

Cotton Root Rot

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Fig. 1. Euonymous plant infected with *P. omnivora*. Photo credit: Claudia Nischwitz



Fig. 2. Root rot caused by cotton root rot. Photo Credit: Claudia Nischwitz



Fig. 3. Rotted euonymus root with mycelium strands covering the surface. Photo Credit: Claudia Nischwitz

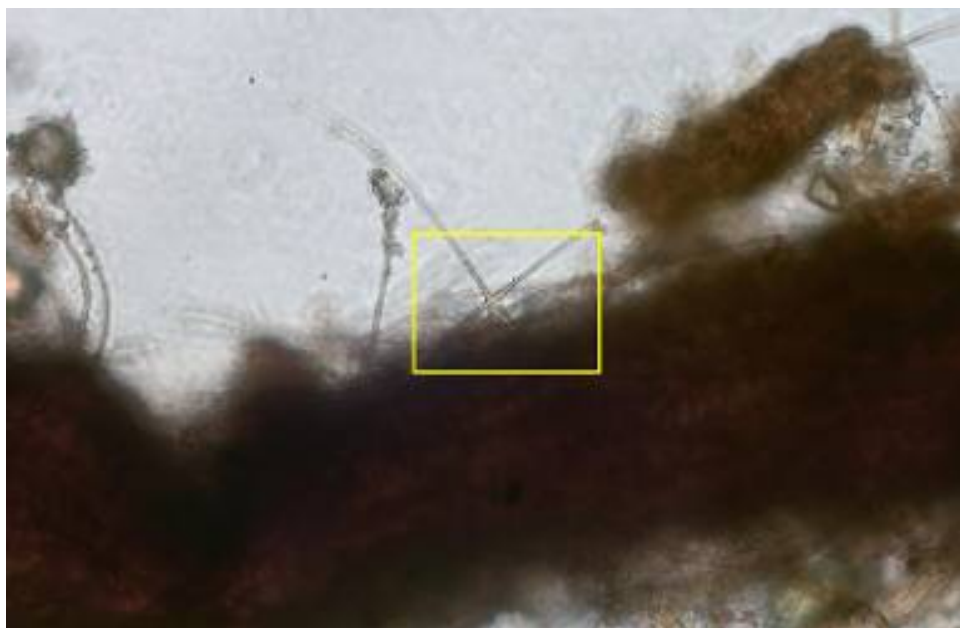


Fig. 4. Cruciform hyphae as seen under a microscope. Photo Credit: Claudia Nischwitz



Fig. 5. *P. omnivora* spore mat on the surface of the soil. Photo credit: Ben Scow

Quick Facts

- Cotton root rot is a disease caused by the fungus, *Phymatotrichopsis omnivora*, that affects non-native dicotyledonous plants.
- Infected plants will die with dead brown leaves still attached. The roots will be rotten with mycelial strands on the surface.
- The fungus thrives in warm soils with high pH.

Introduction

Cotton root rot (also known as Phymatotrichum root rot and Texas root rot) is caused by a soil borne fungus, *Phymatotrichopsis omnivora*. The pathogen is endemic to southern Arizona, New Mexico, Texas and northern Mexico, and has been found in southern Utah. It kills dicotyledonous plants that are not native to this area (Olsen 2015). Compared to other known fungal pathogens, cotton root rot has one of the largest host ranges with over 1,800 hosts. While the host range of this pathogen ranges from dicotyledonous ornamentals to vegetables and field crops, monocots are immune.

Symptoms

If a plant is infected with cotton root rot, symptoms may not appear until two to three years after initial infection, typically showing up in late spring to early fall. The branches and leaves on the infected plant will begin to wilt and die (Fig. 1), followed by the death of the entire plant shortly after. The brown leaves remain attached to the dead plant. Note that infected plants may decline more slowly in cooler temperatures and more rapidly in warmer temperatures (Olsen 2015). The dead tree's roots will be rotten, and light to dark brown mycelial strands are often seen growing on the surface of the rotten roots (Fig. 2 & 3). Mycelial strands are bundles of thread-like filaments called hyphae. Identification is easy when a microscope is available. Hyphal strands are cruciform (shaped like a cross) which is a unique characteristic of *P. omnivora* (Fig. 4). As there can be many causes of death for a plant, to rule them out, examining the roots for the mycelial strands is important to confirm it is in fact cotton root rot. Another aspect of cotton root rot is that the fungus may produce a tan colored mat of mycelium and spores on the surface of soil, often during rainy conditions (Fig. 5). However, these mats are not important as they have not been observed to germinate, and do not contribute to the spread of the pathogen (Olsen 2015).

Disease Cycle

This fungus grows in optimal soil conditions such as warm soils with a high, alkaline pH (Olsen 2015). Southern Utah, for example, has suitable conditions, and cotton root rot was recently found on a number of ornamental trees including euonymus, lilac, umbrella trees and ash in Washington County. The pathogen can be introduced to new locations when already infected plants are planted. Southern Utah has a climate conducive to *P. omnivora* whereas other parts of Utah are too cold. Furthermore, *P. omnivora* can survive for a number of years in the soil on root debris or as sclerotia (balls of fungal tissue). As it has no soil or airborne spores, the fungus survives and spreads through mycelial strands of connected hyphae (Olsen 2015). By colonizing and spreading from infected to healthy root tissue, the pathogen could eventually cause the death of an entire grove of plants.

Management/Control

Managing cotton root rot is very difficult and infected plants should be completely removed, roots and all, as soon as discovered. The only effective control method is to re-plant the area with resistant species that are non-susceptible to the fungus (Olsen 2015). As previously mentioned, all monocotyledonous plants are immune.

Table. 1. Plants resistant to cotton root rot.

Scientific Name	Common Name
Trees and Shrubs	
<i>Bambusa</i> spp.	Bamboo Celtis
<i>Celtis</i> spp.	Hackberry
<i>Chamaerops humilis</i>	Mediterranean Fan Palm
<i>Chilopsis linearis</i>	Desert Willow

Scientific Name	Common Name
<i>Cupressus</i> spp.	Cypress/Juniper
<i>Lycium</i> spp.	Wolfberry
<i>Parkinsonia microphylla</i>	Palo Verde
<i>Phyllostachys aurea</i>	Golden Bamboo
<i>Prosopis</i> spp.	Mesquite
<i>Rosmarinus officinalis</i>	Rosemary
<i>Trachycarpus fortune</i>	Windmill palm
<i>Washingtonia filifera</i>	California palm
<i>Yucca</i> spp.	Yucca
Perennials and Annuals	
<i>Antirrhinum majus</i>	Snapdragon
<i>Crocus</i> spp.	Crocus
<i>Fragaria chiloensis</i>	Strawberry
<i>Gypsophila paniculate</i>	Baby's breath
<i>Helichrysum braacteatum</i>	Strawflower
<i>Hyacinthus orientalis</i>	Hyacinth
<i>Iris</i> spp.	Iris
<i>Mentha spicata</i>	Spearmint
<i>Pelagonium</i> spp.	Geranium
<i>Petunia hybrida</i>	Petunia
<i>Tropaeolum majus</i>	Nasturtium
<i>Tulip gesneriana</i>	Tulip
<i>Verbena hybrida</i>	Verbena
<i>Viola odorata</i>	English violet
<i>Viola tricolor</i>	Pansy

References

- Olsen, M. 2015. Cotton (Texas) Root Rot. *The University of Arizona Cooperative Extension*.

Related Research

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