GROWERTALKS

Pest Management

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Diseases Caused by Thielaviopsis basicola

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Thielaviopsis basicola is a root pathogen reported from at least a dozen plant families, including those of many ornamental plants. The most commonly affected ornamental plants are pansy, calibrachoa, annual vinca (catharanthus), salvia and petunia. The disease is also sometimes found on cyclamen, fuchsia, gaillardia, gerbera daisy, holly, snapdragon, geranium, lithodora, phlox, poinsettia and verbena.

Symptoms

Depending on the susceptibility of the plant and the severity of root rot, wilting may or may not occur. Plants are often yellow and stunted with irregular growth. Roots severely infected by *T. basicola* are darkly discolored, leading to the common name black root rot. Other root pathogens like Pythium and Fusarium tend to cause brown or water-soaked root damage.

Root symptoms can be diagnostic due to a distinct blackening caused by the presence of chlamydospores and other fungal structures on the root surface.

Pictured: Black root rot on calibrachoa, vinca, pansy (left pot) and creeping phlox.

Conditions for disease

Root rot is most severe at soil temperatures of 55 to 63F (12 to 17C), but some researchers have reported optimum temperatures as high as 77F (25C). Disease develops over a wide range of potting medium moisture levels (36% to 70%), making management of water level less important.

The most common source of black root rot has been identified as use of infested soil, but especially reuse of contaminated trays and pots. There are reports of *T. basicola* contamination of commercial peat moss. Research from Florida citrus researchers showed that three of 14 samples

of unused peat-based potting media and two of 12 bales of Canadian sphagnum peat were found infested with low levels of *T. basicola*. Isolates of *T. basicola* from these sources were able to cause significant black root rot on several species of citrus tested.

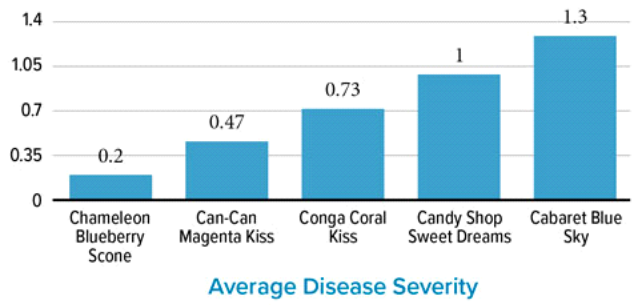
Management

Work in the mid-1990s showed the effect of nitrogen source and ratio, as well as pH on severity of black root rot on pansy. The NO3/NH4 ratio was the most critical factor in determining black root rot severity. Disease incidence was lowest with high ammonium and low potassium. Disease is greatly reduced at pH levels below 5.5. It's actually more effective than fungicide applications in many cases.

In general, cultivar resistance hasn't been a practical method of disease control since the product mix is constantly changing. Cultivars of pansy have been tested for susceptibility to *T. basicola*. Most resistance was seen in the following cultivars: Fama Silver Blue, Clear Sky White, Crown Golden, Fama Blue Angel, Fama Dark-Eyed White and Happy Face Y1/Blotch.

There have also been several trials conducted on calibrachoa cultivars (Figure 1). Researchers used five different isolates of *T. basicola* with results that were somewhat different for the isolates, with some causing more disease symptoms than others. However, the cultivar response was pretty consistent. The most resistant cultivar was Chameleon Blueberry Scone and the most susceptible cultivar was Cabaret Blue Sky.

Figure 1. Relative black root rot severity on five calibrachoa cultivars. The average is for five different isolates of *Thielaviopsis basicola*.



Fungus gnats and shore flies carry spores of *T. basicola*, as well as *Fusarium spp.* Chlamydospores (long-lasting structures—sort of like seeds) of *T. basicola* have been found in frass (droppings) from shore flies (adults and larvae collected) close to naturally infected plants. Approximately 95% of the adult flies and 85% of the larvae were internally infested with the pathogen. Pathogen-free adult shore flies were shown to acquire the pathogen by ingestion after feeding on naturally infected plants. Contaminated adults transmitted the fungus to healthy seedlings and they became infected. This makes controlling insects an important part of any black root rot control program.

Fungicide studies

Many fungicides have been tested against black root rot on pansy, vinca, calibrachoa and petunia. I didn't include products that cannot be used as a drench or those with only a single trial completed (published) since 2002. Pansy was tested in 19 trials, vinca in six trials, petunia in eight trials and calibrachoa in four trials. (Table 1 summarizes many of these trials.)

The most consistently highly effective products are those containing thiophanate methyl (FRAC 1 - Cleary 3336 and OHP 6672). It's been tested more than any other active ingredient based on serving as the best control of black root rot for the past 25 years or longer.

Products containing polyoxin D (FRAC 19) have also shown very good to excellent results (only Affirm is currently available). Good results are sometimes seen with products in FRAC 3. Of the FRAC 3 fungicides, Avelyo has been very safe on crops tested even when used as a soil drench, providing excellent control of black root rot. Interestingly enough, Avelyo also promotes rooting. Terraguard has also been good in some trials, but care should be taken to avoid PGR effects that occur on some crops with this active ingredient (triflumizole).

Medallion (fludioxonil - FRAC 12) is sometimes effective, but results are extremely variable. Of the FRAC 7/11 combination fungicides, Mural is the only member of this group that shows consistently very good results (at least on petunia). The only way to obtain acceptable results with fungicides is to minimize stress to the host, avoid high soil/potting medium pH and use products preventatively.

Table 1. Summary of trials for control for black root rot on various ornamentals.

Product	FRAC	oz./ 100 gal.	Pansy	Vinca	Petunia	Calibrachoa
Cleary 3336/ OHP 6672	1	16	Excellent	Good	Good	Good
Affirm/ Veranda O	19	8	Excellent	None		
Astun	7	13.5			None	None
Avelyo	3	3	Excellent	None	None	Very good
Compass O	11	4	None	None		
Empress Intrinsic	11	3	None		Very good	
Heritage	11	2	None	None		
Medallion	12	4	Variable		Good	
Mural	7/11	3, 6			Very good	
Orkestra Intrinsic	7/11	10			None	None
Pageant Intrinsic	7/11	18	None			
Postiva	3/7	14, 21		None		None
Terraguard	3	8	Good	Good		
Tourney	3	4	Excellent			

Conclusions

Overall, the following steps are most effective in preventing black root rot:

1. Never reuse flats or containers without sanitizing first.

2. Maintain potting medium pH below 5.5.

3. Use ammoniacal fertilizer and do not apply excessive potassium.

4. Use a thiophanate methyl fungicide (OHP-6672 or Cleary 3336) first and then rotate with FRAC 3 (Avelyo or Terraguard) OR FRAC 19 (Affirm). **GT**