

## Warm Climate Production Guidelines for Succulents

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If you're looking to diversify your product line and set yourself apart from the competition, perhaps you



should consider growing succulents. These are plants that are adapted to withstand drought by storing water in specialized cells in their leaves, stems, and/or roots. The term succulent does not refer to a plant family per se, but to a water-storing adaptation that is found in many different plant families. Cacti are probably the best known family of succulent plants, but there are many other types of succulents in a huge variety of shapes and sizes.

Succulent plants are increasingly popular among plant collectors, home gardeners, and professional landscapers for a number of reasons. With water restrictions in place in many areas across the country there is an increasing demand for plants that are appropriate for xeriscaping, or landscaping to promote water conservation. Many succulents are particularly well adapted to withstand climatic extremes, from drought to high heat, strong winds, and frost. They are generally free from insect pests and diseases and are less prone to nutrient deficiencies. They are also amazingly tolerant of poor and shallow soils. There is a huge variety of forms and landscape uses for succulents, including ground covers, bedding plants, and imposing garden centerpieces. Succulents make excellent container plants. Mixed containers of succulents are a high value product that consumers love because they

stand up to neglect and don't require frequent watering. Even when they are not in bloom many succulent plants provide visual interest in the form of bold textures and colorful foliage.

Many of these same characteristics make succulents attractive to professional growers. Although they may take longer to produce, these are plants that actually thrive on reduced water and fertilizer inputs. They rarely require insecticides, fungicides, or plant growth regulators. Many succulents are easily propagated by stem or leaf cuttings, while others readily produce offsets that can be removed and potted separately. Most succulents can also be propagated by seed, but it may take a year or longer for them to reach a saleable size.

In order to grow succulent plants, you will probably need to modify your normal production protocol. A well-aerated and freely-draining medium is critical. Commercial cactus and succulent mixes usually consist of equal parts coarse sand, perlite, and peat or fine bark. If you want to make your own, try mixing one part soil less or soil-based media with one part coarse sand and one part washed grit, small gravel, claimed clay, pumice, or expanded slate. Mixing a time-released fertilizer in the media will insure a constant supply of nutrients. Succulents should be allowed to dry slightly between watering. Under potting is a good way to insure that the roots don't become oversaturated. To produce rapid growth and the best form and color, succulents should be grown in the strongest light possible. Plants that are grown in full sun and warm

temperatures will respond more favorably to high water and fertilizer inputs. Many succulents tend to go dormant during the shorter days and cooler temperatures of winter. This is the time when they are most prone to fungal pathogens that cause rot. To keep them actively growing during the winter months, you may want to consider extending day length with supplemental lighting and keep your greenhouse warm. Maintaining a lower than normal relative humidity and excellent air circulation in your greenhouse will reduce the likelihood of disease and insect pests.

## Aloe

There are over 300 species of *Aloe* native to Africa and the Arabian Peninsula, but only a few are common in cultivation. Most are low growing stemless rosettes of attractively patterned and frequently spiny succulent leaves, but some aloes develop stems and grow into bushes or trees. All have erect spikes of tubular flowers in shades of orange, yellow, or pink. *Aloe maculata* (also known as *Aloe saponaria*) is commonly referred to as soap or zebra aloe. It has medium green leaves with white spots arranged in bands and a branched inflorescence with pinkish-orange flowers. This an awesome landscape plant for mild winter regions because it multiplies readily to form handsome clumps that bloom repeatedly throughout the year. Medicinal or Barbados aloe, *Aloe vera*, is known for its gel that is used in cosmetics and to soothe burns. It has grey-green foliage with dull spines and intense yellow flowers.

Candelabra or torch aloe, *Aloe arborescens*, has blue green foliage with sharp paler colored



Photo by Marc Frank

teeth and reddish orange flowers arranged on dense spikes. All three of these form large clumps that thrive in full sun and are relatively frost tolerant. *Aloe variegata*, partridge breast aloe, is a much smaller species with extra thick, triangular, spineless leaves that are deep green with silver-white bands. It prefers more shade than most other aloes and is particularly prone to rotting if over watered. It is usually grown as a container plant.

## Agave

The Century Plants, or *Agave*, are an incredibly diverse group of rosette forming perennials. There are *Agave* to suit almost every climate zone in the U.S. with cold hardy forms that can withstand single digit temperatures. While most people look at these plants as a southwestern phenomenon, our changing ideas of what an annual is are opening markets for these plants as summer color throughout the U.S. Northern growers may need to look at buying in pre-finished material, as the crop is in general a very slow one from seed to sale can be 1-6 years. Plants are durable, but heavy which can be a problem in shipping. Another misconception is that all *Agave* are sharply spined, and a problem to work with; while it may be true that most *Agave* are spined, one of the most dramatic and easily grown species *A. attenuata* is soft leaved and extremely architectural. *A. americana* is a large blue gray foliated form with sharp spines but a wide range of acceptable climates across the southern half of the United States. The variegated form of this plant is less cold hardy, but broadly banded with creamy yellow stripes. There are *Agave* native throughout the U.S and for specimen containers, or creating a western look in a landscape you can't beat these prehistoric, bold textured. Except by using paddle Cacti, which is also a great idea, but will have to be another article...

## **Sempervivum and Echeveria**

*Sempervivum* and *Echeveria* are both commonly known to as hens and chicks, and each attracts a devoted following of hobbyist collectors, but they are actually very different plants. *Sempervivum*s, also referred to as houseleeks, are native to southern and central Europe. They are generally frost-hardy but tend to suffer in extremely hot and dry conditions. The leaves form low-growing, tightly rounded rosettes in varying shades and patterns of green, grey, and red. The flowers, which are usually pink or purple, are held on stout stems just above the foliage. These plants are monocarpic, which means that each rosette dies after it flowers, leaving behind a cluster of offsets. There are around 40 species and at least twice as many cultivars of *Sempervivum*. The most commonly grown and hybridized species are *Sempervivum tectorum*, which has grey-green leaves with red tips, and *S. arachnoideum*, which has tiny threads connecting the leaf tips to create an amazing cobweb effect. *Sempervivum* are appropriate for landscape use throughout most of the U.S. but are prone to rotting in areas with hot humid summers. Combining several different *Sempervivum* in a container creates a dynamite effect.

*Echeverias* are native to Central America. Consequently they are able to withstand high temperatures and drought better than their European *Sempervivum* relatives, but are not particularly frost-hardy. The rosettes of *Echeveria* are generally much larger than those of *Sempervivum*, and the range of leaf shapes and colors is much more diverse. The foliage colors include green, grey, blue, pink, orange, and red, and many are edged in a contrasting color. Some *Echeveria* have leaves covered with soft downy hairs, but most have a powdery or waxy surface which lends a shimmering richness to the foliage color. The bell-shaped flowers, in shades of

yellow, orange, red, and pink, are borne in clusters on arching stems. There are about 150 species of *Echeveria*, which have been extensively hybridized to create an astounding assortment of cultivars.

*Echeveria lilacina* has powdery grey leaves with pointed tips, forming a tight, elegant-looking rosette. *Echeveria pulvinata* has upright stems with rosettes of rounded fuzzy green leaves with glowing red tips. *Echeveria shaviana* has blue-green glossy leaves with frilly edges. One of the most popular cultivars is 'Perle von Nurnberg', which has broad pointy-tipped grey-green leaves flushed with pink. An *Echeveria*



Photo by Marc Frank

relative, *Graptopetalum pagaguayense*, sometimes called the ghost plant, has grey leaves flushed with pink and erect spikes of white star shaped flowers with red markings. These plants may be grown in the landscape in mild winter areas, but they really shine in mixed containers.

## **Yucca**

*Yucca*, an unfortunate name for a plant, eh? Well, this group of plants is also misunderstood and underused. Most of us are familiar with *Yucca elephantipes* which is sold as an indoor plant, produced as a cane, much like *Dracaena*. As with *Agave* there are *Yucca* adapted throughout most regions of the United States, so why don't we use them more often? There is also a misconception that ALL *Yuccas* are sharply spined and troublesome to work with. I think two of the best examples of soft foliated and attractive are the *Yucca filamentosa* hybrids 'Bright Edges' and 'Color Guard'. Both of these variegated forms are brightly marked with white to cream colored variegation, leaves exhibit curled filaments, and tips of leaves are soft to the touch.

### Euphorbia

The genus *Euphorbia* has over 2000 species (all commonly referred to as spurges), about half of which are succulent. The poinsettia and the crown of thorns are two of the best known Euphorbias. The genus is characterized by tiny petal-less flowers enclosed by bracts that are often brightly colored and very showy. All Euphorbias should be handled with caution because they contain a milky sap (known as latex) that is irritating to the skin and mucous membranes. Some spurges, such as *Euphorbia horrida* and *Euphorbia echinus*, are leafless but have swollen spiny stems that resemble a cactus. Others, including *Euphorbia obesa*, form small rounded and ridged domes that might be mistaken for sea urchins. The crown of thorns, *Euphorbia millii*, has erect spiny stems with showy red bracts. New crown of thorn hybrids, generally referred to as *Euphorbia x lomi*, have much larger, long lasting bracts in a variety of colors. The pencil bush, *Euphorbia tirucalli*, has thin, usually leafless succulent stems; a new cultivar of this species turns pinkish red in bright light. All of these species are generally grown as container plants except in frost-free climates. But there also many succulent spurges that may be grown as landscape plants in temperate zones. *Euphorbia myrsinites* has spirally arranged grey-green leaves and clusters of greenish-yellow flowers. Gopher spurge, *Euphorbia lathyris*, which has leaves with a white midrib and small green flowers, is reputed to repel burrowing rodents in the garden. The Mediterranean spurge, *Euphorbia characias*, grows to 3 feet or more, with erect woody stems, long linear leaves, and dense showy inflorescences of yellow flowers. Many cultivars of this species, including a variegated form, are also available.

### Sedum

There are some major groups of Sedum and they are quite different in their growth habits. The Stonecrops are a fantastic group of plants with all foliage and flower qualities and textural interest you could possibly ask for. Most sedum are ground covers in the landscape and easy in containers. Most root from any leaf that breaks off and can be propagated in this way, or by cuttings and also from seed. *Sedum acre* is a great perennial ground cover with yellow flowers in early summer for the northern states, and *S. spurium* and its hybrids provide brilliant purple to red toned flowers as well as sharing strong winter hardiness. For the southern tier of the US *S. procumbens*, *S. rubrotinctum*, and *S. mexicana* perform the same role. We trialed Sedum 'Angelina' from EuroAmerican this year's in our trials and it was outstanding for yellow toned foliage and growth habit. Ball Floraplant released 'Coral Reef' and 'Sea Stars' which were both fine textured and dense growing plants. Another great group of Sedum to try, which has excellent northern hardiness is the *S. spectabile* group. These are upright forms with fall flowering, usually in shades of brownish burgundy to Red. 'Autumn Joy' was the old standard and is still readily available but look for purple foliage forms (*S.* 'Purple Emperor'), variegated foliage, and dwarf types like 'Mini Joy' from Bodger Botanicals. There are literally hundreds of sedum species and cultivars out there and they make outstanding landscape or container plants, with extremely low water requirements. I couldn't begin to cover all of them but do a quick internet search for Sedum and then plan on spending a few hours sorting through all the different types, there are definitely some that will work in any operation.

## Succulent Mixed Containers

I was so pleased to see Saul Nursery's booth at the southeast show had some excellent examples of succulent mixed containers on display in the trade show. I really think more nurseries should look at this product as a way to diversify from chain retail. These succulent containers are heavy, and fragile so they don't ship well, giving local marketers and real edge in producing something unique and with a high profit margin. In following the old rule of one upright plant, one mounding plant and one trailing plant to make an attractive mixed container try using Agave or Yucca for the upright plant,

Echeveria, Euphorbia, Kalanchoe make excellent mounding plants, and then use Sedum or Portulaca for the trailing component.



Photo from EuroAmerican

These containers are a bit slow, but easy and can be planted in anything from old tires, moss topiary & wreaths (EuroAmerican has some great offerings!), sea shells, driftwood, or custom cement containers to make for unique and profitable retail sales.

In general this group of plants has always played a minor role in our industry, but with increasing water restrictions and consumers looking for the easiest way to get the maximum effect for their gardening efforts, you may want to brush up on your knowledge of succulents and succulent-like plant materials. They offer a higher price point than traditional annuals and in some cases even perennials. They can be a local market item that allows you a niche that will likely never get truly exploited by chain retailers because these plants are problematic in the mass market machinery. In addition there are many native forms found throughout the United

States and these plants can also you or your retail customers the ecological identity our industry needs to promote.

## Production guidelines for Cacti & Succulents

Fertilization – 150 ppm N, but for larger size production, a granular or slow release can be applied at medium rates. When using slow release make sure all other production environmental conditions are optimal, otherwise stem breakage, poor quality growth, and diseases can become an issue.

Watering – Always on the dry side, the key factor in good production is making sure roots have a lot of air surrounding them, which means you really need to watch watering and possibly use a media designed for succulent production.

Media – Use media with a lot of drainage capacity. Many growers cut normal peat production media in half and supplement with scoria, gravel, or PermaTill®. However, you can use a standard production media; you will just need to be careful with watering frequency.

Production Temperatures – In almost all cases quality growth occurs at night temperatures above 55°F and day time temperature must be at least 65-70°F. However, the hot days of summer will not be a problem and production conditions into the 100°F range can still produce good quality plants. High temperatures and high humidity can create a lot of disease issues, so stay on the lookout.

Light level – The higher the better in most cases, a minimum of 5,000 ft-C. Most plants require high light to develop strong leaf coloration and will stretch badly under low light conditions. Low light levels can be offset

with dry soil conditions, but only for a short period of time.

Propagation – Seed, Cuttings, Leaf cuttings, Division of mature plantings.

Crop timing – Highly dependent on the crop. Check with your supplier and find out crop schedules before you commit to growing the crop. Some types are very slow and may require more than one season to reach a salable size.

Growth regulators – In most cases you'll be using drought, and high light levels as a plant growth regulator and chemical PGRs should not be necessary.

Flowering – In most cases these plants do not need to be in flower to be sold, that's part of the inherent advantage of growing this type of crop. Within the different types of succulents we've discussed here there are long day and short day flowering types, so do some research before taking on the crop if flowering is a major issue.

Overall notes:

Care needs to be taken to avoid over-watering and over-fertilizing any of these plants especially during the short days, lower light levels, and cooler conditions of winter.

**Sources for Cacti & Succulents:**

ForemostCo - <http://www.foremostco.com>

Ball Floraplant - <http://www.ballfloraplant.com>

Liner Farm Inc. Box 701369, St. Cloud, FL  
34770-1369, Phone: (800) 330-1484  
Fax: (407) 892-3593

Plant Delight's - <http://www.plantdelights.com>

Yucca Do Nursery - <http://www.yuccado.com>

Saul Nurseries Inc. 5007 New Peachtree Rd,  
Chamblee GA 30341-3124, Phone  
770-458-0058

Bodger Botanicals -

<http://www.michells.com/Bodger/bodger.htm>

Green Leaf Perennials - <http://www.green-leaf-ent.com>

EuroAmerican Propagators –  
<http://www.euroamprop.com>