



Arid Zone Trees

Common Pest and Disorders of Desert Trees

Having evolved for millennia in some of the harshest environments on earth, desert adapted trees are susceptible to a limited number of natural diseases, pests and disorders. This does not mean that the “domestication” of these species, in the process of planting them and maintaining them in landscape settings, doesn’t present some challenges. Desert adapted tree species thrive most easily on a maintenance regime of benign neglect, where moderate water (properly applied) and limited fertilizer tend to help to reduce or eliminate the likelihood of most serious problems.

Correctly Identifying the Problem

It's easy to identify trees in the landscape that don't appear to be thriving. It is far more difficult to determine why trees are not growing vigorously and what to do to correct a given situation. Adding to this potential confusion is the tendency of individual desert species, grown from seed, to exhibit widely varying horticultural and physical characteristics (growth rate, canopy density, leaf size and density, rooting habits, form and structure) within a single landscape. These kind of issues can be addressed by planting cloned varieties (trees produced by vegetative propagation) to insure the highest level of uniformity in growth and structure among trees.

Sources of problems can range from insects, soil conditions, watering, fertilization, herbicide injury, maintenance practices, diseases, parasitic plants or weather conditions (freezing, excess rainfall, wind damage, sunburn). Using the wrong control strategy can be time consuming, expensive, ineffective and potentially dangerous. For example, plants with root rot often exhibit wilting symptoms because the disease damages the root system and results in a lack of viable roots to extract water from the soil. Applying additional water in response to the wilt symptoms saturates the soil and creates conditions favorable for further root rot.

An accurate diagnosis of the situation is critical. Before seeking help, assess the current status of the entire landscape. Have any cultural practices changed recently or were they recently completed or delayed (irrigation modification, fertilizer, pest control, pruning)? Have weather conditions followed seasonal norms or is there a change of season taking place (e.g. winter to spring)? What is the apparent health and vigor of neighboring landscapes? Have you seen similar symptoms in past years? Answering these or similar questions may help you zero in on the problem or at the very least prepare you to discuss the situation with a consultant or county agent. The University of Arizona, College of Agriculture, Cooperative Extension Service has offices in each Arizona county. Similar services associated with the Land Grant University in most states offer consultation assistance. The Cooperative Extension Service offers information by phone, internet and an array of useful publications dealing with the most commonly encountered problems and pests. The County Agents are familiar with common diseases and pests of local landscape trees and can serve as an authoritative source for control options. Most offices can send plant or soil samples to laboratories on the university campus if additional diagnostic work is needed. Typically these services are free to the public but response times can be slow.



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Professional, certified arborist can also be a source of answers for tree care questions. These professionals generally offer their services for a fee. If control options include the application of pesticides, it is prudent to confer with a qualified professional before having them spray pesticides and definitely before spraying pesticides yourself. Application of pesticides carries with it an array of personal, physical, environmental and legal liabilities. Make certain you or the professional pest control applicator carefully assess these liabilities and adhere to the products label.

With the possible exception of Texas Root Rot and Palo Verde Borer, diseases and insects rarely cause serious damage to desert species. The overwhelming majority of desert landscape tree problems are related to detrimental cultural practices (over or under watering, fertilizing, pruning, poor root development or deep planting) or environmental conditions (soil type, drainage, incompatible plant mix, wind, heat and sun exposure). Before initiating changes in cultural practices be certain that the changes will remedy the problem at hand.

Common Insect Pests of Desert Trees

Insect pests can and do injure desert trees, both in nature and in the landscape, but this damage is rarely severe and in only a single case fatal. These pests can damage leaves, twigs, branches, trunks and roots. Insects attack stressed, compromised or damaged trees and rarely pose a threat to healthy, vigorously growing trees. With the exception of the Palo Verde Borer, these insects usually do not seriously damage trees. Tree Borers can be divided into three general groups: Flatheaded Borer, Roundheaded Borers and Root Borers.

Flatheaded Borers most commonly invade sunburned or otherwise damaged areas along the trunks and branches of trees. Olive-gray adults lay eggs under the bark of damaged areas. Larvae are cream colored and legless and mature to 1 1/2" long. Maturing larvae feed on dead wood producing small tunnels (galleries) filled with what appears to be sawdust. This damage occurs beneath the bark and can go unnoticed for long periods. Since the insects are hidden within the wood they are well protected from chemical sprays applied to the surface of the tree. Larvae do not attack and cannot feed on adjacent healthy, undamaged wood (sap wood). The adult form of this insect is an entirely non-descript beetle.

Larvae of Roundheaded Borers can also bore into damaged wood. The larvae are cream to white colored and are also legless. Like the Flatheaded Borers these insects are limited to damaged wood or dead wood. An exception is the mesquite twig girdler, which girdles and kills small twigs of mesquite trees. The females then lay eggs in the section that is killed and the larvae develop within the wood. Holes typically observed on trees are the exit hole where the mature adult has chewed its way out of the tree. These exit holes can be occupied by many other non-injurious insects. Firewood piles can serve as a reservoir of these insects and should be considered a potential source of adults. The adult form of this insect is an entirely non-descript beetle.

Palo Verde Borers are root borers and are rarely seen above ground in the larval form. The adult form is a very large (3" to 6" long with antennae nearly as long as their bodies) conspicuous, dark brown cockroach looking beetle. Adults are active July through October. Immature larvae feed on living roots of Parkinsonia (Cercidium) (Mexican Palo Verde) and other non-native trees. Larvae spend up to three to four years underground feeding



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on roots. Over a 7 to 10 year period Palo Verde Borers will gradually kill a tree. Most adult borer females (beetles) lay eggs from spring through summer. With the exception of the Palo Verde Borer most borers complete their life cycle in about a year (from egg to adult). Landscape trees located near areas of mature, undisturbed desert trees are more likely to be attacked by tree borers than are those at greater distances from the desert. Maturing native desert trees can harbor populations of pest insects that can then easily migrate into nearby landscape plantings. Small, white to cream colored grubs, frequently encountered when excavating the roots of dead trees, usually are not tree borers. Typically these grub are the larvae of the common June Beetle and are only feeding on decomposing organic matter. The Palo Verde Borer larvae are large up to five inches long, grayish white to cream colored, with a large, distinct head regions and thick body.

A number of insects attack the foliage of desert trees. These include: Acacia whitefly, aphids, psyllids, thrip, spider mite, and the recently identified Palo Verde Scale. Aphids are a common and wide spread plant pest that can attack desert species. As with other traditional landscape plants, aphid feeding is restricted to the succulent new growth on the tips of twigs of desert trees. Aphids reproduce extremely rapidly, under ideal conditions and can quickly kill small twigs and deposit honey dew (a clear, sticky material excreted by aphids that blackens leaves and twigs). Acacia White Fly feed by scraping at the undersides of leaves giving the leaves a blotchy, yellowing appearance. Acacia White Fly actually appears dark gray or black because of a large dark spot on the body. These insects also reproduce rapidly and can cause significant leaf loss. Psyllid occurs on leaves, terminal shoots, and flower buds of many trees. Adults are green to brownish but often appear darker during cooler weather. The tiny, golden eggs and the orange to green, flattened nymphs are most abundant on the surface of new growth. Psyllids suck plant juices and produce honeydew, sometimes in crystallized form, on which blackish sooty mold grows. Abundant psyllid infestation can defoliate, reduce plant growth, and cause terminals to distort, discolor, or die back. Defoliation damage is caused by the nymphs (the immature stage). Psyllid damage is aesthetic and populations will decline naturally with higher desert temperatures. Insecticide may be applied to manage intolerable damage levels.

Thrips are tiny slender insects, 1/20 to 1/16 inch in length that can appear from white-yellowish to brown/ black in color. Thrips can damage new emerging leaves in the spring by piercing the leaf or stem and sucking sap from the tree. The damage is cosmetic causing leaf curl and can stunt early seasonal growth. Thrips rarely kill desert trees unless a heavy population begins to defoliate the tree causing stem dieback. If heavy infestation occurs insecticide treatment can be applied to control infestation. As temperatures rise insect activity and the associated damage will diminish. There are certain beneficial species of thrips that feed on mites and other insects. Without a magnifying lense it can be difficult to distinguish one from the other. Thrips are considered the poor flyers, transported from plant to plant by the wind.

Spider Mites are related to insects, but are not an insect, they are classified with spiders and ticks. Spider mites produce a web between leaves that sometimes goes unnoticed until dust builds up within the web. Spider mites appear as tiny, moving dots to the naked eye. A simple method of identifying mites is taking a white piece of paper and tapping a webbed branch on the paper. If yellow, red, greenish or brownish specs are seen moving around on the paper, this signifies a spider mite infestation. Spider mites suck the sap out of the foliage and turns the affected leaves a bronze color. If left uncontrolled, leaves will turn yellow and can drop off. Typical



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infestation occurs during dry hot periods such as May and June in the desert and most noticeable along dusty roadways or paths. Rainfall will clear up minor infestations while heavy infestation will require a pesticide application. New products available today upset the ovation lifecycle. Utilizing a combination of contact miticide and ovicidal achieve effective control.

Palo Verde Scale, a previously unidentified pest of Palo Verdes, has recently been observed in the Phoenix metropolitan area. To date it does not appear to cause injury to the trees. Young trees (3 to 5 years of growth) may require sprays to control foliar insect pests. The damage from these insects can slow growth. On more established trees, chemical control can be reduced or eliminated. Allowing moderate populations of these insects to survive will help support populations of a number of beneficial insects that actually feed on these pests.

Witches' Broom: Witches' Broom is a disorder found on a wide assortment of native and non-native trees and is typically characterized by a dense proliferation of numerous small branches originating in close proximity of each other. The general appearance is similar to a broom, and as it is an undesired condition, hence "Witches" Broom. There has been a great deal of confusion, dating back to the large scale introduction of Palo Verde species as landscape trees, about the causes and treatment of Witches' Broom in desert landscapes. Suspected causes have included genetic disorders, pathogenic microorganism (as is the case in several trees species native to the mid-Western and Eastern states) to insect damage. Over the last few decades it appears certain that Witches Broom in desert adapted trees species is primarily associated with Spider Mite infestations. Spider Mites can attack Blue Palo Verde anytime during the warmer seasons. Infestations, especially high infestations, are usually associated with dirt and dust accumulation on leaves and an external source of the spiders (typically carried in the wind from one plant to another). The "Witches'-broom" observed is the result of the feeding of mite that are most likely already done or dead. Spraying "active" Witches' Broom affected trees does not reverse the condition but may help reduce the spread of the spiders. From a purely cosmetic standpoint, pruning is the most effective method of controlling this problem. Implementing cultural and chemical control measures to reduce Spider Mite populations are, by far, the best preventative for avoiding Witches' Broom in desert landscapes.

Mistletoe: While we may use it during the holidays for stealing kisses, mistletoe, as a parasitic plant, is specially adapted to stealing nutrients and water from host trees and shrubs. It is not surprising that the genus of the two mistletoes species commonly found in the desert southwest, Phorodendron, literally translated mean tree thief. These two mistletoes are *P. californicum* (a narrow leafed type) and *P. tomentosum* var. *macrophyllum* (a broad-leafed type).

Landscapes that are immediately adjacent to undisturbed desert (golf courses, residential or commercial properties) may wish to control mistletoe in infested trees for cosmetic reasons or in an effort to limit spread to other trees. It is instructive to think of mistletoe as a weed and as such control strategies revolve around removing the target plant, controlling seed sources or chemical control. Simply removing the stems of the mistletoe will not affect the "roots" (haustoria) embedded within the branch. Ultimately new stems will be produced. Stem removal will slow the growth of individual plants within a tree and have the added benefit of



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reducing seed production but will not eradicate the plant from infested trees. Removing infested branches is another option but such pruning may only further disfigure the tree or generate other problems often associated with heavy pruning. Appreciate that other infested trees in the surrounding desert will still be a more than significant source of seeds for new infestations. Chemical control has never proven effective experimentally and there are no labeled herbicides for the control of mistletoe. In short, control is difficult, time consuming and usually ineffective.

Mistletoes are seed plants that grow either as a parasite (extract all nutrients for growth, including sugars, from the host) or a semi-parasite (capable of photosynthesis but depends on its host for water and mineral salts). Flowers are petal-less, inconspicuous and produce large numbers of sticky seeds. The seeds are coated with a gelatinous material that makes them stick to the beaks of birds and the feet of animals. Birds are the primary carriers of seeds from infested to healthy trees. Seeds can germinate anywhere but can only penetrate young, thin bark. Once inside the tree, small root-like growths called haustoria grow in the spaces between the host plant cells. It is through these haustoria that mistletoe extract needed water and nutrient from the host plant. The age of a mistletoe plant can be calculated by counting the tree rings from the region of the first haustoria to the surface of the bark. Many mistletoe plants are 60 to 70 years old and one has been reported as living 419 years.

The aerial portions of mistletoe are leafy, evergreen clusters of shoots (stems) that appear to emerge from the branches of host trees. Stems and leaves contain chlorophyll and are generally green in color though often with yellowish, brown or olive tints. Plants have opposite leaves with round, segmented stems. Growth is initially slow but tufts can grow to 3 feet across in 6 to 8 years. Aerial portions do not live much longer than that but new clusters can arise from haustoria surviving within the tree.

Phorodendron californicum has small, narrow, nearly inconspicuous leaves, making the plant look like a cluster of short, densely packed, green stems. *P. californicum* is typically found on desert legumes, especially Native and Screwbean mesquites but is also common on Cat Claw, Palo Verde species, and occasionally on Creosote and Desert Ironwood. In contrast, *P. tmentosum* var. *macrophyllum* has broad, thick leaves arranged opposite each other along the stem. It is usually found on stream-bank trees such as Cottonwoods, Willows, Sycamores and Ashes but also on Walnut, Mesquite, and Hackberries. Both are found throughout the desert southwest.

Mistletoes are commonly found in native stands of mature desert trees but rarely, if ever, in cultivated trees. Obviously it can be introduced into the landscape on desert salvaged or relocated trees. Mistletoes can damage and weaken older trees, cause unattractive branch swellings and in rare cases the weight of the plants can cause branches to break. The impact of mistletoe on the appearance of trees is highly subjective. Some people find the infestations unattractive while others find they add color, density and character to maturing trees.

The relationship between mistletoes and host desert trees is ancient. Over the millennia they have learned to tolerate each other and safely co-exist. Perhaps desert horticultural professionals should take a lesson from the native mesquite and just learn to live with mistletoes.



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General Pest Control Practices:

Inspect trees during the growing season for common garden piercing/sucking insects like aphids, thrip, whiteflies or psyllids, these pests are usually quite obvious. During dry months, (May and June) in dusty conditions, spider mites can appear. Monitor for infestation and apply controls as needed. Spray applications of water or water and Safer Soap give short-term control (3 to 7 days) for small insect population. For heavy infestation or longer control use federally registered insecticides. A contact insecticide application will kill existing adults. An application with a systemic foliar or soil drench pesticide will provide 8 to 12 weeks control for any post application insect hatchings or in-migration of insects from untreated areas. Before using pesticide for the first time or on new plants or cultivar, treat only a few plants and check for phytotoxicity. Always read label and follow label instruction before using pesticides. For pesticide control recommendations contact a licensed pest control advisor.

Chemical Controls and IPM: Chemical sprays that are aimed at controlling pests also destroy populations of beneficial insects like Lady Beetles and parasitic wasps. By using Integrated Pest Management (IPM), promoting a balance between pests and beneficial insects, long term biological control of foliar insect pests can be achieved. Other insects that can cause damage but were not discussed here include lygus, mealy bugs, leafhoppers, ants, spiders, caterpillars, lace bug and cicadas. For chemical control recommendations contact a certified arborist, certified nursery professional, licensed pest control professional or the county extension office.