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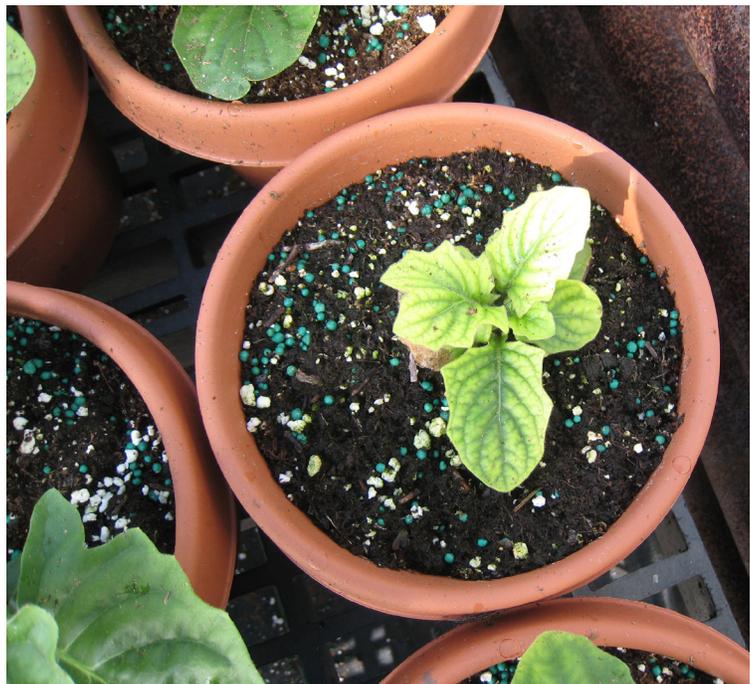
## Pythium Problems

*Overwatering can cause many problems, Pythium root rot is one.*

We've had some wild swings in the weather lately - from sunny and spring-like to gray weather and frigid winter temperatures. If you are not paying attention and irrigating carefully, you can struggle to keep your irrigation at the right level. There is plenty to worry about if you are providing too much or too little irrigation. Brian Krug nicely summed up some issues in the e-GRO Alert, *Cold Temperatures + Cloudy Days = Careful Watering* (<http://www.e-gro.org/pdf/325.pdf>). More great tips on proper irrigation can be found in *Water Management - More an Art Than a Science* ([http://www.e-gro.org/pdf/E-Gro\\_Bulletin\\_1\\_15.pdf](http://www.e-gro.org/pdf/E-Gro_Bulletin_1_15.pdf)).

Root rot is one thing to always be concerned about when plants are sitting in media that is too wet for too long. Sure enough, there have been numerous reports of trouble with Pythium root rot this spring.

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Gerbera plant showing stunt and chlorosis, a result of Pythium root rot.

## e-GRO Alert

[www.e-gro.org](http://www.e-gro.org)

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Snapdragon plant wilting as a result of Pythium root rot.

Root rots are often first noticed when plants appear ‘hungry’ or nutritionally deficient, showing chlorosis/ yellowing or are stunted. Wilt is also an early sign that roots might be compromised. Sometimes you will see stem or crown rot, or lower leaf death. When the roots are inspected they will appear poorly developed, brown and rotted. You will often see ‘rat-tails’, roots in which



Root rot symptoms where the outer root surface has sloughed off, leaving the inner core.

the outer root surface has sloughed off. (While this symptom is often associated with *Pythium*, it can also be observed with other root rots.) When inspecting roots for diagnosis, it's always a good idea to compare to the roots of a healthy looking plant of the same crop.

It is difficult to tell different root rots apart visually, so it's likely necessary that you seek help with diagnosis. Remember that a fungicide labeled for *Pythium* root rot will not necessarily be effective in managing another root rot.

To help manage and prevent *Pythium* root rot, use good cultural practices. Avoid overwatering; pay attention to the current weather conditions as well as the upcoming weather and irrigate accordingly. Do not plant too deep, use well-drained growing media, good quality plant material, and appropriate growing conditions for the crop.



A comparison of a healthy root system (left) to roots infected by *Pythium* (right).

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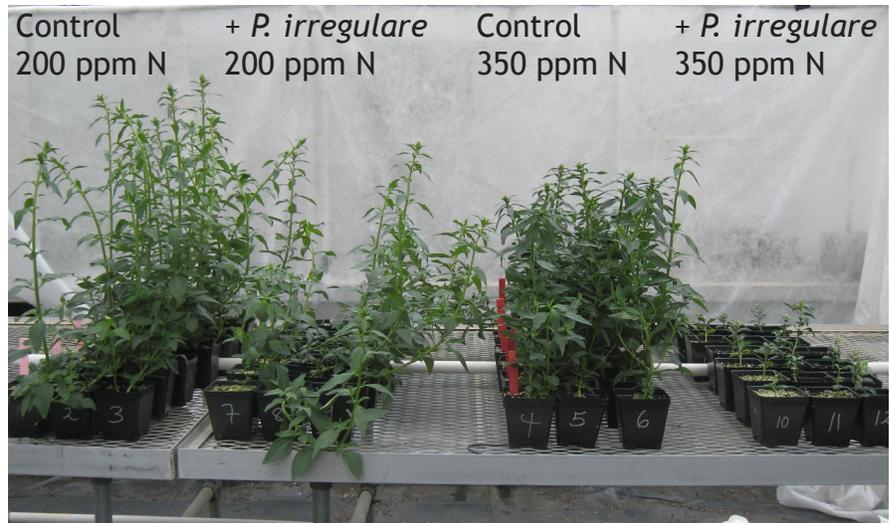


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Also make sure not to over fertilize - a too high rate of fertilizer can make a root rot problem much worse. To illustrate this point, Margery Daughtrey (Cornell University) and I ran a demonstration trial a few years ago. Snapdragon plants were fertilized with 200 ppm N or 350 ppm N, and half the plants of each group were inoculated with *Pythium irregulare* at transplant. While we saw symptoms of *Pythium* root rot on the inoculated plants fertilized with 200 ppm N, the symptoms were sporadic and far less devastating than on the snapdragons grown with 350 ppm N. See the photo to the right.

In the photo of the trial, you might think the non-inoculated plants fertilized with 350 ppm N look more compact and nicer than the non-inoculated plants fertilized with 200 ppm N. However, be aware that while they appear nice at first glance, we observed that the quality of the root systems were poor in comparison to the control plants fed with 200 ppm. At high rates you not only have to worry about opening the door for or exacerbating a *Pythium* issue, you also need to worry about injury due to high salts.



*Pythium irregulare*-inoculated and non-inoculated control snapdragon 'Rocket White' plants grown at two fertilizer rates.



Young New Guinea impatiens affected by *Pythium* root rot.

If needed there are numerous products labeled for *Pythium* management. Etridiazole materials (e.g., Terrazole, Truban; also found in Banrot) have been most effective in research trials. Subdue MAXX has also performed well in research trials, though resistant strains of *Pythium* are not uncommon. Other labeled products that will provide some management include phosphorous acid materials (e.g., Alude, Aliette, Areca, KPhite, Fosphite, etc.), fluopicolide (e.g., Adorn), and strobilurin materials such as pyraclostrobin (e.g., Insignia, Empress) or fenamidone (e.g., FenStop). Always read labels and rotate between fungicides with different modes of

action. Not all products listed will be labeled for use in all states.

Other products labeled for *Pythium* prevention include biofungicides such as *Bacillus subtilis* products (e.g., Companion, Cease), *Streptomyces* products (e.g., Mycostop, Actinovate), *Trichoderma harzianum* products (e.g., RootShield), and *Trichoderma virens* products (e.g., SoilGard).



Snapdragons with *Pythium* root rot.



Geranium roots showing symptoms of *Pythium* root rot.