

# Taking Care of Root Diseases



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## COMING UP THIS WEEK:

What the ... ?  
Managing Oomycetes  
Managing Fungal Rots  
Cultural Management  
Disease Webinar

**Ball Culture Guide**  
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## What the ... ?

I was visiting growers in Michigan six weeks ago when I came across a crop of petunias that were melting away with dead plants right next to some seemingly healthy ones.

Well, "seemingly" because their roots weren't looking that great upon closer examination. Since the symptomatic plants weren't distributed evenly across the entire area and the symptoms seemed to have some pattern of progression, I thought it may be a root rot disease. The grower thought so too, but he was puzzled by the failure of cultural management (keeping the media on the dry side) and mefenoxam (Subdue Maxx) treatment in keeping the disease under control. (Go [HERE](#) where I discussed how to distinguish biotic and abiotic disorders.)





There are quite a few root and crown diseases that can cause havoc in a greenhouse—Pythium, Phytophthora, Sclerotinia, Fusarium, Rhizoctonia, black root rot, to name a few. Ever heard of Phytopythium? I didn't know about this new group of oomycete pathogens until last October. Formerly grouped under Pythium, Phytopythium is a widespread and damaging pathogen of ornamental plants.

I texted the picture to Aaron Palmateer, who's with Harrell's, on the spot. After some back and forth, a little field identification, and the process of elimination, we thought it might be Rhizoctonia. Here's when I emphasize the need to send in samples and have the disease properly identified.

As y'all will see in today's newsletter, fungicide efficacies differ tremendously among target pathogens. Field diagnosis isn't 100% reliable because the symptoms can be quite similar among some species. That day, we did a quick-and-dirty diagnosis on the spot and made a treatment recommendation that can cover many potential diseases to save a crop.

Hopefully, y'all scout your crops regularly, pick out plants that simply don't look right, find out what's causing the problem (and if it's indeed a problem that needs addressing) and select the right solutions for the problems. I know, it's frustrating not to know the answer immediately. But a proper disease diagnosis is worth the wait, especially if the infection isn't widespread and you have a little time on your side.



## Efficacy Against Oomycete Root Diseases

I heard the news that Albaugh has received registration of its systemic fungicide **Thrive 4M** in California. I thought, "Awesome. One more piece of news for the newsletter. And the root disease pic will be a good lead-in for this news." Alas! Thrive 4M, which contains mefenoxam, isn't for use on ornamental plants, so ... cue the wah-wah, please.

Think that'll stop me from populating this newsletter with something, useful or not? Y'all are underestimating my determination to milk enough second income from this writing gig to buy a used jon boat. (Those who've followed this newsletter from the very beginning perhaps remember "buying a jon boat" is a goal of me writing this newsletter. I still haven't gotten a jon boat yet because competing demands have continued to surface over the past six years.)

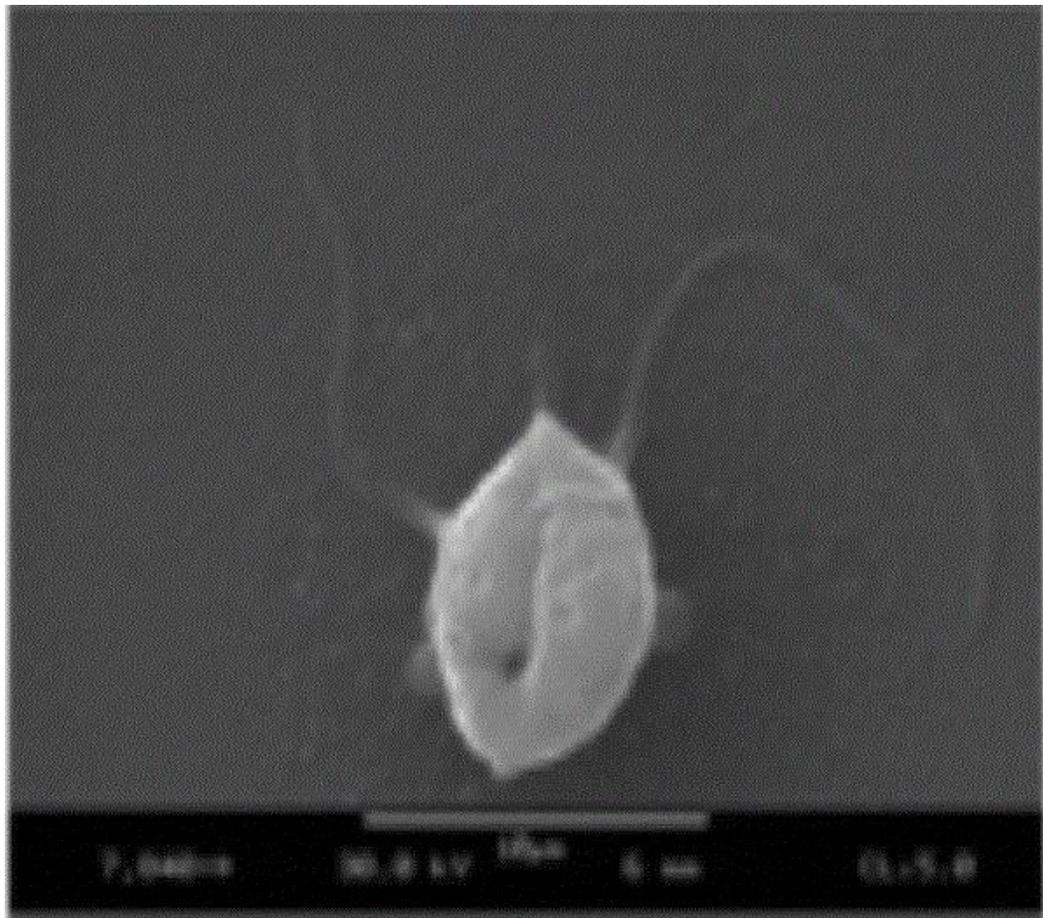
I, once again, used IR-4's research summaries to find out which fungicides may do a good job of managing root and crown rots. The IR-4 Environmental Horticulture Program published research summaries for Phytophthora in 2024, Rhizoctonia in 2023, Pythium in 2022, and Fusarium and black root rot in 2021.

Let's start with the oomycetes ...

Researchers conducted 926 trials against various Phytophthora species from 2003 to 2015. A total of 65 active ingredients were tested. As I read through the research summary, I was impressed by how fungicide efficacy differed among Phytophthora species, host plant species and even among trials against the same species. So it's important to get the species identified by a diagnostic lab, if at all possible, before selecting the best products. If you don't know which Phytophthora species you're dealing with, but you *need* to do something quick, the products that seem to have performed well

against multiple species are ametoctradin (Orvego; FRAC 45), cyazofamid (Segway; 21), dimethomorph (Stature; 40), fenamidone (Fenstop; 11), fluopicolide (Adorn; 43), fluoxastrobin (Fame; 11), mandipropamid (Micora; 40), mefenoxam (Subdue Maxx; 4), and phosphorus acid generators (such as fosetyl-AI or Aliette and phosphites or Alude; P07).

Again, the above are fungicides that did well across multiple species. If you know which species you're dealing with, there may be additional effective options. Go [HERE](#) to find out the best conventional fungicides for each species.



A zoospore of Pythium. Notice the two flagella that help propel the zoospore in the water. (Source: [Deutsch Wikipedia](#).)

The research summary for Pythium included data for 47 active ingredients tested against multiple species of Pythium root rots and blights. The data came from IR-4's own trials from 2010 to 2013 and various publications. Pythium and Phytophthora were recently selected by IR-4 and researchers as top research priorities, so more data will be generated in the coming years and added to the summaries.

Like what we saw with Phytophthora, the same active ingredient had different efficacies against different Pythium species. In fact, I feel that variations in Pythium efficacies are greater than those in the Phytophthora efficacies. This again points to the importance of properly identifying the causal Pythium species.

With the great variability in mind, products that seemed to have generally good to excellent efficacy across the board include azoxystrobin (Heritage; FRAC 11), cyazofamid (Segway; 21), etridiazole (Terrazole; 14), fenamidone (Fenstop; 11), fluopicolide (Adorn; 43), mefenoxam (Subdue Maxx; 4), and pyraclostrobin (Empress Intrinsic; 11). Boscalid + pyraclostrobin (Pageant Intrinsic; 7 + 11) and fluoxastrobin (Fame; 11) also seem to work well, but they're currently not labeled for Pythium management. Go [HERE](#) to read the research summary.

Wait, wait ... what about biologicals against Phytophthora and Pythium? Unfortunately, many biological products didn't perform particularly well or consistently against Phytophthora or Pythium. I'd be hesitant to rely on biologicals completely when dealing with oomycetes.



## Efficacy Against Fungal Root Diseases

The efficacy of 44 products against *Rhizoctonia solani* were evaluated in 117 trials from 1999 to 2023. Quite a few products are effective against *Rhizoctonia*, including azoxystrobin (Heritage; FRAC 11), azoxystrobin + benzovindiflupyr (Mural; 11 + 7), boscalid + pyraclostrobin (Pageant Intrinsic; 7 + 11), fludioxanil (Medallion; 12), fluopyram + trifloxystrobin (Broadform; 7 + 11), fluoxastrobin (Fame; 11), fluxapyroxad + pyraclostrobin (Orkestra Intrinsic; 7 + 11), metconazole (Tourney; 3), pentachloronitrobenzene (Terraclor; 14), pydiflumetofen + difenoconazole (Postiva; 7 + 3), pyraclostrobin (Empress Intrinsic; 11), polyoxin-D (Affirm; 19), thiophanate-methyl (3336; 1), trifloxystrobin (Compass; 11), triflumizole (Terraguard; 3), and triticonazole (Trinity; 3). Mefentriconazole (Aveylo; 3) and isofetamid (Astun; 7) were effective, but aren't currently labeled for *Rhizoctonia* management.

Among the biologicals (FRAC BM 02), *Gliocladium virens* (SoilGard) and *Streptomyces lydicus* (Actinovate) were good to excellent, but *Bacillus amyloliquifaciens* strain F727 (Stargus) and *Trichoderma* species (RootShield and RootShield Plus) had variable efficacy. Go [HERE](#) for the research summary on *Rhizoctonia*.

Do you know *Thielaviopsis* is now *Berkeleyomyces*? Not only that, what was previously *Thielaviopsis basicola* is now two species—*Berkeleyomyces basicola* and *B. rouxiae*. I didn't know about the change of name and split of species before I read an article by Inga Meadows and Cecelia Stokes of North Carolina State University this morning. The changes smell fishy to me. I think someone in a lab somewhere in South Africa thought, "Hey, if I split this species into two and give them a new genus name then I can publish another paper!" (I know, it's awful of me to joke about my fellow scientists.) You know what? I'm going to keep calling this disease black root rot because I can pronounce neither *Thielaviopsis* nor *Berkeleyomyces*, even when sober.



Healthy (left), blackened (middle) and reduced root masses (two on the right) of pansies infected by black root rot. (Photo

credit: Mike Munster, North Carolina State University. Go [HERE](#) for a post on this disease.)

Back to the efficacy summary: 35 active ingredients were tested against that pathogen from 2003 to 2020. The trials used thiophanate-methyl (3336; FRAC 1) or triflumizole (Terraguard; 3) as standards; these were very effective. Other effective fungicides are fludioxanil (Medallion; 12), mefenconazole (Avelyo; 3), and polyoxin-D (Affirm; 19). Azoxystrobin + benzovindiflupyr (Mural; 11 + 7), metconazole (Tourney; 3), and pyraclostrobin (Empress Intrinsic; 11) are also effective, but not currently labeled for black root rot. The efficacies of fluxapyroxad + pyraclostrobin (Orkestra Intrinsic; 7 + 11) and biologicals were variable. Go [HERE](#) to check out the black root rot efficacy summary.

It's my opinion that Fusarium is the most difficult to manage among the fungal root diseases. That's based on my own observations, hear-say and the lower number of fungicides effective against this disease.

IR-4 research summary corralled the efficacies of 40 active ingredients against five Fusarium species from 48 trials conducted on ornamental plants and vegetables from 2001 to 2020. The efficacy of most active ingredients were variable, ranging from excellent against one Fusarium or plant species to god-awful in another. The research summary labeled these fungicides as "promising though inconsistent:" azoxystrobin (Heritage; 11), fluxapyroxad + pyraclostrobin (Orkestra Intrinsic; 7 + 11), metconazole (Tourney; 3), pyraclostrobin (Empress Intrinsic; 11), pydiflumetofen + difenoconazole (Postiva; 7 + 3), trifloxystrobin (Compass; 11), and triticonazole (Trinity; 3). Isofetamid (Astun; 7) and mefenconazole (Avelyo; 3) are also "promising but inconsistent," and currently not labeled for Fusarium. Go [HERE](#) to dig through the data on Fusarium on your own.

Go [HERE](#) to access all of IR-4's research summaries for free! These reports work so much better than Quiviq in inducing sleepiness for non-nerds. Of course, talk to your favorite pathologists or extension agents to find out about options that are available in your states or for your particular use sites and crops.



## Do I Have to be a Nozzle-head?

No, of course not! There's more than one way to deal with root diseases—spraying fungicides is just one of several approaches. I'd pay close attention to three actions to prevent root and crown diseases from ever starting—start clean, don't overwater and don't overfertilize.

Starting clean is easy to understand, I hope. Y'all want to buy from reputable propagators and start with uninfected seedlings or cuttings, otherwise, you're just bringing in problems. How do you know the incoming materials are infected? Well, quarantine the materials that don't look right, and diagnosis and treat for whatever problem you may see while in quarantine.

Starting clean also includes using clean media, pots, trays, etc. Sanitize benches to get rid of debris and pathogens. Definitely sanitize pots if you're going to reuse them. Media should be stored properly and away from potential sources of contamination. Infected plants and old/unsold plants should be dumped promptly so they never have the chance to become a source of pathogens.

Excessive wetness and salt content (from overfertilization) are great for root pathogens, particularly the oomycetes. Fertilizers are basically salts; too much of them can damage roots and open wounds to allow pathogen invasion. Keeping media at the right moisture and EC at the right levels not only makes the environment less favorable for the movement or germination of pathogens, but it also makes plants healthier and happier.

These three actions, in addition to others (such as maintaining the proper pH and temperature, and managing fungus gnats and shore flies), form the cornerstones of a disease management program. You'll stack preventive fungicide applications on top of these to build a comprehensive program.

## Root Disease Webinar

If you'd rather listen to a real pathologist talk about disease management instead of reading a newsletter by some entomologist pretending to be a pathologist, here's your chance.

The American Floral Endowment (AFE) will be hosting a webinar by Francesca Hand of The Ohio State University at 1:00 p.m. Eastern/noon Central on May 21 as part of its Grow Pro Webinar Series. Francesca will talk about identifying and managing fungal and oomycete root rots in floriculture.



Go [HERE](#) to register for this free webinar. You better do it quick if you read this newsletter on Monday or Tuesday. While you're at it, check out the many webinars (and recordings of previous webinars), from drones to thrips and tissue culture, offered by AFE in the coming months.

See y'all at Francesca's webinar!

A handwritten signature in black ink, appearing to read "JC Chong".

[JC Chong](#)

Technical Development Manager at SePRO  
Adjunct Professor at Clemson University

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