

Down with PRD

The mysterious pythium root dysfunction scares superintendents, but there are preventative measures they can take to make sure their roots stay healthy and PRD-free. BY JASON STAHL

“Mysterious” is a scary term to describe any turf disease, but that’s exactly the word Jim Kerns uses when talking about pythium root dysfunction (PRD)

Caused by the root pathogen *Pythium volutum* and impacting creeping bentgrass greens, Kern, a turfgrass pathologist at North Carolina State University, says it doesn’t act the way most superintendents expect. There are other reasons why it’s shrouded in mystery, too.

“If you actually look at the root system, it doesn’t look that bad,” says Kern. “The pathogen infects during spring and fall when the soil temperature is between 55

and 75 degrees Fahrenheit. And the symptoms don’t show up till you enter a stressful period (soil temperature increase to greater than 90 degrees Fahrenheit). So by the time you see the symptoms, going out and treating for it can be very challenging.”

But before you talk about managing PRD, you must be able to distinguish it from pythium blight and pythium root rot – two completely different diseases. According to Kerns, pythium blight occurs when pythium species attack the foliage of the plant. Pythium root rot is easy to detect because, if you pulled up a sample, the roots would be rotten, black and stinky. PRD is not as easy to determine.



Pythium root dysfunction (PRD) got its name because it doesn’t kill the roots, it just impairs their function. It’s difficult, if not impossible, to see without a microscope.

“PRD got its name because it doesn’t kill the roots, it just impairs their function somehow, whether it’s nutrient uptake or water uptake,” says Kern. “We tried to figure out which one of these functions it impairs through studies, but we couldn’t distinguish between the two. But we did determine that the pathogen impairs root hair development, and that would imply that the turf is having trouble getting water and nutrients up to the foliage.”

The kicker is that it’s also extremely difficult to diagnose. First, because it affects the root system, it can be hard to see.

Key points

- The pythium root dysfunction (PRD) pathogen infects during spring and fall when the soil temperature is between 55 and 75 degrees Fahrenheit.
- PRD symptoms don’t show up until you enter a stressful period, such as high temperatures.
- PRD doesn’t kill the roots, it just impairs their function.
- It’s also extremely difficult to diagnose, and nearly impossible to see without a microscope.
- While PRD has been seen throughout the U.S., it’s most active on Mid-Atlantic and Southeastern courses.

Second, it can also be found on healthy roots, so just seeing it doesn’t necessarily mean you have the disease. Finally, the symptoms can be confused with take-all patch.

“So really, the only surefire way to diagnose the disease is to send it to a diagnostic clinic,” says Kern, who recommends North Carolina State, Rutgers, Purdue or the University of Wisconsin – labs he personally knows have stayed abreast of the disease and know what to look for.

PRD is difficult if not impossible to see without a microscope, which is one of the reasons Kern recommends sending a sample to a clinic. He especially emphasizes the clinic route for those superintendents who haven’t had it diagnosed in the past.

“One of the biggest issues I’ve found is that many vendors will say you need to treat for this particular disease, and then you have people treating for it who have never had previous experience with it or anything remotely similar to it,” says Kern. “Not to say it couldn’t hurt, but what I like to say is if you’re going to do that, you need to pick the right fungicide where you’re getting the most bang for your buck.”

Kerns emphasizes that super-



If they’re not seeing results from their traditional fungicide programs, superintendents should have turf samples diagnosed for PRD.

intendents will not be able to see PRD with the naked eye. He says it does not create any real defining feature in the foliage.

“From what we’ve seen, the pathogen never gets into the foliage, so you basically just see a decline when it initially starts,” he says. “It would look like an area suffering from heat or drought stress, a small little patch that might be drying out that then, over time, gets progressively worse.”

So how do you manage it? The experts, including Kern, all promote a preventative approach. But Kern doesn’t necessarily believe it’s a lost cause if you haven’t

managed it preventatively and it surprises you.

“You can do something about it once it appears because it’s primarily a stress-induced disease,” he says. “Doing simple things like raising your mowing height, adding more fertilizer and anything to limp the plant through the summer months can help you manage it – it’s just a lot more challenging than if you managed it preventatively. If you continue to manage your greens at extremely low mowing heights and limit fertilizers, then the tissue can collapse pretty quickly.”

Some experts have said that superintendents will typically scout wet, low-lying spots on their courses and then make preventative applications during hot, humid weather conditions. Those conditions may be the best time to try to stave PRD off, but as far as weather having anything to do with PRD rearing its ugly head, Kern says he has not seen any pattern. He has not seen an increase in it over the last couple years of unseasonably warm winters and hot, dry summers, only that it has lingered on. But one interesting characteristic has been determined.

“Back in the early ‘80s when Clint Hodges was studying PRD at Iowa State, we found that this disease was most problematic on

MAXIMIZING ROOT HEALTH

BEING THAT PRD is a root disease, measures that promote healthy root production are key to managing it. One measure is to not limit nitrogen fertility.

Root cultivation such as core or solid tine aerification followed by topdressing in the spring and fall is also key, says Maria Tomaso-Peterson, Ph.D., associate research professor, plant pathology, Mississippi State University.

“Root cultivation promotes an increased root mass that can better withstand PRD,” says Tomaso-Peterson. “A weakened root system, due to a lack of root cultivation, may be a contributing factor to the overall decline during the stressful summer months. Spent cores should always be removed prior to topdressing. Core removal reduces the level of *P. volutum* and other associated root pathogens by physically removing the pathogens and any associated infected roots.”

Monitoring for nematodes is also critical to keeping creeping bentgrass roots healthy in that they may be a factor that weaken them, making them more vulnerable to PRD. Their feeding sites, says Tomaso-Peterson, can serve as a point of entry for PRD.

“And that may increase infection and overall foliar dieback,” she says. “Monitor the nematode populations and treat if populations are above the threshold.”

newer putting greens less than 10 years old,” says Kern. “I think the reason we haven’t seen either increases or decreases in the disease is because we haven’t had a lot of new construction or renovations.”

As far as why new greens would be more susceptible to PRD than older greens, the experts simply don’t know. A valid hypothesis, Kerns believes, is that maybe the roots on new greens aren’t as developed. Or, as greens age and develop more organic material, perhaps the microbial environment is less conducive to the pythium species’ survival.

PRD has been spotted throughout the U.S., but, according to Kerns, it seems to be predominant in the Mid-Atlantic and Southeast states where there are prolonged periods of stress during the summer. Recommendations for those areas include two applications one month apart of Insignia, Segway or Signature tank mix when soil temperatures are around 55 to 60 degrees at a two-inch depth.

“This method has stood up outside of the Southeast, but it has not been documented with research,” Kerns says. “But in my experience, PRD hasn’t been a major disease outside of the Southeast and has been fairly limited in other areas around the country.”

But he admits that the weather patterns of the last few years give other regions reason to be concerned.

“Over the last couple summers, that stress has moved into other areas, for example Ohio, Wisconsin and maybe the Northeast, so I advise superintendents to be on the lookout for PRD but also to not be scared of it. It used to be a hot button issue when it was a new disease and was a one-hit wonder for a long time, but I think things are starting to calm down a little now.”

Kerns recommends that superintendents send in samples of their turf to be diagnosed for PRD if they’re not seeing results from their traditional fungicide programs.

“For example, in Ohio, a lot of superintendents are probably treating for take-all patch, and then they’ll see symptoms in the summer and wonder why their application didn’t work,” he says. “If that’s the case, send samples to a diagnostic lab or local extension to figure out if the problem is caused by take-all or PRD.”

Kern offers another observation: “We have only ever seen it on creeping bentgrass. Some people have claimed they’ve seen it on annual bluegrass, but I personally have never diagnosed it on that.” **GCI**



The PRD pathogen infects during spring and fall when the soil temperature is between 55 and 75 degrees Fahrenheit. The symptoms, though, don't emerge until the turf enters a stressful period.