

# Sampling and determination of avocado root rot

Avocado root rot, caused by the soil fungus, *Phytophthora cinnamomi*, occurs in all of the avocado-producing counties in California. This publication tells how to take soil samples for determining whether the fungus is present in a particular location, and how to test these samples for the presence of the fungus.

Trees affected with the root rot disease show a gradual decline and dieback; symptoms are described and illustrated in University of California, Division of Agriculture and Natural Resources publication, *Avocado Root Rot*, #2440. Trees can show similar symptoms from several other causes, so to be sure that the trouble is caused by the avocado root rot fungus, tests should be made as described below. Also, the fungus may be present on the roots of healthy trees on the margin of an area with diseased trees; these trees often show no symptoms for some time, and the distribution of the fungus can only be determined by laboratory or soil tests.

## How to sample a suspected tree

With a trowel or small spade, take several cupfuls of soil from three locations around the tree; samples should be taken within the drip line of the tree, in the main root zone.

Samples should include soil and, if possible, small feeder roots taken from moist areas of the root zone. Scrape off top inch of soil and mulch and then take sample from the next 6 inches of soil. Place the samples in small polyethylene bags to prevent drying out before tests are made. Keep the samples in a cool place until tests are made.

## Disease identification

There are two methods available for determining if a tree is affected with root rot:

*Laboratory test* - One is to send the sample to an agricultural laboratory where they will place small pieces of feeder roots on cornmeal agar or agar containing antibiotics and identify the fungus as it grows from the roots.

*Soil Test* - The other method is a relatively simple and practical one that the grower can do. For this test, place a firm, unscarred mature green avocado fruit in a waxed paper cut, coffee can, or similar container which contains the soil sample (separating each sample into two different containers is a good practice). Flood the surface of the soil with water and leave the fruit on the soil for four or five days.

Then remove the fruit from the soil, wash it and leave it at room temperature for several days. If the root rot fungus is present, firm brown to purplish-brown spots will develop characteristically at the water line, and only occasionally below this line, on the fruit. This growth will occur in approximately four to eight days after placing the fruit in the infested soil, depending on the maturity and/or variety of fruit.

Positive identification of the fungus requires placing bits of tissue from these discolored areas on cornmeal agar in Petri dishes. For most purposes, so few other fungi will attack firm, unwounded avocado fruit that development of typical spots will show that the root rot fungus is present.

Fuerte fruit provide an excellent test, but other green avocado fruit with thin or only moderately thick skins may be used.

Caution: Remember that positive detection of this soil fungus is difficult, especially where infestation is light. A very small amount of the fungus may be present, even though the laboratory or soil test is negative. If in doubt whether the fungus is present, re-check questionable trees.

Small pieces of equipment, such as shovels, augers, trowels, should be dipped in alcohol or formaldehyde solution between each sample that is taken, in order not to transport the fungus, in soil remaining on the tools, to a healthy tree that may be sampled. A 70% solution of methanol, ethanol or rubbing alcohol can be used. Commercial formalin or formaldehyde should be diluted to make a 5% solution.

Insist that shoes of any person entering your orchard be clean of mud and disinfected. The fungus has been recovered from mud scraped from shoes worn in infected soil. Again, clean shoes are the key, followed by the added precaution of a disinfectant. Effective disinfectants are listed above. The use of powdered copper sulfate in a "step-in" box has some effectiveness and also serves as a reminder of the need for sanitation.

Several commercial laboratories are available for making tests for the root rot fungus. Your University of California Farm Advisor will be able to tell you where such tests can be made, and can provide you with additional information on this disease.