CT IPM
Integrated Pest Management Program
Department of Plant Science and Landscape Architecture
UConn Extension

Black Root Rot (*Thielaviopsis basicola*) on Ornamental Plants

Introduction

Black root rot is caused by the fungus *Thielaviopsis basicola* (Taxonomists have recently assigned a new name of *Berkeleyomyces basicola* rather than *Thielaviopsis basicola.*) and can affect a wide range of greenhouse crops. Affected roots become black and rotted, hence it is common name, black root rot.

Favorable Conditions

Favorable conditions include cool temperatures (55-63° F) and growing media with an alkaline pH. Disease development is reduced at pH 5.5 or below; however, not all crops can be grown in such acid growing media. Black root rot can develop over a wide range of moisture levels. *Thielaviopsis* spreads in the soil and water via spores (conidia). Fungus gnats also help spread the spores. Due to its highly resistant overwintering spores, (chlamydospores), black root rot can be difficult to eradicate from a greenhouse with a history of the disease.

Symptoms

Above ground, symptoms include stunting, chlorosis or yellowing and plant dieback. Roots become black and rotted but are not as brown or water-soaked as may occur with Pythium or Fusarium root rot infections. *Thielaviopsis* can also produce toxins that adversely affect plant growth, so root systems may not be that stunted for infected plants to look unhealthy. At first, plants may look yellow and off-color, resembling nitrogen deficiency.


Figures 1 & 2: Black root rot infections resemble nutrient disorders. Photos by L. Pundt

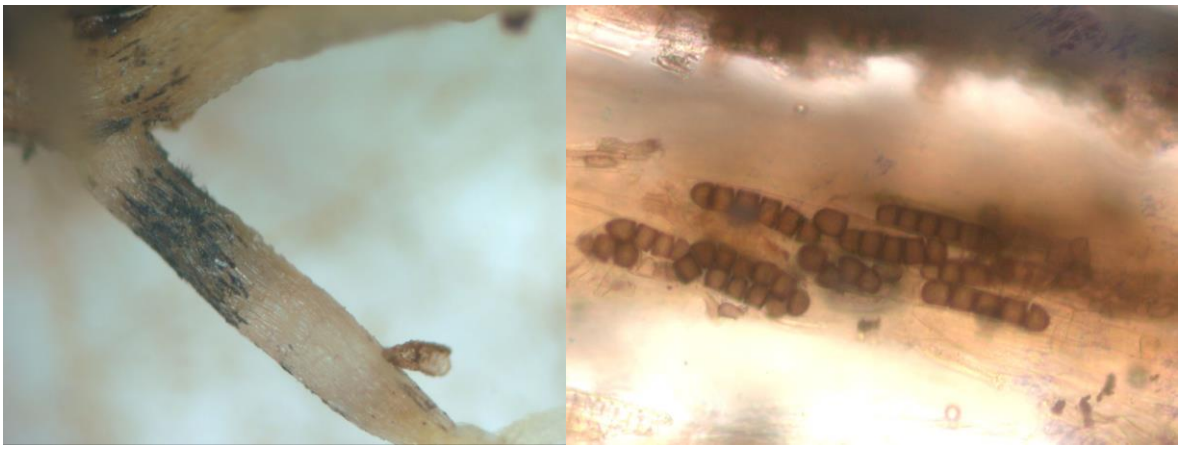
Scouting

Calibroachoa, pansy, viola and annual vinca (*Catharanthus*), salvia and petunia are some of the most common annual hosts. Diascia, fuchsia, gerbera daisy, geranium, snapdragon, and verbena can also become infected**.** Herbaceous perennials are also susceptible including dicentra, hardy geraniums, heuchera, gaillardia, lithodora, creeping and garden phlox are also susceptible.

At first, plants may appear that they are just suffering from a cultural mistake or lack of fertilizer. However, with cultural mistakes, the pattern is more uniform than with plants suffering from a disease where the overall pattern is more random. Infected plants in a plug tray will often be uneven in height. Roots and lower stems may be shriveled, dark-brown to black in color and under-developed.

The characteristic black roots can be seen by washing the infected roots free of growing media and then viewing them carefully with a hand lens or under a dissecting microscope. Look for the black, longitudinal areas on infected roots. Root tips may also be blackened. You can also look for the characteristic dark brown to black thick-walled overwintering spores known as chlamydospores.

Figure 3: Roots are blackened. Photo by L. Pundt



Figures 5 & 6: Black longitudinal areas on infected roots (left) and thick-walled overwintering spores (chlamydospores). Photos by J. Allen

Management

- Choose less susceptible cultivars, whenever possible, especially among calibrachoa and pansy. The most resistant calibrachoa cultivar was Chameleon Blueberry Scone and the most susceptible was Cabaret Blue Sky. The pansy cultivars Fama Silver Blue, Clear Sky White, Clear Sky White, Crown Golden, Fama Blue Angel, Fama Dark-Eyed White, and Happy Face.
- If the crops you are growing can tolerate a low pH, lower the growing media pH to 5.5. or well below 6.0
- Using acid reacting ammonium-based fertilizers helps reduce disease incidence compared to the more basic calcium nitrate type fertilizers
- Purchase pathogen-free plants. This can be challenging as incoming plugs can appear healthy until they are subject to some type of stress.
- Control fungus gnats and shore flies that can spread the spores.
- Reused pots, especially plug trays, may harbor the pathogen. If you are considering reusing containers, select those crops less susceptible to *Thielaviopsis* for replanting in reused containers. Powerful rinsing is needed to remove organic debris that can harbor *Thielaviopsis.*
- Use a disinfectant to thoroughly clean the pots and plug trays. The disinfectants hydrogen dioxide (XeroTol 2.0) or a 10% solution of chlorine bleach was found to be most effective as disinfectants for plug trays.
- Discard infested plants and growing media. If a hanging basket or flat has infected plants, the whole basket or flat and infested growing media should be discarded because fungicides will not eradicate the disease.

- At the end of the growing season, do a thorough cleanup of the greenhouse. The fungus can survive as resistant chlamydospores on the soil floor and in wooden benches.
- Proper diagnosis is needed to determine an effective management program. Not all fungicides labeled for root rots are effective against *Thielaviopsis.* Fungicides will only help protect healthy plants from becoming infected. If you have a history of the disease, treat preventively with fungicides. See the latest edition of New York and *New England Management Guidelines for Greenhouse Floriculture and Herbaceous Ornamentals* for more specific up-to-date recommendations.

Careful attention to preventive sanitation measures, scouting, managing the pH and preventive use of fungicides are all needed to manage black root rot on susceptible crops.

References

Catlin, N. 2015. Black Root Rot. E-Gro Alert. 4(13):1-4. February 2015. https://www.e-gro.org/pdf/2015_413.pdf

Copes, W. E., and F. F. Hendrix. 1996. Influence of NO3/NH4 Ratio, N, K, and pH on Root Rot of *Viola x wittrockiana* caused by *Thielaviopsis basicola.* Plant Disease. 80:879-884.

Chase, A. R. 2023. Diseases Caused by *Thielaviopsis basicola.* Grower Talks. October 2023. 66-68. https://www.growertalks.com/Article/?articleid=26481

Daughtrey, M. 2006. *Puny Calibrachoas? It May be Thielaviopsis*. Northeast Greenhouse IPM Notes 16 (4):3-4.

Thomas, P. A., and J. L. Williams-Woodward. 2016. Spring Thielaviopsis? Look to Your Roots! E-Gro Alert 5(12) March 2016. https://www.e-gro.org/pdf/2016_512.pdf

Warfield, C. 2003. Survival of *Thielaviopsis* Spores on Reused Plug Trays and Efficacy of Disinfestants on Spore Viability. SNA Research Conference Proceedings. 48: 545-547.

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