Problems and Pests of Agave, Aloe, Cactus and Yucca
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Agaves, aloes, cacti and yuccas are classified as succulents — plants that have highly specialized anatomical features such as thick waxy cuticles, fleshy or minimal leaves, modified leaves (spines), and roots with extra storage capabilities for food and water. These modifications allow them to survive and thrive in harsh desert environments. They survive long periods of drought in areas of sparse rainfall and intense heat. During stressful periods many succulents cease to grow. They drop unnecessary leaves, dehydrate and become dormant until conditions for growth return.

Despite their adaptations, succulents suffer from diseases, insect pests and horticultural problems. Some of the more common problems that occur in agave, aloes, cacti and yuccas in Arizona are discussed in this bulletin.

**Abiotic (non-living) problems**

Abiotic problems are not caused by living organisms. They include poorly drained soils, sun exposure, and weather events such as cold and high temperatures, excessive rainfall, over watering, planting too deeply and hail damage. In transplanted agaves, aloes, cacti and yuccas, abiotic problems are probably the most common problems that growers and homeowners encounter.

**Selecting the correct plant and planting location**

Careful selection of species that are suited to your local conditions is necessary and will eliminate or diminish serious problems. Choose species that are found in your neighborhood or area. Visit specialty cactus and succulent nurseries and discuss cold hardiness, heat and cold tolerance, mature size of the plant, growth rate and known problems of a specific plant with the nursery personnel. Contact your local Cooperative Extension office for expert advice. Visit local arboreta that have extensive succulent collections. Choosing the right plant for the right place is the first step in successfully growing these unique plants.

Most succulent species originate in areas of diverse habitats. For example, many agaves grow in pine and oak forests, open grasslands and even in barren open areas. By researching a little about your plants and their special requirements, they can be planted in areas of your yard that fulfill most of their requirements.

**Freeze Damage**

Many of the more showy and exotic succulents originated in frost-free climates. As a result, when temperatures remain below freezing for several hours, they suffer freeze damage. The damage originally manifests itself as blackening of the exposed parts of the plant (Fig. 1). After a few weeks, the blackened area will dry out and become crisp. Freeze damage cannot be repaired, but unless the freeze is of particularly long duration or exceptionally cold, the damage may be only cosmetic and the plant will grow out of it. When exposed to a severe freeze, portions of columnar cacti will yellow, and then die completely (Fig. 2). In freeze-damaged barrel-type cactus, the margins of ribs become straw yellow. If temperatures are not substantially below freezing (a “hard freeze”) and the freeze lasts for only a few hours or less, only the epidermis may be damaged and the plant will outgrow the damage in several years.

Freeze damage can be prevented. It is important to become acquainted with temperature requirements of the particular species. Protective measures often can be taken to ensure survival. Cold-sensitive plants should be grown in areas that receive radiated heat at night from a patio or wall or in hilly areas where air temperatures are slightly warmer.

Covering the plant with a cotton sheet will help on nights that are just at or slightly below freezing. Another strategy is to place a 60-watt light bulb under the cotton sheet, taking care that the light bulb does not touch the plant or the cotton sheet. Do not cover the plant with plastic sheeting. Plastic is a poor insulator and will transfer the cold directly to the plant wherever it touches the plant. Containerized plants can be moved indoors until freezing weather has passed. If kept dry and placed in a brightly lighted area, they will survive without damage.

Extremely low temperatures may cause a loss of turgor in saguaros. This causes sagging of branches (arms) or death of the apical meristem (growing tip) that results in saguaros with many stems or ‘heads’.

**Sunburn**

Sunburn is a common problem in greenhouse or shade house grown plants. It is also problematic when plants grown in open beds or filtered sunlight in nurseries are transplanted into open landscapes. Those parts of the plant that have not been acclimated to direct sun will burn easily.

Sunburned plants turn yellow. As the damage progresses, the epidermis turns straw yellow, then tan and dies (Fig. 3). The plant often will recover but is permanently scarred.
Sunburn can be minimized in nursery-grown plants by placing the plant in the same direction as it had been previously growing. Many nurseries will mark one side of the plant so it can be transplanted in the same orientation. Placing shade cloth (30%) or cheese cloth over newly-acquired plants reduces sunburn. If possible, purchase locally grown plants that have been grown in full sun or partial sun (depending on the species) and acclimatized to sunlight.

Greenhouse-grown plants that will be planted in the open garden can be acclimated by gradually moving them out into full sun over a period of weeks or planting in shade of a deciduous tree or shrub. Planting in late winter when solar radiation is less intense and using inorganic mulch such as gravel or decomposed granite around new plants also will reduce sunburn. Mulch about two to four inches (5–10 cm) deep will help retain soil moisture and reduce reflected light and heat. Many species will benefit from partial or dappled shade. By planting near a deciduous tree or shrub, the plant will be protected from the summer sun and winter freezes.

**Planting depth**

Proper planting depth is essential for the survival of many succulents. In columnar cacti such as saguaro (*Carnegiea gigantea*), green stem tissue should not be below ground. This is commonly done with saguaro and other columnar cacti and leads to poor establishment and death of the plant. Do not attempt to ‘match’ plant sizes so that all the plants are equally growing. Many nurseries will mark one side of the plant so it can be transplanted in the same orientation. Placing shade cloth (30%) or cheese cloth over newly-acquired plants reduces sunburn. If possible, purchase locally grown plants that have been grown in full sun or partial sun (depending on the species) and acclimatized to sunlight.

**Poorly-drained soils**

All succulents require fast-draining soils. Special ‘cactus’ mixes are available at many retail nurseries. These mixes are formulated for potted plants. Poorly-drained soils will predispose the plants to attack by soil-borne, root-rotting pathogens that may result in the death of the plant. Careful irrigation management is critical in growing cactus, agave, and yucca successfully in heavy clay soils. In outdoor landscapes, adding copious amounts (up to 25%) of pumice will improve drainage and soil structure.

Sandy soils should be avoided because they will drain very rapidly and retain little water and nutrients. They should be amended with well-rotted compost or peat moss. Fresh or uncomposted manures should not be used as soil amendments because the high salt content found in manures is detrimental to root development.

**Irrigation**

The interaction of biotic (living) and abiotic (non-living) conditions cannot be overemphasized. One of the more serious abiotic conditions is over-watering. This combined with poorly drained soils is a recipe for plant failure. In times of drought or low rainfall for prolonged periods, supplemental water will diminish problems associated with heat and sun damage. As a general rule, watering succulents in well-drained soils on a 10–14 day interval is sufficient to ensure plant health and growth during summer. On heavier soils such as clay soils the watering interval may be decreased. On sandy or very rapidly draining soils the frequency will have to be increased. Check the root zone 2–3 inches (5–7.5 cm) below the surface. If the soil is even slightly damp, wait until it has dried to irrigate. By regularly checking the root zone before watering, you can get a good idea of your plants’ water needs. A thorough irrigation followed by a 2–14 day dry period (no rain, no supplemental water) will give the soil a chance to dry out completely which in turn will reduce the incidence of soilborne pathogens. As the daylight decreases in fall and winter, irrigation may be reduced. When nighttime temperatures drop below 60°F (16°C.), discontinue irrigation. When nighttime temperatures are above 60°F, water as described above. Most of these plants can survive on natural rainfall through late fall, winter and early spring.

**Hail damage**

In some areas of the desert southwest, hail storms cause considerable damage to young aloe, cacti, agave or other succulents. Hail damage on barrel-type cactus results in scar tissue forming at the point of impact (Fig. 4), leaving scars that can vary from very small spots to larger lesions. On *Agave* species, leaves may be perforated by the impact of the hail. There is no protection from hail unless plants are covered before a hail storm begins. Small areas or a few specimens may be covered with a heavy blanket or tarp to minimize the damage.

**Diseases**

**Fungal lesions**

Anthracnose of agaves is caused by a fungus, a species of *Colletotrichum*. It can be a problem during moist conditions or occasionally when agaves are grown in the shade and overhead irrigated. Infections cause lesions on the leaves and/or crowns. When the fungus is active, it produces a red to orange spore mass within the lesions (Fig. 5). The spores are distributed by splashing water and windborne rain. They must be in free moisture on the host plant for several hours to germinate and cause infection. Infections may kill all or part of a leaf.
Leaves with active lesions should be removed. In areas where disease has occurred, overhead watering should be avoided. Application of fungicides such as thiophanate methyl during wet weather may prevent new infections, but efficacy of fungicide treatments has not been established.

Other fungi also have been associated with stem lesions on cacti and agaves. They usually occur during prolonged periods of cool, wet weather. There is a great deal of variation in susceptibility among Agave species. For example, severe lesions have been observed on Agave weberi while other species growing nearby are not affected (Fig. 6). Species that are susceptible to fungal lesions should be replaced with more tolerant species of Agave or another type of plant.

Fungal lesions also develop on barrel cactus (Fig. 7). These infections usually develop during spring rains and are more common on plants that are shaded. Infections rarely kill the plant but do cause cosmetic damage. If cacti are planted in an area that is routinely problematic, the plants should be moved if possible. Heavily infected plants should be removed and placed in plastic bags and disposed of in the trash to reduce the spread of the fungi.

**Bacterial necrosis of saguaro**

Bacterial necrosis of saguaro is caused by the bacterium *Erwinia carnegieana*. The initial symptom is a small, light-colored spot with a water-soaked margin on the surface of the trunk or branches that may easily go unnoticed. The tissue under the infection site soon becomes brown or almost black. As disease progresses, the tissue may crack and exude a dark brown liquid (Fig. 8, Fig. 9). If decay is slow, the tissue may not have the liquid exudates. As infected tissue breaks down the woody skeleton is exposed (Fig. 10).

The pathogen, *E. carnegieana*, survives in soil or plant tissue for long periods of time. The bacterium is spread by insects and in infested soils. Infections take place at wound sites on roots, trunks and branches, especially those made by insects, weather-related events, or rodents. Dead and dying plants serve as reservoirs of the bacterium and as sources of bacterial inoculum for new infections. In large natural stands where disease occurs, proximity of saguaros to dead and dying plants significantly influences mortality.

New infection sites can be treated when very small (less than two inches (5 cm) in diameter) by carefully removing the infected tissue, along with a small margin of healthy tissue, using a clean sharp knife. Allow the wound to heal on its own. Older infection sites exuding dark liquid, especially those at the base of the plant, are not treatable. Plants with advancing decay should be removed to prevent infection of nearby saguaros and damage or injury of persons or property. All infested plant material should be completely removed from the site and away from any other saguaros.

**Fungal crown rot of Echinocereus**

Soft rot of several species of *Echinocereus* has been attributed to infection by a fungal pathogen. The fungus has not yet been positively identified, but it produces spores abundantly. These spores are probably disseminated in splashing water and windborne rain, and they require free water for germination and penetration into the host. Most occurrences have been in plantings in commercial nurseries, but the fungus has been isolated from pad cacti occasionally. The first symptom of infection is dark, sunken areas that are soft and water soaked (Fig. 11). In *Echinocereus*, disease may begin anywhere on the upper part of the cactus and causes an internal soft rot (Fig. 12). In pad cacti, sunken soft-rotted areas appear on the pad surface.
Water management is probably important for prevention of this disease, but to date no research has been done to determine the optimum conditions for disease development.

Applications of fungicides such as thiophanate-methyl may help prevent infection where disease has been problematic. Infected plants should be removed so that they are not sources of spores that will infect nearby plants.

Phyllosticta pad spot

Lesions on pads of prickly pear cacti (Opuntia species) may be caused by several different pests or environmental conditions. However, the most common pad spot on the Engelmann’s prickly pear in the desert of Arizona is caused by a fungus described as a species of Phyllosticta. The disease is found throughout the desert. Lesions are almost completely black because of the presence of small black reproductive structures called pycnidia produced on the surface of infected plant tissue (Fig. 13). Spores produced within these reproductive structures are easily disseminated by wind-blown rain or dripping water and infect new sites on nearby pads. Pads on the lower part of plants are often most heavily infected since the humidity is higher and moisture often persists after rain. Once pads dry, the fungus becomes inactive and the lesions may fall out.

Severely infected pads or entire plants should be removed from landscapes to prevent spread of the fungus. No other controls are recommended.

Pythium rot of barrel cacti

An internal soft rot of barrel cacti is caused by species of Pythium, a soil borne pathogen that is favored by moist conditions (Fig. 14). Golden barrel (Echinocactus grusonii) is commonly affected. Pythium sp. can cause root and/or crown rot if plants are placed in the ground too deeply when transplanted or are wounded and then over-watered.

Barrel cacti should be planted so that the roots are placed firmly in the soil but no soil is placed around the base of the plant. Care should be taken to avoid wounding the fleshy part of the barrel when planting. Since the rot is internal, it is often too late to treat cacti once disease is detected. Preventive treatments of mefanoxam or phosphonyl-Al may be warranted in valuable species, but the best prevention is proper planting and watering.

Root and crown rot of agaves

Several soil borne pathogens including a species of the bacterium Erwinia and the fungus Fusarium have been implicated in root and crown rots of agaves. Disease is usually in concert with infestations by the agave weevil, and currently it is thought that weevil feeding enables these pathogens to enter and cause disease when they normally would not be pathogenic on healthy plants. See the section on agave weevil for more information on this insect vector.

Other than preventing wounds in the plant, such as those caused by the agave weevil, there is no control for the bacterial and fungal infections once the microbes have entered the plant.

Sammons’ virus of Opuntia

Opuntia Sammons’ virus is common on Engelmann prickly pear (Opuntia englemannii). It causes light yellow rings with some mosaic pattern in the pads and is often called a ringspot virus (Fig. 15). The disease is more of a curiosity than a problem since infections do not cause noticeable harm to the plant. The only known native hosts are species of Opuntia. Opuntia Sammons’ virus has no known insect vector, but it is sap transmissible. It is a member of the genus Tobamovirus and is closely related to viruses such as tobacco mosaic virus. It is typically spread by propagating cuttings from infected plants. Do not use infected plants as a source of propagation material. No controls are recommended.

Insects

There are several insects that can potentially damage many cacti, agave and yuccas. Most do not require chemical treatment for adequate control. A healthy, non-stressed plant will withstand the occasional insect pest better than a plant stressed by planting in poorly-drained soil, improper planting location, and general neglect. Whenever purchasing cacti, agaves or yuccas, examine the plant carefully to avoid bringing the insects home with you and infecting your other plants.

Agave Snout Weevil (Scyphophorus acupunctatus)

The adult weevil attacks many species of agave. The very large Agave americana or century plant is more susceptible to weevil damage than the smaller species. The adult weevil...
is about ½ inch (12 mm) in length, is brownish-black and has a dull body. The adult female enters the base of the plant to lay eggs. Decay microbes also enter through this injury and as the tissue rots, the plant has a wilted appearance. Infested plants soon collapse and die (Fig. 16). The larvae (grubs) develop in the dying plant and infect other hosts nearby. Agave snout weevil also infests the canes of many Yucca species.

Control of the agave snout weevil is difficult. Selecting species that are less susceptible and typically smaller than the century plant is helpful, especially in areas where the problem has occurred previously. With rare or special specimens, chemical prevention using a broad-spectrum insecticide applied in spring is often effective in reducing damage.

Cactus longhorn beetle (Moneilema gigas)

The cactus longhorn beetle attacks several species of cacti including prickly pear and cholla cactus (Cylindropuntia species), barrel cactus (Echinocactus and Ferocactus species), young saguaro cactus (Carnegiea gigantea), and others. The adult beetle is about 1 to 1¼ inches (2.5–3 cm) long, shiny black, and has distinctive white markings on the antennae. The antennae are often longer than the overall body length of the adult beetle. Damage to the plants is the result of feeding on the margins of prickly pear pads or terminal buds of other cacti (Fig. 17).

Cholla cacti are attacked by the beetle when the adults lay their eggs and the newly-hatched larvae burrow into the stems. Waste (frass) is pushed out the entry holes and forms a black crusty deposit on the canes. Larvae may burrow into plant roots and cause collapse and death of the plants.

The Cactus longhorn beetle is controlled by hand picking the insects off infested plants. The beetles are most active and easier to detect and destroy in the early morning or late evening, especially after warm summer rains. Very spiny species are less likely to have damage from the beetle due to a natural defense by the spines. Chemical control is not recommended since the populations usually are not high and hand picking is effective.

Cochineal scale (Dactylopius coccus)

Prickly pear (Opuntia species) and cholla cacti (Cylindropuntia species), are attacked by cochineal scale. The insect covers itself with a waxy coat that makes it appear as white cottony tufts attached to the pads and stems of the cacti (Fig. 18). To positively identify cochineal scale, crush the waxy coat with a pencil eraser. If the result is a deep red material-actually the body fluid of the insect-then it is cochineal scale (Fig. 19). Cochineal scale is used by native peoples as a source of red dye and also as a natural food coloring in processed foods.

Cochineal scale usually can be controlled by using a strong stream of water to wash the insects from the plants. If the infestation is heavy or the insects return, an application of insecticidal soap may be needed.

Plant bugs

Caulotops barberi, small plant bugs measuring about 1/16 inch (1.6mm) long, attack agaves and other rosette succulents. Large populations may be found on any given plant. The populations reach damaging numbers in late summer or early fall. The bugs feed on leaves and cause a light yellow-tan scar at the point of feeding (Fig. 20). If left untreated, the plant will decline and eventually die.

Caulotops barberi may be controlled by using insecticidal soap or a broad spectrum ornamental plant insecticide. Chemicals should be applied in early morning or late evening when the bugs are most active. Several applications of the insecticidal material may be needed for complete control.
A larger species of plant bug attacks prickly pear (Opuntia spp.) and leaves a tan scar at the point of feeding (Fig. 21). The damage is cosmetic but can be reduced by application of insecticidal soap or a broad spectrum insecticide.

**Aloe mites**

Mites are very small and can be observed only with a magnifying lens or microscope. The mites that attack aloe and other species like Haworthia and Gasteria are eriophyid mites, a group of plant-feeding mites that often cause galling or abnormal growth of the host plant tissues (Fig. 22). Unlike their spider mite relatives that have four sets of legs, aloe mites have only two sets of legs. They cause malformations in plants by injecting a chemical that induces galling into the plant tissue. Stems, leaves and flowers may be affected. The damage to the aloe plant is irreversible, and infected plants should be removed. After removal, place all infected plants in plastic trash bags to prevent re-infestation of remaining plants.

**Animals**

Ground squirrels, pack rats, rabbits and mice can severely damage agaves, yuccas and cacti. Aloes are relatively free of rodent damage. During periods of prolonged drought these mammals attack and destroy both mature and young plants. Damage of the foliage is very typical (Fig. 23, Fig. 24). If the damage is not too severe the plants will recover, but prized specimens may be irreparably damaged. In some cases damage is so severe that the plant dies.

Control measures include exclusion of the pests by fencing, using live and other traps, and using poison baits. Poison baits should be used carefully and according to the manufacturer’s recommendations since they may cause injury or death of non-target animals such as birds. Fencing should completely surround the plants and be buried 4–6 inches (10–15 cm) below ground to prevent the animals from burrowing underneath. Only through diligence can these pests be controlled.

In times of drought, larger animals such as javelinas (wild peccaries) will often grub out many desert plant species. They eat the roots and small portions of the foliage. Fencing is the only effective solution to this problem. Fencing should be sturdy and at least 4 ft. high. The bottom 4–6 inches (10–15 cm) of fencing material should be buried below grade to prevent rabbits from burrowing under the fence. Commercial growers have reported success with electric fences that deter both rabbits and javelinas.

**For more information**


The University of Arizona Cooperative Extension Bulletins:

Cactus, Agave, Yucca and Ocotillo, Bulletin Az1225, University of Arizona, and Life Sciences College of Agriculture, Tucson Arizona, 85721

Control of Bacterial Necrosis of Saguaro. Bulletin # 8837, University of Arizona College of Agriculture and Life Sciences, Tucson Arizona, 85721

How to Transplant a Cactus, Bulletin #1376, University of Arizona College of Agriculture and Life Sciences, Tucson Arizona, 85721

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