Phytophthora Root Rot (*Phytophthora cinnamomi*)

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Introduction:
Phytophthora cinnamomi, the casual agent of avocado root rot, is the limiting factor in avocado production in most avocado-producing countries. On all varieties of avocado, this pathogen attacks the feeder roots, which can result in death of the tree. Although the disease has been studied for more than 60 years, definitive control measures have not been found and losses continue to mount. However, many control strategies have been discovered which will reduce the impact of avocado root rot. When all of these control measures are packaged into a single strategy called the "integrated management of avocado root rot", they allow the continued economical production of avocados in the presence of *P. cinnamomi*.

Symptoms:
The first signs of the disease are observed in the tree canopy. The leaves are small, pale green, often wilted with brown tips, and drop readily. Shoots die back from the tips, and eventually the tree is reduced to a bare framework of dying branches (Fig 1). Tree death may take from a few months to several years, depending on soil characteristics, cultural practices and environmental conditions (Fig 2). The small feeder roots on diseased trees may be absent in the advanced stages of decline. When present, they are usually black, brittle and decayed, in contrast to healthy trees which have an abundance of creamy-white feeder roots (Fig 3).

Disease Management:
Since no definitive measures have yet been found to control the disease, an integrated approach to managing the disease has been found to be most effective. This approach includes prevention, cultural practices and chemical treatment. These aspects are listed below:

Cultural Practices:
-Provide favorable soil conditions
-Use certified disease-free nursery stock
-Plant resistant rootstocks
-Prevent soil or water movement from infested areas
-Irrigate carefully, not too much water
-Apply gypsum and mulch
-Provide appropriate nutrition
-Rotate crops

Chemical Control:
-Systemic fungicides
-Fosetyl-Al (Aliette ^{R}) or potassium phosphonate can be applied as soil drench, foliar spray, trunk paint, trunk injection (buffered) or with irrigation water Trunk injection (buffered solution)
-Metalaxyl (Ridomil ^{R}) can be applied as granular, a drench or with irrigation water

References:
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Coffey, M.D. 1987. Phytphthora root rot of Avocado: An integrated approach to control in California. Plant Dis. 71: 1046-1052.


Fig 1. Phytophthora root rot symptom on a young tree


Fig 2. Phytophthora root rot symptom on an older tree


Fig 3. Phytophthora root rot symptom on feeder roots