Phymatotrichum root rot

O & T Guide OD-8

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Hosts: Phymatotrichum root rot (also known as Texas root rot or cotton root rot) is caused by the soil-borne fungus *Phymatotrichopsis omnivora*. The fungus has an extremely wide host range that affects more than 2,300 species of dicotyledonous (broad-leafed plants). Monocots are not affected, although the fungus has been found to grow and reproduce on some monocots without causing any disease. Observations in New Mexico indicate that many native plants such as mesquite, creosote and desert willow, do not succumb to the disease, however they are likely to harbor the pathogen.

Distribution: The fungus is limited geographically to parts of the United States (parts of Arizona, New Mexico, and Texas) and Mexico. Even within its geographical boundaries, the fungus is spotty in occurrence. The pathogen may be so isolated that it is only found in small areas; areas small enough that only one or a few plants are affected. It may also be found in larger areas where many plants may be affected. It is found only at elevations below 5,000 feet. In New Mexico, the disease has been found only in the southern part of the state.

Symptoms: Symptoms first appear during the summer when air and soil temperatures are high. The first evidence of the disease is a slight yellowing of the leaves. The leaves quickly turn to a bronze color and begin to wilt. Permanent wilting can occur very rapidly - as little as two weeks from the first expression of disease. Plants infected with *Phymatotrichopsis* die rapidly with the leaves remaining firmly attached. In some cases, the tree wilts so quickly that there is little color change, though the leaves become dry and brittle. The disease may progress more slowly in plants grown at higher elevations. The roots are brown and rotted. A reddish lesion develops around the trunk near the soil-line of trees killed by this fungus.

Pecan tree killed by *Phymatotrichopsis*. Photo: N. P. Goldberg, New Mexico State University.

Signs: The fungus also produces signs on or near infected plants. Strands of fungal hyphae are produced on the surface of infected roots. These strands usually are visible with a good hand lens. When strands are viewed under a light microscope, cruciform (cross-shaped) hyphae unique to this fungus can be seen. Another sign is the formation of a white to tan colored spore mat on the soil surface around infected plants. Spore mats may develop during periods of high moisture. Spores produced in spore mats have never been germinated and are considered to have no function in survival or infection by this pathogen. Therefore, spore mats do not spread disease but are merely evidence of the fungus' presence.

Fungal strand on a root. Photo: R. B. Hine, University of Arizona.

Cruciform hyphae. Photo: N. P. Goldberg, New Mexico State University.

Spore mat. Photo: R. B. Hine, University of Arizona.

Conditions for Disease: The disease is associated with soils low in organic matter and high in alkalinity (pH). The fungus survives indefinitely deep (12 feet or more) in the soil as sclerotia (masses of hardened hyphae). Plants become infected when roots come in contact with sclerotia. It may take many years for plants to develop a root system deep enough to encounter the fungus. This explains why many plants will live for years before succumbing to the disease. Spread of the fungus is limited as it does not produce any viable spores. The only known spread is through root grafts between nearby plants.

Management: This disease is very difficult, if not impossible, to control. If caught very early in the development of the disease, affected plants should be cut back immediately, leaving sufficient supporting branches for normal growth. Applying soil sulfur, ammonium sulfate, and steer manure out to the drip line of infected trees may help to delay the development of the disease. This treatment must be done on an annual basis and is no guarantee of control. Avoiding areas known to be infested with the pathogen or planting immune or resistant plants in these areas is the best control measure.