

## CITRUS PROBLEM DIAGNOSIS

Citrus trees are well suited for Southern California. They don't mind alkaline soil too much and they like the climate. The major problems of backyard citrus at this time are Citrus Leafminer, various honeydew-secreting insects, and various fungal diseases. Details are in the table below.

Every year we receive many Hotline calls/emails from people who fear an infestation of Asian Citrus Psyllid (ACP) which has caused Orange County citrus to be quarantined. Most often, the culprit turns out to be Citrus Leafminer. If citrus leaves are twisted, crumpled, and deformed, the most likely cause is Citrus Leafminer, but see the table below for more information on these two pests.

Honeydew-secreting pests include various soft scales, mealybugs, aphids, and some others, most of which are protected by ants. One of the best prevention methods is to exclude ants from the canopy of the tree. See the table below for further information.

Fungus thrives in excess soil moisture and is very difficult to eliminate. It is best to prevent fungus or at least reduce populations by preventive measures; avoid over-irrigation, poor drainage, and wetting of the trunk. Plant on soil with good internal drainage; use clean nursery stock, preferably certified disease-free; use resistant rootstocks; prevent soil or water movement from infested areas.

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

What the Problem Looks Like	Probable Cause	Control Measures
New citrus leaf growth in spring and fall are twisted, crumpled, and deformed. Deformed leaves have tunnels left by Citrus Leafminer larvae.	Citrus Leafminer	Place pheromone traps near but not in citrus trees, just before the new growth flush occurs in spring and in fall. Citrus Leafminers do not pose a threat to any but the very youngest citrus trees. Mature trees can weather a Citrus Leafminer invasion, although the new leaves are unsightly.
Twisted deformed leaves, no tunnels in damaged leaves.	Asian Citrus Psyllid	The Asian Citrus Psyllid (ACP) has established only a small presence in Orange County to date. Twisted leaves are almost always a sign of Citrus Leaf Miner. To view ACP pictures and learn about the pest, read the UC IPM Publication on ACP. <a href="http://www.anrcatalog.ucdavis.edu/pdf/8205.pdf">http://www.anrcatalog.ucdavis.edu/pdf/8205.pdf</a>  If you conclude that you do have ACP on your citrus, you can visit the California Department of Agriculture website to report your findings and receive further instruction. <a href="http://www.cdfa.ca.gov/phpps/acp/">http://www.cdfa.ca.gov/phpps/acp/</a>

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<p>Round, red-brown scales on fruit, leaves, and twigs. Leaves may yellow and drop and twig dieback may occur. Most visible in late summer and early fall.</p>	<p>California red scale</p>	<p>An armored scale. One of the most important pests in California citrus. Lemon is the most susceptible followed by grapefruit, Valencia navel and mandarin oranges. This scale does not secrete honeydew. Natural enemies (parasitic wasps - <i>Aphytis</i> and <i>Encarsia</i> spp.) can provide good control in many parts of California.</p>
<p>Scales on leaves and twigs, rarely on fruit. Fruit and leaves covered with honeydew and sooty mold. Tree vigor may be reduced.</p>	<p>various soft scales: citricola scale brown soft scale black scale</p>	<p>Natural enemies and oil sprays are effective controls. Keep ants out of trees because they protect scales from natural enemies. <i>Metaphycus</i> parasites can be purchased and released for additional control. Time treatments to target new brood right after hatching.</p>
<p>Distorted, curled leaves, honeydew, and sooty mold</p>	<p>Spirea aphid cotton aphid melon aphid</p>	<p>Aphids suck sap from tender, new growth and secrete honeydew which provides a medium for growth of sooty mold fungus. Control needed only for heavy infestation on young trees. Dislodge with jet streams of water or use soap or oil sprays. See comments for sooty mold fungus, above.</p>
<p>Tiny whiteflies fly out when branches are disturbed. Immature insects look like transparent spots on leaves.</p>	<p>woolly whitefly citrus whitefly ash whitefly</p>	<p>Whiteflies excrete honeydew, which attracts ants and promotes growth of sooty mold. Whiteflies also suck phloem sap from leaves, causing leaves to wilt and drop. Adults have mealy, white wax on their wings and bodies. Natural enemy parasites usually provide control. Eliminate ants and control dust; they interfere with natural enemies. Chemical controls are not effective.</p>
<p>Cottony secretion on scales and twigs.</p>	<p>cottony cushion scale</p>	<p>Scales extract plant sap from leaves, twigs, and branches, reducing tree vigor. Newly hatched nymphs are red and found on leaves and twigs. Older scales are on twigs and covered with a cottony secretion. Eggs are in a fluted white egg sac about 1/2 inch (1.3 cm) long. Becomes a pest only when its natural enemies (<i>Vedalia</i> beetle and a parasitic fly) are destroyed by insecticides. Reestablish natural enemies and avoid use of insecticides. Occurs on a wide variety of fruit trees, nut trees, and ornamentals.</p>
<p>Fruit and leaves covered with honeydew and sooty mold. Soft oval segmented insects covered with a mealy white wax. Adults about 1/8 to 1/4 inch long.</p>	<p>mealybugs</p>	<p>Mealybugs extract plant sap, reducing tree vigor. If a cluster of mealybugs feeds along a fruit stem, fruit drop can occur. Natural enemies usually control. Hand-pick them, hose them off with water, or apply soap or oil sprays. A predator, the mealybug destroyer, is available commercially for release. Eliminate ants.</p>

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Ring or partial ring of scarred tissue on fruit rind near stem end. Young leaves may be deformed and scarred.	citrus thrips	A tiny yellow insect about 1/25 inch (1 mm) long. Very active. Damage is primarily aesthetic, cosmetic. Ignore in home gardens. Irrigate adequately, because thrips prefer dry plants.
Surface feeding or holes in blossoms, leaves, or young, developing fruit. Chewed leaves.	orangeworms	"Orangeworm" is a collective term for all moths and butterflies that are pests of citrus in the larval (caterpillar) stage. Trees can tolerate some foliage damage and loss of blossoms. Orangeworms can cause substantial damage by feeding on fruits. Examples of orangeworms are the citrus cutworm and leafrollers (see below), the western tussock moth, citrus looper, and orange tortrix. Larvae of the major orangeworms are difficult to distinguish. All produce webbing except the citrus cutworm.
New leaves have holes and are webbed and rolled together. Caterpillars also feed on buds and developing fruit, often rolling and webbing fruit and leaves together	leafrollers: fruittree leafroller omnivorous leafroller orange tortrix	Fruittree leafroller attacks citrus, apples, almonds, pears, stonefruit. It has the same geographical distribution as the citrus cutworm, and the two species often occur together. Damage to fruit may expose it to decay organisms. Most damage occurs in spring and early summer. One generation per year. Omnivorous leafroller has many generations per year and damage can occur throughout the growing season. Translucent caterpillars. General sanitation and natural parasites are effective controls.
Holes in leaves and fruit; slimy trails.	brown garden snail gray garden slug	Brown garden snail is about 1 inch (25 cm) diam. with distinct color pattern; gray garden slug is a snail relative, lacks shell. Most active at night and early morning when it's damp. Manage by skirt pruning and trunk treatment. Use wooden boards with cleats for monitoring. Remove collected snails and slugs daily. You can crush to destroy or use a 1:1 solution of household ammonia and water in a spray bottle. Keep ammonia solution off leaf surfaces because it can damage plants. Copper barriers, such as trunkbanding of citrus trees, can be effective.
Ants feeding on twigs, bark, leaves, and honeydew excreted by other insect pests. Argentine worker ants travel in distinct trails.	Argentine ant Southern fire ant	Ants feed on honeydew excreted by soft scales, mealybugs, aphids, cottony cushion scales, and whiteflies. Ants can interrupt biological control of these pests. Control ants by denying access to the canopy. Apply a band of sticky material to base of trunk that mechanically impedes ants. Prune the canopy up (above 30 inches [76 cm] off the ground) so that ants cannot get into the tree without climbing the trunk.
Leaves and green fruit have a pale yellow stippling. No webbing. Bright red globular eggs laid on bark or leaves.	citrus red mite	A barely visible red mite (use hand lens) found mostly on young leaves. Can be a problem on patio trees and indoor house plants. Oil sprays between August and September will control problems in most areas. Natural controls should be sufficient in unsprayed backyard trees. Weekly washings with soapy water are an effective control, but will not eliminate the problem.

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Oddly misshapen and distorted flowers, fruits, and leaves. Primarily a problem on lemons in coastal areas.	citrus bud mite	Very small, barely visible, elongated, yellow mite with only four legs that appear to be coming out of their heads. Smaller than red mites. Petroleum oil sprays during May and June or September through November can control. Natural predators are also effective. To detect bud mites before damage occurs, check buds on green angular twigs from midspring to fall.
Destroyed rind cells, causing russetting on mature oranges and silvering of rind tissue on lemons.	citrus rust mite	Very small, barely visible mite, deeper yellow than bud mite. A sporadic pest in coastal citrus plantings. Called silver mite on lemons and rust mite on oranges. Most damage occurs from late spring to late summer. No effective natural enemies are known. Monitor by looking for rust mites on foliage in early spring using a 10x to 14x hand lens. On lemons, check fruits for scarred rind tissue. If treatment is required, check the latest UC pest management guideline for citrus.
Maggots inside fruit pulp.	fruit flies: Oriental fruit fly Mediterranean fruit fly Mexican fruit fly	Female fruit flies lay eggs in the fruit rind. Importation of these pests from Mexico and Hawaii is a constant threat. They attack citrus, other subtropical fruits, and deciduous fruits. Maggots develop inside the fruit pulp destroying it. Infestations have occurred several times in Southern California in recent years. Contact your local Agricultural Commissioner's office if you suspect fruit fly infestation.
Fruit decreased in size, yellowed leaves, twig dieback, general loss of vigor.	citrus nematode	Microscopic wormlike pest. Nematodes feed on citrus roots. Belowground symptoms include poor growth of feeder roots. May occur in conjunction with Phytophthora root rot. Plant trees with resistant rootstocks.
Black film on leaf surfaces.	sooty mold fungus	Most active in cool, moist conditions. Feeds on honeydew excreted by aphids, mealybugs, scale insects, and whiteflies. Sooty mold should be washed off leaves because it can reduce photosynthesis and tree productivity if prolonged. Cosmetically unappealing on fruit; usually no serious harm, but wash it off.
Leaves yellow and drop. Beads of sap ooze from trunk lesions. More pronounced in spring. Inner bark is brown and gummy, but discoloration does not extend into the wood. Bark can dry, harden, and crack. Overall decline of tree.	Phytophthora gummosis	When infection is just above the bud union, it is often called foot rot; when infection is higher up on the trunk, it is often called gummosis. When it spreads down into the crown, it is referred to as foot rot. Fungus infects the tree trunk and may spread to crown and woody roots. Keep trunk dry. Do not allow sprinkler water to hit the trunk. Scrape away all diseased bark and include a buffer strip (about 1 inch [2.5 cm]) of healthy light brown to greenish bark around margins. Allow to dry. Repeat if infection recurs. Keep mounded soil and water away from trunk. Improve ventilation by removing branches that touch the ground. Avoid injuring bark with lawn mowers, weed whackers (the worst), and pruning tools, since wounds give fungus an easy entry.

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Leaves yellow and drop. Root bark of infected roots slides off easily when pinched. Feeder roots destroyed.	Phytophthora root rot	Caused by the same fungus that causes gummosis but it infects the root system in this disease. Survives in soil a long time. Disease can occur when water is in direct contact with the base of the trunk and the trunk is allowed to stay wet. Shorter, less frequent irrigations may help if damage is not severe. Do not plant citrus in the lawn where it will be watered too frequently. If damage is severe, remove tree. Fumigate if replanting.
Ripe fruit turns light brown and becomes soft. Water-soaked spots on rind become soft and turn brown. Pungent odor.	brown rot	Caused by the same fungus that causes gummosis, but it infects fruit in this disease. Occurs primarily on fruit borne near ground during wet weather. Fungus spores on the ground get splashed onto fruit on lower branches by rain or irrigation water. Remove diseased fruit. A preventive Bordeaux treatment (copper sulfate $\text{Cu}(\text{SO}_4)_2$ ) before first fall rains can be applied to tree skirts up to 4 ft (1.2 m) and to the ground beneath trees.
Poor growth, dieback of shoots. Small, yellowing leaves and premature leaf drop. In winter, mushrooms may be at base of infected trees a few days after rain	Armillaria root rot	Also known as oak root fungus. Symptoms may not appear until fungus is well established. Once symptoms appear, the disease has probably already spread to roots of surrounding trees. Pathogen invades roots and crown and can destroy entire root system. Fungus requires cool, moist soil for development and spread. Management relies on preventing infection in new trees. Once infection is apparent, it is very difficult to save a tree. If your planting site may be infested, fumigate it before planting. Remove and burn infected trees and neighboring healthy trees. Note: Not all mushroom growth indicates presence of <i>Armillaria</i> .
Internal black rot in navel orange fruit. Rot starts at stem end, extends into core. Can occur on lemons in storage.	Alternaria rot	A fungus disease. Also known as black rot on navels. More of a problem when the navel is split. Preventing stress reduces susceptibility. No chemical control.
Whitish mycelium on fruit; blue and/or green spores appear on fruit.	blue mold green mold	May occur on injured fruit in the field but more often is a postharvest disease. Early infections are almost impossible to detect. Easily recognizable when whitish mycelium and blue or green spores appear. Both types may occur together. To reduce infection, do not pick wet fruit and handle fruit carefully during picking. Immediately discard infected fruit and wash all stored fruit nearby in soapy water.
Small, lopsided fruit; stunted growth. Small leaves held upright, not flat. Inferior, off-bloom fruit.	stubborn disease	Virus-like disease. Afflicts primarily sweet orange, grapefruit, and tangelo trees in hot inland areas of Southern California and the desert. No control available. Infected young trees yield small harvests.

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Scaling, flaking of bark on scion cultivar. Patches of bark on trunk, scaffold branches show small pimples or bubbles that later enlarge and become loose scales.	<i>Psorosis</i> virus	Graft-transmissible disease, presumably a virus found in old citrus plantings. Infected trees, mostly orange and grapefruit, slowly decline. Gumming can occur around lesions.
Excessive fruit drop, especially on young trees.	sudden temperature change; heat wave at fruit set; too much or too little moisture; nutrient deficiency	Nutrient deficiencies can be identified by the pattern of leaf yellowing (chlorosis) and by noting whether it occurs on new or old foliage. Adjust fertilization program to add needed nutrient in form that roots can extract (chelated) or as foliar spray. Nutrient deficiencies can also result from too little water. <i>Nitrogen deficiency</i> : Starts with older leaves near bottom of tree and foliage turns a uniform yellow. <i>Zinc deficiency</i> : Young trees are abnormally small with yellow blotches between the veins. Symptoms are most obvious on the south side of the tree. Use foliar spray. <i>Iron deficiency</i> : Young leaves turn yellow between the veins. Veins stay green. Common in alkaline, poorly drained, overwatered soils. Add chelated iron not foliar sprays. <i>Manganese deficiency</i> : Young leaves turn a lighter green between the veins. Often more noticeable on tree's north side. May occur with iron and zinc deficiencies. <i>Magnesium deficiency</i> : Older leaves turn yellow between veins and drop. Most noticeable in late summer to fall and in rainy climates.
Brittle wood peels off in patches. Fruit rind develops tough, brownish spots and fruit may dry out.	sunburn	A problem in hot sunny areas. For newly planted trees, wrap the trunk in white cardboard or use whitewash or flat latex paint in white or a light brown color that blends with tree trunk.
Random fruit scarring. Scarring does not form a ring around the stem end as with damage from thrips.	wind abrasion	Minor problem. Create a windbreak or plant trees in a nonwindy area. High winds can also cause premature leaf drop.

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Leaves, twigs look watersoaked, then wither, darken. Leaves may drop quickly or persist on tree. Flesh of fruit dries out and brownish pits (ice marks) may form on the rind. Branches die back and bark splits in severe cases.	frost damage	Wait before treating frost damage. Allow the tree time to recover before removing frost-killed wood. After new growth appears in early spring, wait for any die back, then cutback to live wood (identified by a green layer just under the bark). Pruning cuts will heal naturally, so there's no need to paint them.
Navel oranges crack and split. Small percentage of fruit affected.	late growth spurt	Cause unknown. Problem may occur in the fall when the rind does not expand as fast as the underlying flesh during a late growth spurt, causing splits
Leaves yellow and drop. No mites present. Abnormal number of blossoms.	overwatering	Decrease irrigation frequency. Avoid planting ferns, annual flowers, or plants that need lots of water near citrus trees.
Leaves turn pale green to yellow, especially in winter and spring. No mites present.	nitrogen deficiency	Symptoms may appear in spring when soil temperatures are cold and trees are not able to take up nutrients despite adequate amounts in the soil. Check to see that fertilizer requirements are met. Can apply foliar nitrogen as urea to increase bloom set and yield.