

## Winter Protection

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It's still warm during the days and cool at night. Frost will not threaten for another two months. Now is a great time to prepare for the upcoming cold season. Waiting for the last minute means some plants will be forgotten and likely suffer cold damage. Most of us don't have a greenhouse. We rely on moving plants around to avoid frost. This can be a lot of work if left until the weatherman says there will be frost that evening! So, begin moving your plants now, a few each day.

Freezing damages plants in several ways. Cold weather may cause the proteins in the cells to curdle, the way whole milk fills with floating particles after being frozen. As water freezes, it expands. The expanding water in plant cells may rupture the cells, leading to their death. Often frozen plants, after warming, are collapsed, soft and slimy, this is because all the cells have ruptured.

Most plants suffer less frost damage if they have been dry for quite a while when the cold temperatures occur. The amount of salts in the cells stays relatively constant, but the amount of water decreases. It requires colder temperatures to freeze water with more dissolved salts than water with less dissolved salts. Dehydrated cells are shrunken and wrinkled. Cell contents can expand some when freezing before the cell wall is ruptured.

Many favorite cacti and succulents tolerate our brief freezes well outside without any protection if the soil is dry. Landscape cacti sold in nurseries around here are fairly frost tolerant; on really cold nights, the tips may freeze. Walk through the Desert Botanical Garden and look closely at the *Myrtillocactus*, you will see branching where the tips were killed in the freezes of December 20-21, 1991 and January 13-15, 2007. *Hoodia bainii* has been completely hardy for me in a pot the last 10 years. Of course, the plant was so dry the stems were bending over and almost touching the ground. In the spring, with watering, they straightened up and resumed growth. Larger plants usually tolerate freezes better than smaller plants.

A helpful clue to cold tolerance is the origin of the plant. There are many solidly frost proof *Echinocereus* and *Ferocactus*, but others from Baja California are very tender.

Most cacti bloom much better if they get quite cool in the winter. Keep this in mind. Even very tender cacti, which should be brought in on cold nights, bloom better if left outside as long as possible before freezes arrive.

There are different levels of frost protection. Those with the luxury of a greenhouse or shade house can enclose the structure for the winter. Heavy transparent plastic sheeting can be layered over a shade structure to hold in warmth. A small space heater and excellent air circulation with multiple fans will easily keep the air above 40 degrees even on cold nights. The fans are critical and must not be omitted. Do not use unvented propane or kerosene heaters in closed spaces; carbon monoxide kills plants as well as people.

An unheated sunroom works well if well-ventilated with fans. I shut the Arcadia doors enclosing my southeast-facing patio and winter my Brazilian cacti and Euphorbia there. It is seldom below 40 degrees. In the daytime, I open the doors to the house and it warms my entire house.

Many plants will survive freezes if under some cover. Dense shrubs or trees, patio covers, and even overhanging eaves will protect most of your plants from frost. Cold air flows downward, and the overhead protection deflects it away from the plants. I move many tender potted cacti under a patio cover or against my house for the duration of cold weather. Many people in the Valley grow stapeliads at the bases of trees or shrubs. These plants are not hardy at all if left out in pots, but do fine under the tree canopy, against the ground, which holds some heat.

Blankets, sheets or frost cloth or may be draped over landscape plants. Frost cloth is better because: it is inexpensive; it is less permeable to moving air; it is lighter and easier to move around; and, it transmits about 75% of the light and does not heat up in the day, so it may be left over the plants for several weeks in the winter. It is a woven white paper product. It is sturdy enough to last for many years if folded and stored. It is sold in many nurseries in pieces or in wholesale rolls. Buying a roll and dividing it up among five or more friends is less than 20% of the retail package price. I drape 12' wide lengths from my roof down to the ground along the entire front of my house to protect my banana plants. I have the sections cut and labeled in storage. When the weatherman talks frost, I get out the ladder and drape the frost cloth. It takes me less than an hour.

Smaller specimens may be protected with an inverted trash barrel. I have also placed tomato cages over columnar cactus spears and draped frost cloth over the cage. On really cold nights a string of miniature Christmas lights can be lit under the draping. Don't worry, your neighbors already know you're a nut case.

Some succulent plant genera with many species having fair to solid cold tolerance here include Agave, *Astrophytum* (*capricorne*, *myriostigma* and *ornatum*), *Cereus*, *Chamaecereus*, *Coryphantha*, *Dasyliroia*, *Echinocereus*, *Echinopsis*, *Escobaria*, *Ferocactus*, *Lobivia*, many mesembs, *Neocardenasia*, *Nolina*, *Opuntia*, *Oreocereus*, *Oroya*, *Pachocereus*, *Pachycormus*; *Rebutia*; *Selenicereus*; *Soherensia*, *Stenocereus*, *Sulcorebutia*; *Tephrocactus*, *Trichocereus*, and *Yucca*.

Some genera have just a few cold-tolerant plants. These would include *Aloe*, *Euphorbia resinifera*, *Gymnocalycium bruchii*, and *Mammillaria geminispina*, *senilis*, *sonorensis*.

There are a lot of plants that won't take cold at all, including many favorites of hobbyists. Most vining caudiciforms are in this group. If the tuber is buried, they usually survive our winters, but this is not how people usually grow them. Brazilian cacti can't take cold weather, and neither can almost any asclepiad, such as *Stapelia*, *Ceropegia* or *Huernia*. Malagasy plants (that is, plants from Madagascar) must be kept well above freezing in the winter. A few *Hoodia* will take frost.

Be sure you protect these: Ariocarpus, Aztekium, Buiningea, Bursera, caudiciform cucurbits, Ceropegia, Cynanchum, Cyphostemma, Discocactus, Edithcolea, epiphytic cacti other than Selenicereus, which are remarkable cold-tolerant, especially under tree, Gasteria, Geohintonia, Haworthia, Huernia, almost all Euphorbia, Melocactus, many mesemb.; Notocactus, Obregonia, Orbea, Pachypodium, Pilosocereus, Sansevieria, Stapelia, and Turbinicarpus.

Planning now will keep more plants alive during the coldest time of the year.