

UC Pest Management Guidelines

AVOCADO

AVOCADO ROOT ROT

Pathogen: *Phytophthora cinnamomi*

(Reviewed: 7/01, updated: 7/01)



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SYMPTOMS

Leaves of trees with root rot are small, pale green, often wilted, and frequently have brown tips. Foliage is sparse, giving the tree an unthrifty appearance. New growth is usually absent, but if it occurs, new leaves are small and of poor color. Small branches die back in the top of the tree, allowing other branches to become sunburned because of the lack of foliage. Diseased trees frequently set a heavy crop of small fruit.

The small fibrous feeder roots on diseased trees may be absent in the advanced stages of this disease; if present, they are usually blackened, brittle, and dead. The absence of feeder roots prevents the uptake of moisture, and the soil under diseased trees stays wet even though the tree appears wilted. Roots of pencil size or larger are seldom attacked by the fungus.

COMMENTS ON THE DISEASE

Avocado root rot is the most serious avocado disease in California and most other avocado-producing areas of the world. The soil fungus, *Phytophthora cinnamomi*, thrives in areas of excess soil moisture and poor drainage. Trees of any size and age may be affected. Affected trees will decline and die either rapidly or slowly. The disease can be spread from a few trees to the entire orchard by unaware growers and workers.

COMMENTS ON CONTROL

Phytophthora cinnamomi has over 1,000 hosts and can be spread by moving contaminated nursery stock of avocado and other plants, on equipment and shoes, in seed from fruit lying on infested soil, or by other types of activity by people or animals in which moist soil is moved from one place to another. The fungus produces spores that are specialized for movement in water. Therefore, *Phytophthora* spreads easily and rapidly with the movement of water over or through the soil. Entire areas can become infested. Control is best achieved by an integrated approach of prevention, culture, and treatment.

Plant on well-drained soil. Root rot develops in soils that have poor internal drainage because accumulated moisture permits the fungus to form its spore stages and to infect the roots. In new plantings, avoid soils favorable to root rot development; in established plantings, manage soils carefully so that moisture does not accumulate in the soil.

Use disease-free nursery stock. Historically, diseased nursery stock has been one of the major sources of the spread of avocado root rot into the avocado-producing areas of California. Avocado trees certified to be free of avocado root rot are available from nurseries that participate in the certification program. It is recommended that disease-free trees be used, especially when planting new areas.

Prevent soil or water movement from infested areas. The fungus can be moved by any means by which moist soil is moved, and also can be spread downhill from an infested area by surface or subsurface drainage water. Install water-tight drains to take care of surface runoff if a diseased area lies above your healthy grove. Control gophers, as their burrows can provide means of moving the fungus in water.

Irrigate diseased trees and margins of diseased areas carefully. Because high soil moisture favors root rot development, careful irrigation can retard the spread of the disease and often prolong the life of affected trees. Diseased trees have fewer roots to take up water, so do not water soil that is already wet as this increases the disease problem.

Establish a barrier. If the disease situation is such that the fungus occurs in only one area and cannot spread downhill in surface runoff or drainage water into the part of the grove to be protected, a physical barrier should retard spread. Establish the barrier at least two tree rows beyond where tests indicate the fungus is present. The barrier should consist of a fence and/or warning signs to inhibit movement between the root rot area and healthy sections of the grove.

Resistant rootstocks. Some resistance to root rot has been found in several different varieties such as Ban Duke, Duke 7, Duke 9, Eustro, Toro Canyon, and Thomas. Clones of these and similar varieties are more resistant than seedlings and are in general use in the industry. It is important to remember that these rootstocks are resistant-not immune. If they are planted or maintained under adverse conditions, they may be killed by the combination of these conditions and the disease.

Gypsum and Mulch. Create soil conditions that suppress *Phytophthora* root rot by applying gypsum (1500-3000 kg/ha or 25 lb of gypsum under the canopy of each tree) and mulch (6-12 inches, but kept 6 inches away from the trunk) in the form of yard trimmings, hardwood chips, or avocado trimmings. Mulching promotes development of beneficial microorganisms antagonistic to *Phytophthora cinnamomi* and gypsum supplies calcium, which suppresses the formation of different spore stages. For best results, apply mulch and gypsum when the orchard is established. As the trees grow, they will contribute to the mulch, but gypsum applications should be made yearly.

Crop rotation. Replanting the infested soil to resistant crops is one of the best ways to control avocado root rot. The fungus has a wide host range,

but there are many plants that are not susceptible, including all varieties of citrus, cherimoya, persimmon, all types of vegetables, most annual flower crops, and many deciduous fruit trees and berries. Macadamia is highly resistant to Phytophthora root rot, although a few cases of Phytophthora trunk canker have been found on macadamia trees in California.

CHEMICAL CONTROL

If only a few trees are affected, and the disease is detected early, cut off the trees at ground level and fumigate the soil with maximum dosages of fumigant.

TREATMENT

Pesticide (commercial name)	Amount/Acre	P.H.I.+ (days)
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The following materials are listed in order of usefulness in an IPM program, taking into account efficacy and impact on natural enemies.

NONBEARING TREES

- A. ALUMINUM TRIS
PHOSPHONATE
(Aliette) WDG
- Drench: 5 oz/10 gal
Foliar: 5 lb/100 gal

COMMENTS: For drench application: apply 1 qt per pot or sleeve of each tree 2-3 days before transplanting. For foliar application: begin application at transplanting or the start of the growing season and continue for up to 4 applications/year at 60-day intervals.

BEARING TREES

- A. ALUMINUM TRIS
PHOSPHONATE
(Aliette) WDG
- 5 lb
- 12 hours
- COMMENTS: Begin application at the start of the growing season and repeat every 60 days. Do not exceed 20 lb/acre/year.

- B. MEFENOXAM
(Ridomil Gold) EC
- Label rates
- 28
- COMMENTS: Apply as a drench or by chemigation.

+ Preharvest interval. Do not apply within this many days of harvest.

PRECAUTIONS

PUBLICATION



UC IPM Pest Management Guidelines: Avocado
UC ANR Publication 3436

Diseases

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