

PROBLEM DIAGNOSIS FOR AVOCADO

Avocado trees are well suited for Southern California. They don't mind alkaline soil too much and they like the climate. They are, in general, tolerant of the heavy pruning that may be needed to keep the tree's growth low enough for convenient homeowner fruit harvesting. Avocado trees are troubled by relatively few pests, the most common of which are various root rot fungi, perseá mite, and excess salt accumulations.

Fungus is the most serious avocado disease in California. Fungus thrives in excess soil moisture. Over-irrigation and poor drainage and may attack trees of any size or age. Absence of feeder roots prevents moisture uptake so soil under diseased trees stays wet. Diseased trees may set a heavy crop of small fruit but will decline and die, either rapidly or slowly. Fungus can spread by contaminated nursery stock, water in contact with infested soil, shoes, cultivation equipment. Control measures for fungal diseases are to use an integrated approach of prevention, culture, treatment. Plant on soil with good internal drainage; avoid over-watering; use clean nursery stock, preferably certified disease-free; use resistant rootstocks; prevent soil or water movement from infested areas.

In the table below, pink shading represents fungal or bacterial problems, green shading represents insects or other pests, blue shading represents other conditions.

What the Problem Looks Like	Probable Cause	Control Measures
Small, pale green, wilted leaves. Sparse foliage. New leaves don't grow or are small with poor color. Small branches die back at top of tree.	avocado root rot	<ul style="list-style-type: none"> - Fumigate small spots of disease. If detected early; otherwise, cut off the tree at ground level and fumigate soil. Contact a pest control adviser about soil fumigation. - Fungicides. Use as part of an integrated control program. - Replant infested soil with immune plants, such as any varieties of Citrus, cherimoya, all types of vegetables, most annual flower crops, and many deciduous fruit trees and berries.
Poor growth, loss of tree vigor. Small, yellowing leaves; premature leaf drop; wilting, collapse. In winter, clusters of fan-shaped mushrooms form at base of infected trees a few days after a rain.	Armillaria root rot	Also known as oak root fungus. Attacks roots. Visible symptoms may not appear until fungus is well established in the roots. Can destroy entire root system and kill tree. Once symptoms appear, it is very difficult to save a tree, and disease may have spread to roots of adjacent trees. After aerial parts of infected trees are dead, the fungus remains alive in the roots to infect any replanted, susceptible trees, such as citrus, peach, or avocado. Fumigate before replanting. Let soil dry out between irrigations
Poor growth, loss of tree vigor. Yellowing) foliage. Poor fruit production. Cankers on trunk and branches. Leaf blotching, wilting. Rapid death of some new growth. Often death of entire tree eventually.	avocado black streak (ABS)	Causal organism unknown. Attacks trunk and branches. Present in California for more than 60 years but observed only on Guatemalan varieties such as Hass and Reed and only after prolonged stress. Since many symptoms are similar to those attributed to other causes, cankers on trunk and branches are diagnostic of ABS. Cankers vary in size and have a dry, powdery, water-soluble sugar that exudes through tiny cracks in the bark. Shallow red-brown lesions under cankers are revealed when bark is removed. Management of ABS consists of maintain tree health with good fertilizer and irrigation practices. Remove unhealthy trees; it is safest to fumigate the soil if replanting to avocado.

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Leaves suddenly wilt on one or more parts of tree and then turn brown and die but do not drop off for months. Brown to gray-brown streaks are visible in wood of branches or roots.	Verticillium wilt	May kill all or part of tree, with the remainder having complete recovery. If disease is severe and recurring, contact a pest control adviser about soil fumigation. Mexican rootstocks are more resistant than Guatemalan. Do not plant on soil that has been used for other crops susceptible to Verticillium wilt, such as tomato, eggplant, pepper, many berries, apricot, potato, and several flower crops. Do not plant any of these near an avocado tree.
Bark cankers exude white powder. Outer bark cracks and sheds easily. Diseased trees die back and may look unhealthy but rarely die.	Dothiorella canker	Attacks trunk and branches; a minor fungal problem favored by moisture. Keep irrigation water off tree base. Guatemalan rootstocks or scion tops are much more susceptible than Mexican. Control not usually needed. Scraping off outer bark removes some infection and encourages regeneration of vigorous bark. After picking, move fruit to a minimum of 41°F as quickly as possible. Ripen under 60°F to minimize rot.
Trunk cankers at base of older trees, originating at or below ground level. Canker appears as a dark region with a red, resinous exudate that dries to a white, crystalline deposit. Underneath the superficial canker is an orange-tan to brown lesion instead of the normal white or cream-colored tissue. Lesion has a fruity odor when exposed. Gradual decline over years or sudden tree death.	Phytophthora canker (collar rot)	Collar rot is now widespread in California, second only to avocado root rot in severity. Disease is favored by excess soil moisture, such as from over-irrigation or poor drainage. Spreads by contaminated nursery stock, irrigation water, and cultivation equipment. Use sanitation measures noted for other <i>Phytophthora</i> species. Seedling rootstocks are generally more sensitive than clonal stocks, such as Duke 7 and Toro Canyon. Since Phytophthora canker is found increasingly together with avocado root rot, use an integrated approach to control both. Do not allow the lower trunks of trees to stay wet. Place drip emitters away from tree trunks. Avoid wetting tree trunks. Avoid wounding trunks. If cankers are detected at an early stage, they can sometimes be controlled by cutting out the infected tissue. No chemicals are currently registered for use on this disease.
Fruit hanging near the ground has a distinct, rounded black area, usually at the end toward the soil. Rot soon extends internally, sometimes to the seed.	Phytophthora fruit rot	Attacks fruit. Limited to prolonged wet weather in a dry climate like California. Probably caused by disease organisms splashing the soil, so a mulch or leaf layer should help. Removing fruit that touches the ground will remove a likely source of disease.

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Brown, scattered, dead areas on leaves. If extensive, causes severe leaf drop. Infected fruit develops small, dark spots. Fruit rot develops upon ripening after harvest; the flesh rots are many and smaller than <i>Dothiorella</i> .	Anthracnose	Attacks leaves and fruit. Becomes serious in California only with wet, mild winters. As with <i>Dothiorella</i> fruit rot, important to cool fruits quickly after picking and to ripen them at below room temperature, if possible. Removing dead material and pruning to open tree canopy for better aeration are helpful, if needed. Spores germinate and penetrate the fruit before harvest, causing brown to black spots but the disease does not develop further until after harvest. Resumes growth during ripening.
Lengthwise narrow yellow, red, or necrotic shallow indentations on twigs. Rectangular fruit with white, yellow, or reddish streaks. Cracking of bark on trunk and larger branches known as 'alligator bark'. Tree is stunted.	sunblotch (avocado sunblotch viroid)	Attacks all parts of tree. Purchase registered trees for which scion top and rootstock are indexed as viroid-free. Established infected tree can contaminate nearby healthy avocados by wound-to-wound cutting tools. Removal is recommended in such cases. Sterilize pruning tools and harvesting clippers between trees.
Light green or yellow areas on upper leaf surfaces along the midrib, later extending to the smaller veins and entire leaf. Areas of severe feeding later turn brown (bronzing of leaves) and leaves may drop.	avocado brown mite	Tiny, brown-colored mite about the size of a period, the same size as the perseia mite and the avocado mite. Attacks upper leaf surface. Trees injured in proportion to the amount of green leaf area lost. See perseia mite for further details.
Light green or yellow areas on underside of leaves along the midrib and larger veins. Heavy infestations can cause leaf drop.	avocado mite	Tiny, yellow to pale-green mite about the size of a period; a pest of avocados primarily in coastal areas. Attacks underside of leaves. Formerly known as six-spotted mite. See perseia mite for further details.

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<p>Small necrotic spots on the underside of leaves along the midrib and main veins. As population increases, new necrotic spots appear between the veins. Each spot is covered with fine webbing that shines silvery in sunlight. Necrotic spots can coalesce and block transport of carbohydrates from leaf cells to veins. At this point leaves drop, and if extensive, fruit drop follows.</p>	<p>persea mite</p>	<p>Attacks underside of leaves. A yellowish mite about the size of a printed period. This new mite pest, a native to Mexico, was first detected in California in 1990. It spreads rapidly since its webbing protects it and its eggs from the predacious mite <i>Amblyseius hibisci</i>, a common biological control agent in California. In severe infestations, mite population can reach 1000 mites per leaf. Its numbers peak with dry summer heat and decline rapidly in the fall, but enough winter survival occurs (eggs overwinter) to repeat the cycle, allowing buildup of adult populations in spring. Gwen is a favorite host, then Hass, Reed, and other varieties. Other hosts include citrus fruits (not leaves), deciduous fruits (apricot, peach, nectarine, plum, persimmon), grapes, sumac and liquidambar trees, roses, and acacias.</p> <p>To confirm the identity of persea mite, hold a white sheet of paper horizontally under symptomatic foliage and rap the stem sharply; the mites will be evident on the paper as moving specks. With a hand lens, the 8 distinguishing mite legs will be visible, and yellow color should be definitive. The persea mite is gradually coming under good biological control because the population of a predacious mite native to California, <i>Galendromus annectens</i> is increasing. Another predacious mite imported to California by UC scientists <i>Galendromus helveolus</i>, also holds promise. In the meantime, individual homeowner trees can be helped by water-jet washing, which is more effective if insecticidal soap is added. To minimize initial infection, avoid drought and other stress. Contact our hotline for up-to-date recommendations for control methods approved for home growers.</p>
<p>Scarring on young fruit that starts near the stem end and spreads over entire surface. Feeding on fruit stems causes fruit drop. Dark leathery patches on upper leaf surface and random feeding lines on leaf underside. Unlike mites, thrips leave small black fecal pellets.</p>	<p>Avocado thrips</p>	<p>Similar to citrus thrips; a very active, oval, yellow insect about 1/25 inch (1 mm) long. Attacks leaves and fruit. New exotic avocado pest first noticed in July 1996 in Ventura County. Has spread to many avocado groves statewide. Believed native to Central America. Scarring can be severe, leading to 'alligator skin'. Damage is usually cosmetic. Sanitary precautions recommended, not spraying, because insecticides disrupt beneficial insects. Thrips can fly but are also spread by wind, contaminated clothing, and equipment. UC entomologists are working on introducing new biocontrols</p>
<p>Fruit and leaves covered with honeydew and sooty mold. Mealybugs present.</p>	<p>Mealybugs</p>	<p>Attack leaves and fruit. Soft, oval, segmented insects, usually whitish, under 1/4 inch (6 mm) long, covered with a mealy wax. They suck plant juices, leading to stunting and, rarely, death. Natural enemies usually control mealybugs, but ants protect them from their natural enemies. If ants are controlled, natural predators such as ladybird beetles will control mealybugs. Hand pick small mealybug infestations or daub with rubbing alcohol. For larger infestations, hose off with water or apply soap or oil sprays.</p>

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<p>Ants present. Ants do not feed on avocado trees, but drive away the natural enemies of insect pests of avocados. Argentine worker ants travel in distinct, narrow trails.</p>	<p>Argentine ant Southern fire ant</p>	<p>Ants feed on honeydew excreted by scales, mealybugs, and other insect pests and can interrupt biological control of pests by denying access to the tree. Apply a band of sticky material around the base of the trunk of mature trees that mechanically blocks ants; prune trees about 2 feet (0.6 m) above the ground so ants cannot get into trees without climbing the trunk. Any ant activity is a danger sign. Insecticide or poison baits can reduce ant numbers.</p>
<p>Holes in leaves and fruit. Slimy trails. Diameter of the brown garden snail is about 1 inch (2.5 cm). Gray garden slug is a snail relative that lacks shell.</p>	<p>Brown garden snail Gray garden slug</p>	<p>Attack leaves and fruit. Most active at night and early morning when ground is damp. Hand-pick; best hunting is after 10 pm. Or place short, wide boards with cleats at either end to keep the boards about 1 inch (2.5 cm) off the ground; these will be daytime hiding places. Pests can then be squashed or killed with a solution of 1 part household ammonia and 1 part water in a spray bottle. Keep ammonia off leaves since it damages plants. Other methods include chemical baits; predatory decollate snails; drowning snails in fermented liquid, such as beer; and copper barriers around trunk. K</p>
<p>Holes in new leaves, webbed and rolled together. Fruit scarred and rolled/webbed with leaves. Caterpillars make shelters by webbing two leaves or a leaf and a fruit. Caterpillar pupates inside fruit. Adult, night-flying, brownish moth emerges. Leaf damage on terminal shoot is especially evident for omnivorous looper.</p>	<p>Avocado worms (leafrollers): amorbia moth omnivorous looper orange tortrix</p>	<p>Attack leaves and fruit. Several different leafroller pests are often called avocado worms, usually found near damaged leaves. Omnivorous looper eats holes in leaves, leaving only midrib and larger veins. Feeds on fruit and causes scarring. Crawls with a looping motion.. Can spin a silken thread and hang suspended from it when disturbed. May vary in color from pale green to pink or yellow with stripes or other markings. Grows to 1½ to 2 inches (4 to 5 cm) long. Amorbia moth caterpillars are yellow-green, about 1 inch (2.5 cm) long. Orange tortrix caterpillars are greenish to bright yellow or pale straw-colored and prefer the top half of trees. Small parasitic wasps and flies usually keep the avocado worm population low. Certain fungi and viruses are also natural biological controls. Pick avocado worms out of their shelters or squash them in place. Rare, severe outbreaks can be sprayed with <i>Bacillus thuringiensis</i> (BT) or a chemical insecticides as a last resort</p>
<p>Tip and marginal burn of older leaves, premature defoliation, and sometimes a progressive mottled yellowing behind the burn.</p>	<p>Excess salts (chloride and sodium)</p>	<p>Salt accumulations are often confused with nutritional deficiencies. Avocados are particularly sensitive to salts, accumulating chlorides and sodium more readily than most other tree crops. Rapid burn at the base or leaf tip followed by defoliation suggests either an excessive fertilizer application or inadequate irrigation. Extra root-zone leaching during the summer is indicated.</p>
<p>Pale green to yellow, small leaves with yellow veins; lack of vegetative growth; lower yields; premature defoliation</p>	<p>Nitrogen deficiency</p>	<p>Affects leaves and fruit yield. Apply Nitrogen during the first irrigation of each month from March - October. Young trees need Nitrogen applications at different rates than older, mature trees.</p>

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Light yellow areas between veins, starting at leaf margins, extending to midrib and base. Small, narrow leaves. Pear-shaped fruit become oval to round, smaller than normal. Terminal growth looks like feather duster. Twig dieback. Defoliation. Reduced yields.	Zinc deficiency	Affects leaves, twigs, fruit yield. Can be controlled by applying zinc as a spray to foliage or to the soil. Foliar applications most effective in June and July. Methods of soil application vary and effectiveness can last longer than foliar sprays.
Interveinal yellowing on leaves. Tip and marginal leaf burn. Defoliation. Twig dieback. Reduced yields.	Iron deficiency	Affects leaves and fruit yield. Can occur in high-pH soils containing lime (calcium carbonate) but not common in California. Deficiency accentuated by excess soil moisture. Mexican race rootstocks are less sensitive
Leaves, twigs look water soaked, then wither, darken. Branches die back, and bark splits in severe cases. Leaves may drop quickly or persist on tree. When fruit freezes, flesh dries out and brownish pits may form on skin. Xylem (water-conducting elements) in the fruit turn black.	Frost damage	Attacks leaves and fruits first; attacks progressively larger wood after harder frosts. Allow tree to recover before removing frost-killed wood. After new growth appears in early spring, wait for any dieback, then cut back to live wood, identified by a green layer just under the bark. Pruning cuts heal naturally, so no need to paint them.
Large and small branches blacken, die. Wood peels off in patches. Fruit skin develops tough, brownish spots, and fruit may dry out.	sunburn	Affects trunk, branches, fruit. A problem in hot, sunny areas. Wrap the trunk in white cardboard or use whitewash or flat white latex paint. Maintain adequate nitrogen and water for good foliage.

Source: UC Master Gardener Handbook