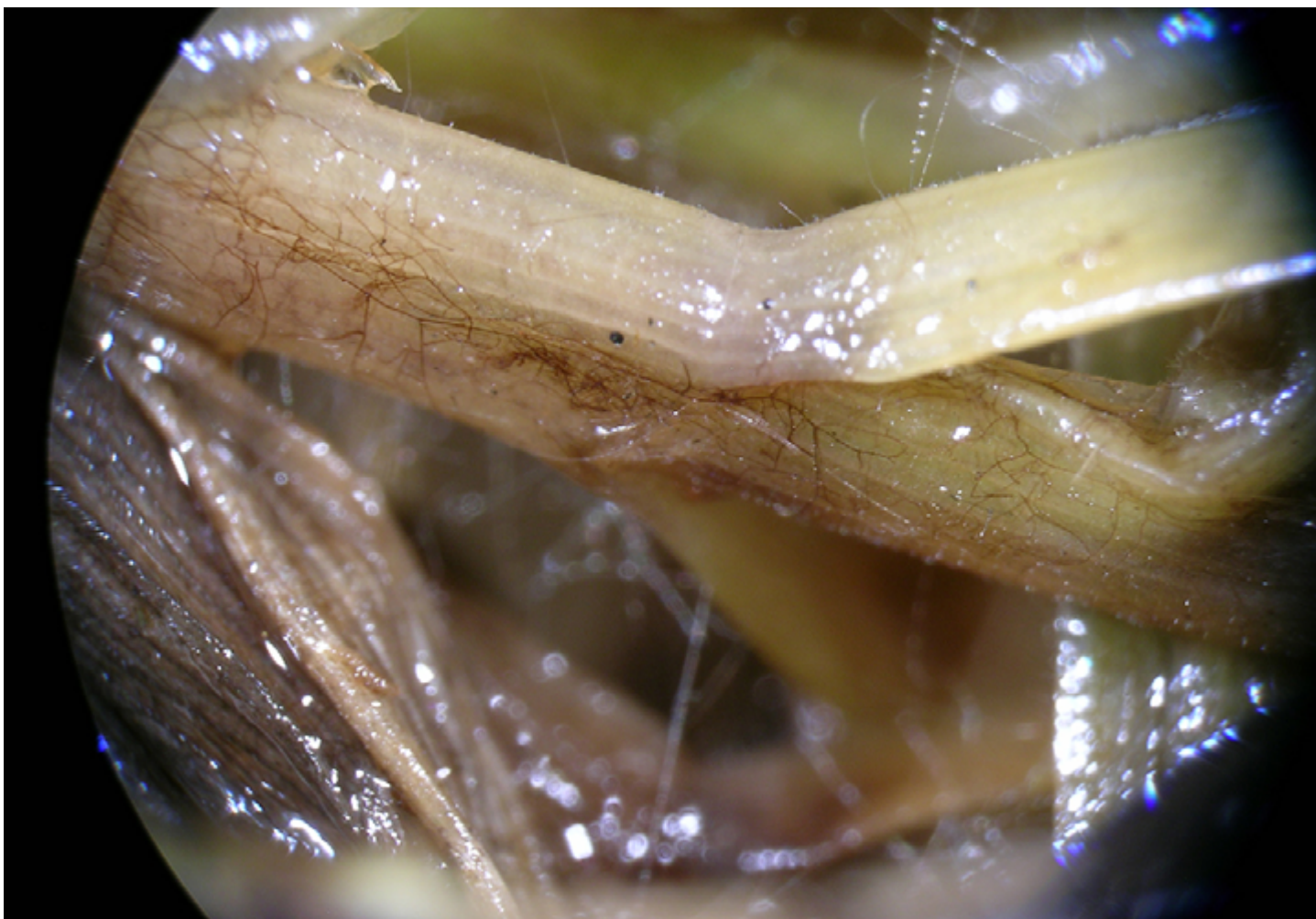
For laboratory diagnostics at a university clinic or otherwise, take samples as early as possible. As part

of my Ph.D. project at the University of Florida, I conducted a two-year scouting program in South Florida on seashore paspalum fairways. Twenty percent of the time when I visited a golf course and recovered a pathogen, there were obvious classic symptoms of the disease. However, 80% of the time there were vague to slight symptoms not consistent with typical of *Rhizoctonia* or *Rhizoctonia*-like diseases, yet fungal isolates within this group were still recovered. With regard to most of these “exceptions” where I obtained these fungal isolates from the surface sterilized turfgrass tissue, the superintendents were largely unaware of any disease issues or infection. Another important finding was that 35% of these recovered fungal isolates were associated with samples of below-ground root and rhizome tissues. As many sprayed fungicides bind or enter leaf tissue quickly upon drying, there is generally less fungicide moving to below-ground turfgrass tissues as compared to above-ground. Thus, there may be a better chance of identifying/recovering the causal pathogen from the below-ground tissues.

Take the samples prior to, not after, a fungicide application. Even if the diagnostic laboratory that analyzes



Disease diagnosis should not be rushed, if possible. Proper incubation can help identify causal pathogens so that effective treatment can be implemented.



*Diseases such as Rhizoctonia zeae can be found in hard-to-find areas, such as the crown of the plant.*

your samples uses selective media in an attempt to induce the fungal pathogen to grow out of the affected tissue for more conclusive identification, a fungicide application, especially of a xylem mobile fungicide, can really complicate the already difficult task of identification of the causal fungus. This can result in a diagnosis of “no pathogens found.”

If sending a sample to a diagnostic clinic or lab, confirm that someone will be there to receive the sample when it arrives. Do not ship a sample on a Friday because your sample may sit for three-plus days before someone sees it. Keep the samples out of the heat and sun after taking them and prior to shipping. If you are going to be traveling or outside for several hours or more, get a small cooler to keep the samples cool, but do not immerse the samples in ice or cold water. Samples should not dry out. Wrap the turfgrass

samples in aluminum foil and then place in a paper bags. Label each sample if taken from different areas. Use overnight shipping so the samples will arrive as fresh as possible.

Most clinics have a submission form. It is extremely helpful to include additional information on the submission form or via email. Pictures of the symptoms can be extremely helpful, and include any obvious cultural issues of the sample location, such as “this is a ‘push-up’ green that has drainage problems.” A short chronology of activities 30 to 45 days prior to the appearance of symptoms will be helpful as well. This should include fungicides applied and major cultural practices recently performed. Any and all additional information you provide can be extremely helpful.

A cup-cutter sample of the affected area is generally adequate for any diagnostic clinic. If variable symptoms

exist, several samples are useful. Because no superintendent wants a green to resemble Swiss cheese, an alternative is to get a smaller core sampler. Additionally, multiple smaller samples are better than one big cup cutter sampler. Sample from the edge of the affected areas. The University of Florida’s RAPID Turf diagnostic clinic’s diagnosticians plate out several pieces of turfgrass tissue on selective media and then assess the plates following incubation over a period of days to help quantify the results. It can be common to identify more than one presumed fungal pathogen out of a sample.

### **INTERPRETING THE DIAGNOSIS**

A superintendent once told me that when he sends out a turfgrass sample, he doesn’t include any pictures or additional information with the sample.

When I asked why, he said he wants a definitive diagnosis of what is present, and felt that including this additional information biases the diagnosis and leads to guessing. Disease diagnostics, especially for turfgrass, is a science and an art that takes experience.

There are “tricks” to diagnosing the most likely causal pathogens. Some fungi grow optimally at high temperatures, some at low temperatures, and some can grow through specific fungicides that inhibit other fungi — selective media incorporate some of these fungicides into the media. Certain fungi express very definitive and unique characteristics when the infected plants are grown in a high-humidity growth chamber versus when they are grown in a petri dish.

I receive phone calls from extremely frustrated superintendents or distributor reps who tell me, “I sent a sample to University A, then another sample to University B, and then yet another sample to a third lab, and I got three different answers.”

Or worse yet, “I got a diagnosis of no disease found.” I try to respond that “no disease found” is great information, as

it means that either the pathogen is in remission and your efforts are providing benefit, or the problem is not a disease but something else. This will save a lot of guessing and unnecessary fungicide applications. I’ve had a few superintendents “test me” by letting me sample an area that they had already treated once or several times with fungicide or had spot-treated with a non-selective herbicide to see if my diagnoses were just

educated “guesses.” A credible laboratory is one where every diagnosis is not necessarily a disease.

A turfgrass sample sent to a diagnostic lab is a “snapshot in time.” It can be quite common to get a different diagnosis each time you take and ship

an economical preventive fungicide program, targeting applications prior to the heavy summer rains and focusing on a *Pythium* fungicide in conjunction with a contact fungicide for the *Bipolaris*. These preventive applications resulted in less fungicide applied,

less spraying, less money spent, and less time/labor involved in fighting this continuing problem curatively. Most important, the turfgrass responded favorably and the disease was much less severe.

Remember that turfgrass damaged by disease requires time to recover and grow new tissue. If the weather or growing conditions are less than optimal, turf recovery may be slow. It doesn’t necessarily mean that the disease or the pathogen is still active. Additionally, weak turfgrass is much more susceptible to infection by secondary pathogens, so preventive fungicide applications need to be initiated or continued until the point that the turf has fully recovered.

## CONCLUSION

Disease management is a challenging facet of turfgrass management. Planning and use of preemptive turfgrass sampling techniques for

pathogen detection will help guide activities on the golf course and will assist in identifying the diseases of significance that need attention.

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Sometimes, two diseases can be present and active at one location. Both *Rhizoctonia* and *Pythium* were identified in this location.

a sample, even to the same lab. It has been documented that zoysiagrass initially damaged by *Rhizoctonia* experienced delayed recovery due to secondary infection by *Pythium*. I worked with a golf course that had severe yearly outbreaks of *Bipolaris* leaf spot, even after several fungicide applications. Upon taking samples from this golf course, I recovered *Pythium* from about 15% of the surface sterilized tissue. We designed