

Cotton Root Rot: Symptoms, Risk Factors, and Management

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Pathogen: *Phymatotrichopsis omnivora* (syn. *Phymatotrichum omnivorium*) is a native soilborne fungus with mycelium, seed-like sclerotia, and mats (rare) on the soil surface that produce non-infectious spores. The host range includes more than 2,000 dicot plant species. Monocot plants are highly resistant. Native dicot plants usually have partial resistance.

Symptoms	
A	Plants usually die suddenly (3-7 days) with dead leaves staying on plants. Established trees may decline over several weeks or months with small leaves, defoliation and branch dieback.
B	Plants often die in groups as the fungus advances underground to nearby adjacent plants of the same species or species with similar susceptibility. This results in dead plants clusters down a row or hedge, or irregular oval or circular clusters of dead plants in massed plantings.
C	Taproot, crown, and lower stem tissues appear dark brown and decayed after the dead bark is removed with a pocket knife. Although not often seen on annual plants (cotton, okra, sunflower, pepper, etc.), diseased woody perennials often have an irregular (undulating) but distinct margin between dead lower tissues and higher stem tissue.
D	Dead roots and crowns have fuzzy, tan to bronze-colored, coarse fungal strands that are often visible to the naked eye (with training) and with a 10X or 20X hand-lens. With magnification, the “fuzzy” bronze strands resemble a miniature strand of bronze-colored knitting yarn. Rarely, a fungal mat forms on the soil surface near dead/dying plants (turns from white to tan/brown over time).

Risk Factors		Management Suggestions	
1	High soil temperature		Apply mulch generously and replenish annually. Or, plant resistant groundcover or cover crop to reduce soil temperature in warm months when fungus is most active.
2	Low soil organic matter		Incorporate organic matter during soil preparation and mulch annual and perennial plants.
3	Low microbial populations in soil		Incorporate organic matter. Incorporate ‘green manure’ cover crops. Replenish mulch at least annually.
4	Extremely dry soil (due to extended drought and/or soil type) brought to saturation by rain or irrigation (change in		Avoid saturated soils due to: drainage issues after heavy rains, and excess irrigation. Postpone irrigation if rain is predicted. Most native

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5	soil from high O ₂ to high CO ₂)	plants do best with limited irrigation during drought.
6	High soil pH (disease risk increases as pH increases from 6.5 to 8.3)	Calcareous clay soils are highly buffered, so pH change will be limited at best, and temporary. For shallow rooted plants, frequently amend the top few inches of soil with agricultural sulfur and organic matter amendments. Use acidifying fertilizers (e.g., (NH ₄) ₂ SO ₄ sold as 21-0-0) and replenish organic matter mulches annually.
7	Calcareous (calcium sulfate- or limestone-based) clay soil	Generously amend soils with organic matter and/or non-limestone grit during site preparation.
8	Poor surface water and internal soil moisture drainage, limited O ₂ movement through soil; soil compaction from construction or farm equipment, vehicles, and heavy foot traffic (see item #3 above)	Contour surface to avoid standing water after rains; break up compacted layers and hard pans. Generously amend soils with organic matter and/or non-limestone grit during site preparation. Install drain tile or french drains as needed at wet spots. Maintain grass or other resistant groundcover or cover crop by mowing, etc. to reduce compaction and erosion. Avoid soil compaction from use of heavy equipment when soils are wet from rains or irrigation.
9	Highly susceptible dicotyledonous plant species	Select highly resistant plants for high risk sites. Among dicots, southwest Texas native plants are generally more resistant than introduced plants but may succumb if mismanaged. All monocot species are highly resistant including grasses, lilies, agaves, yuccas, arrowhead, caladium, calla, dumb-cane, pothos, spathiphyllum, palms, philodendron, bromeliads, canna, dayflower, spiderworts, sedges, irises, gladiolus, rushes, orchids, palms, greenbriers, crane-lily, and ginger.
10	High density of susceptible plants	Increase spacing between susceptible plants
11	Monoculture of susceptible plants	Diversify by inter-planting with resistant plants
	Site history of highly susceptible plants including cotton, okra, alfalfa, apple, peach production	Avoid using susceptible plants at sites with a history of this disease (fungus population in soil is high).