



Black Root Rot (*Thielaviopsis basicola*) in the Greenhouse

Introduction

Black root rot is caused by the fungus *Thielaviopsis basicola* and can affect a wide range of greenhouse crops. Affected roots become black and rotted, hence it's common name, black root rot.

Favorable Conditions

Favorable conditions include cool temperatures (55-61° F) and growing media with an alkaline pH. It is suppressed by temperatures above 72 °F. Disease development is reduced at pH 5.6 or below; however, not all crops can be grown in such acid growing media. *Thielaviopsis* spreads in the soil and water via spores (conidia). Fungus gnats also help spread the spores. Due to its highly resistant overwintering spores, (chlamydo spores), 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 water soaked as may occur with *Pythium* 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 a nutritional disorder such as nitrogen deficiency.



Figures 1 & 2: Black Root Rot Infections resemble nutrient disorders. Photos by L. Pundt

Scouting

Calibroachoa, pansy, viola and vinca (*Catharanthus*) are some of the most common hosts. Petunia, poinsettia, verbena, geranium, diascia, fuchsia and snapdragon can also become infected. Herbaceous perennials are also susceptible including dicentra, hardy geraniums, heuchera, creeping and garden phlox. 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 often more uniform than with a disease where the overall pattern is more random in a crop. 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



Figure 4: *Thielaviopsis* on washed calibrachoa roots. Note blackening of roots and lower stem. Photo by L. Pundt

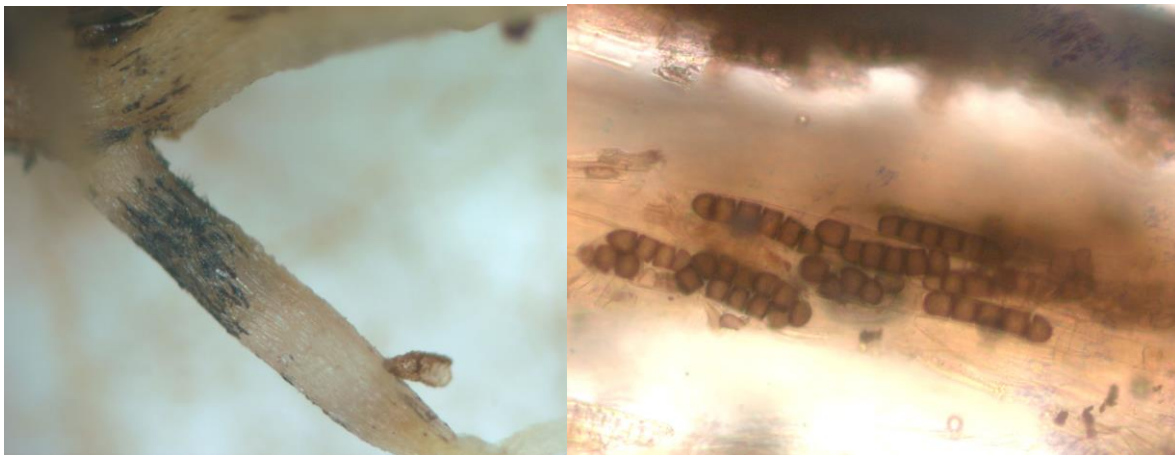


Figure 5 & 6: Black longitudinal areas on infected roots (left) and thick walled overwintering spores. Photos by J. Allen

Management

- Choose less susceptible cultivars, whenever possible, especially among calibrachoa, as well as other crops.
- If the crops you are growing can tolerate a low pH, lower the growing media pH to 5.6. 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. However, incoming plugs can appear healthy until they are subject to some type of stress.
- Control fungus gnats that can spread the spores.

- Reused pots and especially plug trays may harbor the pathogen. If you are considering reusing pots, 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 **the New England Greenhouse Floriculture Manual - A Management Guide for Insects, Diseases, Weeds and Growth Regulators** for the latest information which is available from [Northeast Greenhouse Conference and Expo](#) and the [UCONN CAHNR Communications Resource Center](#)

References:

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