

TCSS Past Newspaper Cactus & Succulent Articles - Growing In The Desert

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Growing Succulents in the Desert

This is the first in what we hope will be a long series of brief articles on growing cacti and other succulents in the desert. At first thought, this might seem like a no-brainer. But there are numerous challenges to growing them here. First, many succulent plants are NOT native to desert habitats, like most of the adeniums featured in this article. Instead, they grow in more humid, wetter habitats such as temperate woodlands, tropical thornscrub, and tropical deciduous forest. When cultivated in the desert, these species may need surprisingly generous watering, and protection from the brutal summer sun. Growing cacti in “cactus country” is a special challenge. Because they are part of the local biological community, there are all kinds of pests and diseases that are adapted to consuming them. Exotic species of cacti are often more susceptible than native ones that have evolved some resistance. For example, the giant cactus borer (*Moneilema gigas*) favors *Trichocereus* (not *Echinopsis sensu strictu*) over its native opuntoid foods, and it does tremendous damage to them.

This series will address the above and many other topics. They will be posted on the website at www.tucsoncactus.org, where they will eventually accumulate into a comprehensive guide for desert succulent growers. Contributions to the series are welcome any time.

Fall is the Time to Shop for Adeniums

by Mark Dimmitt

Although there are about 11 species of *Adenium* from different climates all over Africa and southern Arabia, there is a general growth pattern in cultivation. The great majority of plants that are sold commercially are *obesum* or its hybrids. The parent species grow in equatorial Africa, where they have no obligatory dormant season – they will grow year round as long as they are kept warm and moist. These plants do most of their vegetative growth in the hot summer months, when they flower little or not at all. The flowering season begins when days shorten and the temperatures begin to drop; in Tucson that’s in September or early October. If they are kept under tropical conditions (wintered in a greenhouse or a sunny window where the nights don’t fall below 50° F), they will continue to flower all the way to the following spring (April or May). So if you buy a plant now, you can expect to enjoy their beautiful flowers for 8 or 9 months (Figure 1).

If you want a really superior hybrid, shop in a desert nursery in July or August. Any plant that is in good flower during the peak summer heat will probably flower year round (if it was grown here, not recently imported). Some *obesum* cultivars and hybrids with *swazicum* and *crispum* often flower year round.

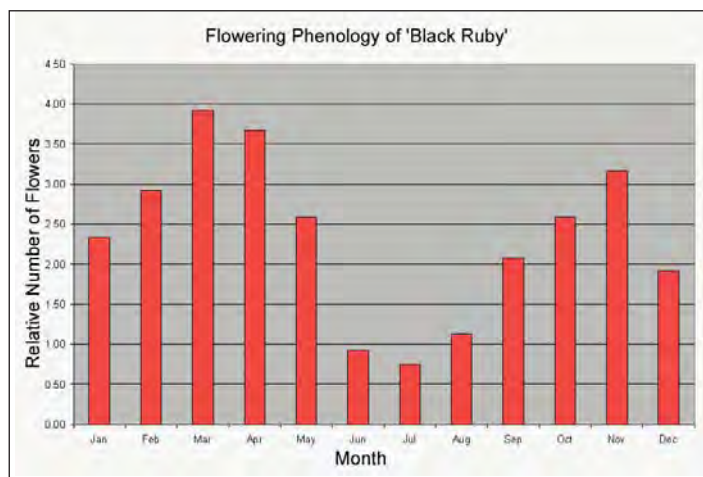


Figure 1. Flowering phenology chart for a typical good *adenium* cultivar, using ‘Black Ruby’ as an example. Flowering peaks in spring, nearly or completely ceases in midsummer, peaks again in the fall, and then continues at a lower rate all winter. On the vertical axis a flowering score of less than 1.5 means essentially no flowers, while 3 represents a good bloom as in the accompanying photos.

Some nearly everblooming adeniums:

‘Calypso’	‘Crimson Star’
‘Daeng Siam’	‘Evelyn Marie’
‘All Year Prosperity’	‘Harry Potter’
‘Beauty of Taiwan’	‘Twinkling Moonlight’
‘Home Run’	‘Pink Elegance’
‘Candy Stripes’	

Caveats:

1. Keep in mind that smaller plants have fewer flowers over a shorter season. The display gets better as the plant matures.
2. If you can’t keep the plants warm over the winter, it is critical that you dry them out for the cool period. The best way to kill an adenium is to give it cold wet feet. Adeniums adapt well to a winter rest. The only downside is that you will lose much of the winter flowering season. Also, much of the caudex growth occurs in fall and winter.
3. All the species other than *obesum* have an obligatory winter dormancy. They must be dried out and allowed to rest for a few weeks to a few months depending on the species and the winter temperatures. Therefore it’s important to know what kind you have.

Cultural instructions can be found in a Cactus and Succulent Journal article, which is also posted on TCSS’s adenium website www.adenium.tucsoncactus.org. More detailed and up to date instructions are contained in the book *Adenium: Sculptural Elegance, Floral Extravagance* by Tucson authors Mark Dimmitt, Gene Joseph, and David Palzkill.

Some of Mark Dimmitt's Adeniums



'Evelyn Marie', another Tucson creation, flowers all year, often profusely.



'Rainbow' is another obesum-swazicum hybrid that flowers in summer. This photo was also taken in August.



'Pink Elegance' was also developed in Tucson and bears flowers year round.



'Taiwan Beauty' (aka 'Beauty of Taiwan') is an obesum-swazicum hybrid that flowers through the summer heat. This photo was taken in mid August.

President's Message



On November 12, 2009, the Tucson Cactus and Succulent Society will complete its first 50 years and I have had the good fortune to be involved for the last 40 years. In this last decade the society has rapidly grown and reached out to more people and their diverse interests. This year we have more than 1,100 members, mostly from the Tucson area but also from many other communities in Arizona, 16 other

states and at least 1 international member. This certainly makes us the largest local Cactus and Succulent Society in the country if not the world. We are truly the Cactus Capital.

We need to think about the future and how our society can contribute in areas like discovery (research), information, conservation and education. We already have a research grants program which provides financial support. Our monthly newsletter "The Desert Breeze" and our website tucsoncactus.org provide great information on a whole range of topics to members and the general public. Our celebrated rescue programs has saved over 46,000 plants from destruction and found them new homes. This has made it possible to provide grants to K thru 12 teachers to do classroom educational projects about cacti and succulent plants. Finally, you have benefited from the almost 600 meeting speakers in the last fifty years.

We will be introducing some new software on our website to make it possible for you to upload pictures and more for everyone's enjoyment and also including an online scrapbook starting at our beginnings and continuing into our future. We will be adding more general information about growing succulents in the desert for your benefit.

Your ideas and interests are important and we will be surveying them in our next general mailing.

Our Holiday Party is set for December 6, 2009 at the Junior League facility. Save the date. You will get all the information in the general mailing in mid November.

We will have nomination from the floor for all open officer and Board positions at the November meeting. Please see the report of the nominations committee in this newsletter.

Thank you for your continued support,

Dick Wiedhopf, President

2010 Slate of Nominees for Officers and Board of Director Members

According to our by-laws, a nominations committee was elected and charged with securing at least one nominee for all open positions.

Additional nomination will be accepted from the floor at the

November general meeting. The nominee must be in attendance and agree to accept the nomination or the nominator must have a written statement from the nominee that they will accept the nomination.

The committee members, Bill Salisbury, Bill Hicks and Ed Bartlett presented their nominee list to the October Board of Directors meeting. The report was accepted by the Board.

The Nomination Committees nominees are:

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Vice President	Vonn Watkins
Secretary	Dave Moyer
Treasurer	Joe Frannea

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Keimpe Bronkhorst
Dale Johnson

CSSA Affiliate Representative

Bill Holcome

Library Update

An Illustrated Guide to Arizona Weeds by Kittie F. Parker

A full page is devoted to a black and white illustration of the weed with description and distribution information on the opposite page. The illustrations are well done and identification should be easy.

Some websites to go to for more information on obnoxious weeds are Arizona Noxious Weeds List at the Arizona Department of Agriculture.

www.azdot.gov/Highways/NResources/Priority_Weeds_List.asp
This site is point and click to see the description and a picture of the weed. The former just gives a list of all noxious weeds.

Field Guide to the Wild Plants of Oman by Helen Pickering and Annette Patzelt

A photographic field guide covering the geographical regions of Oman. The main sections of this book cover 250 common species, divided by the color of flowers. There is an additional section for trees and grasses. Each color group is organized alphabetically by botanical family.

Joie Giunta

Getting Ready for Frost

from Mark Dimmitt

Growing Succulents in the Desert (series)

With temperatures still near 100 degrees F this October, it's difficult to think about winter. But the average date of first frost in Tucson is in mid November, and the coldest areas have had frost before November even arrives. Of course, tender tropicals must be brought indoors for the winter. But this article is about protecting the more frost-hardy succulents. These plants will fare much better if they are properly prepared before frost hits. Consider this: The coldest official temperatures for Tucson are in the mid teens, and most of our native plants can tolerate such temperatures in mid or

late winter. But in 1978 a warm, wet autumn ended with a hard frost of 19 degrees in early December. The plants had not hardened off, and there was wholesale death all across the desert. In the Tucson Mountains almost all of the large saguaros were killed outright or succumbed in the next few years.

Hardening off is very important. Immature leaves and stems will freeze at a higher temperature than mature, hardened growth. This presents a conflict. September and October usually have ideal temperatures for the growth of warm-season succulent plants. If you take advantage of this season and continue to water and fertilize your plants, be prepared to protect them if there is an early freeze. At least by the end of October, water and fertilizer should be withheld to harden the plants against the first hard frost that usually occurs in December.

Most summer-growing, cold-hardy succulents benefit from becoming dehydrated during winter. Succulents that grow in cold winter habitats produce antifreezes – compounds that lower the freezing point of the sap. Generous watering that keeps the plant fully hydrated dilutes the antifreeze and makes the plant more susceptible to freezing. In very cold areas such as the northern states and Canada, native prickly pears shrivel so much in the fall that they look nearly dead. They survive below zero temperatures in this condition for weeks on end and suffer no damage.

We are fortunate in that most of our frosts are only in the mid to upper 20s, and temperature remains below freezing for only a few hours. This enables simple covers to provide significant extra protection. A solid, opaque cover such as a sheet or paper bag gives at least 10 degrees of protection. In other words, a plant that would be damaged by 28 degrees in the open will survive 18 degrees under cover. Even a tree with a 50% canopy cover provides several degrees of protection. Planting next to a heat-retentive object such as a boulder or house wall also aid winter survival.

Don't be afraid to experiment; you may discover that you can grow more "tender" plants than you know. My typical winter minima are in the upper teens. Mexican tree ocotillo (*Fouquieria maccougalii*) is hardy to 26, but I have had a 6-foot tall specimen under a palo verde tree for several years with minimal damage. I have a *Welwitschia mirabilis* in the ground; it has survived 17 degrees under a double blanket. So has a *Zamia furfuracea* that has been in the ground for many years. Sometimes the leaves freeze even under the



When this Welwitschia mirabilis grew too heavy to carry indoors, I began wrapping it in frost cloth. It has been through about 10 winters with no damage. The succulent orchid Eulophia petersii (left) is moved into the patio in Figure 3. It survives well, but does not flower unless kept warmer over the winter.

cover, but the buried crown resprouts in spring. An *Alluaudia ascendens* was wrapped in frost cloth every winter; it grew to 20 feet tall in about 10 years. *Adenium arabicum* specimens planted in the ground in my glass-roofed patio grow and flower very well; they suffer only twig damage at 25 degrees.

Throughout the winter, pay attention to the weather forecasts and be prepared to take extra measures when the rare catastrophic freeze hits. I've been planting out many succulents in my yard for 30 years, and they had survived several nights in the upper teens with the protective measures described above. But a couple of years ago a bad freeze happened, with the temperature dropping two degrees lower than it ever had since 1978. I had become overconfident, and lost some really fine old specimens (including my giant *Alluaudia*).

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TCSS Web Page:
www.tucsoncactus.org
Webmaster: Keimpe Bronkhorst

Everyone is Welcome!
Bring your friends, join in the fun,
and meet the cactus and
succulent community.

4 6 2 1 4
3
Cacti Rescued
227 Rescues Accomplished

Please see our Web site calendar for the next rescued cactus sale. They are scheduled at various times during the year based on our inventory.

TCSS Club Members receive a 10% discount

November 2009

Thursday, November 5, 2009	7:00pm Monthly meeting: Presented By Jerald Wheeler. "The Use of Emulsified Pure Oils to Control Insects and Diseases Attacking Cacti and Succulents."
Tuesday, November 10, 2009	7:00pm Board Meeting at the U of A College of Pharmacy

Some of Mark Dimmitt's Adeniums and other plants



Alluaudia ascendens grows as a narrow column, making it easy to wrap with frost cloth (inset), at least until it's 3 stories tall



This *Adenium arabicum* has been in the ground in an enclosed patio for 10 years. It and the *Stapelia gigantea* surrounding it tolerate mid 20s with no or minor damage

Growing Aloes in the Arid Southwest by Gene Joseph

The genus Aloe contains a good number of species that can be grown here in the arid southwest, enhancing the landscape with interesting leaf colors and markings, striking forms and silhouettes and in almost every case, beautiful flowers. The aloes that perform best here are generally those from South Africa and Namibia and the Arabian peninsula. These plants are more heat tolerant than aloes native to the more tropical areas and those from the cooler winter rainfall areas.

Our climate is hotter than those from where aloes originate. Because of this, it is best to plant them where they get mid to late afternoon shade in the summer. Aloes are mostly cool season growers though, so they can take full sun throughout the day in winter. This is actually easy to accomplish. Planting on the east side of a tree, shrub or wall will work, but the best location is to plant aloes just under the south canopy of a tree. In this case when the sun is high in summer, the plant is in the shade and in winter, with the lowering sun, the planted aloe will receive full sun. Aloes grow well in containers, but are somewhat more sensitive to heat when potted, so placement is very important. The roots of aloes, both in the ground and in containers, are sensitive to overheating and if this occurs will start to rot. Besides placement, another thing that will help mitigate the heat is to plant something green, preferably a summer grower, around the base of the aloe. This should be something that will do well with minimal, shallow waterings throughout the hot summer. Some examples of this are *Salvia* spp., *Manfreda* spp., *Stapelia* spp., *Crassula* spp. (summer tolerant only!), etc.. This root/heat problem is more of a problem for the taller growing aloes than the clumping types.

There are basically three types of aloes in growth form that grow well here in the low deserts; tree aloes, clumping stemless aloes and single (or limited clumping) stemless aloes. The tree type species includes *A. dichotoma*, *A. ramosissima*, *A. marlothii*, *A. ferox*, *A. speciosa*, *A. africana*, *A. excelsa*, *A. candelabrum*, *A. rupestris*, *A.*

aloooides, *A. castenea*. Most of these tree aloes will grow to many feet tall (5 to 10) with a spread of several feet. *Aloe dichotoma* with some protection will grow to 25 feet. Also, the tree aloes have some of the most dramatic and beautiful flowers of all. The inflorescence can be several feet tall and across and the colors can range from yellow

to orange to a spectacular red. Most of these species, however, are not color specific, so the flowers can be different on individuals within a species. These aloes are significant accent plants in the garden. Give them a place of prominence, planting them amongst rocks and plant lower, spreading plants at their base.

The stemless clumping type includes *A. greenii*, *A. variegata*, *A. glauca*, *A. aristata* (cold tolerant to mid teens!), *A. nobilis*, *A. parvula*, *A. vera* (*A. barbadensis*), *A. fosteri*, *A. sapinaria* (very common in older landscapes), *A. longistyla*, *A. sinkatana*, *A. humilis*, *A. vacillans*, *A. globuligemma*, *A. mudenensis*, *A. suprafoliata*, *A. brevifolia*. These aloes are grown for their colors and textures and also their flowers, which range in color from whiteish to yellow to salmon to red. These plants are best used as spreading mass plantings amongst other plants, at the base of tree aloes and along walls, walkways and together with rocks.

The third basic aloe form is the stemless, mostly single rosette, which includes, *A. broomii*, *A. hereroensis*, *A. peglare*, *A.*

praetensis, *A. tomentosa*, *A. striata*, *A. karasbergensis*, *A. lutescens*, *A. claviflora*, *A. cryptopoda*, *A. gariensis*, *A. krapohlina*, *A. melanacantha*, *A. microstigma*, *A. prinslooii*, *A. petricola*, *A. reitzii*. The species in this group are accent plants and look best (and seem to grow best) when planted in a rock garden type of landscape. Their appeal is mostly their distinctive leaf colors, shapes and of course flowers.

With the exception of *Aloe aristata*, which is cold tolerant to the mid teens, most of the previously listed aloes will need protection from temperatures in the mid twenties.

This can be mostly accomplished by placement. If the

Continued on the next page



Aloe broomii in the foreground, *A. melanacantha* left, *A. ramosissima* in the background, and *A. hereroensis* flowers on right.



10 foot tall *Aloe dichotoma* with frost protection frame on right

aloes are planted under a tree, this will in most cases, give enough cold protection to keep them from freezing. Planting next to a large rock will work as well, as the rock will give off heat throughout the night keeping the plant from freezing. Another action, and a very effective one, is to cover the plant with frost cloth. Using the modern, light weight material over the top of the plant can effect 5 to 10 degrees of cold protection. (Keep a piece near the plant, cut to size and marked with the plant's name, ready to throw onto the plant at the end of the evening.

During the cool season, most aloes should be watered weekly for optimum growth and appearance. In the hot summer, water them weekly as well, but with a reduced amount of water. This will keep the roots from drying out

too badly. It is important during hot weather to not water aloes too much, as this is a classic cause for rot, starting in their roots. Aloes respond well to fertilizers during the cooler months. Any available house plant food applied at ½ strength will show results.

The aloe flowering season in our region is late winter through early spring. The flowers are spectacular and are excellent hummingbird attractors. An aloe section of a desert garden adds diversity, beauty and interest to the landscape. The plants in previous paragraphs are tried and true here in Tucson. There are many others to experiment with and new ones should be available in coming years as seeds and plants make their way into the nurseries from the Arabian countries.



Aloe karasbergensis is an unusual summer flowering species.



Aloe marlothii.



The late (and GREAT!) *Aloe dichotoma* at Arizona Cactus Sales in Chandler.

Eulophia petersii: A Desert Orchid by Mark Dimmitt

I was going to subtitle this article “A Succulent Orchid”, but that doesn’t say much. Of the 25,000 species of Orchidaceae worldwide, many thousands of them are succulent. But this is one of a relative few that grow in desert climates under the same culture as cacti or euphorbias. Dave Grigsby of Grigsby Cactus Gardens used to say, “Grow it like an aloe”. That’s pretty good advice, except that unlike most aloes, this orchid should be watered in summer and rested in winter.

Eulophia petersii is one of the most desert-adapted orchids. It grows in arid habitats from Namibia all the way to the southern Arabian Peninsula. An extreme succulent, it stores water in its large pseudobulbs, thick rigid leaves, and an ample system of fleshy roots. In spring 3- to 6-foot tall racemes bear hundreds of 1-inch brownish flowers with twisted petals.

This species was introduced to succulent nurseries in the early 1990s, when it was rare and expensive, selling for \$45 per bulb. It is now fairly easy to find.

Culture

Eulophia petersii will grow best in a deep pot that accommodates the big root system. Use a coarse, well-drained succulent mix. During the summer growing season, they can take quite a bit of water, but it’s best to water only when the medium dries out, about every two weeks. They can go months without water, especially during the cool season. It is tolerant of temperatures from well over 100F. to freezing. All-day sun is a bit too much in summer; the plant will look much better in very light shade.

To ensure flowering, give the plant a cool, dry winter rest. While it can tolerate down to freezing or even a few degrees below under a cover, it tends not to flower after a cold winter outdoors or in an unheated enclosure. I keep my plants in a cool greenhouse with night temperatures about 45-50 F. Watering during winter also seems to inhibit flowering. I don’t water my plants at all from November until March.

Plants are vigorous and will grow into large clumps that bear a dozen or more inflorescences. Repot or divide as needed; the best time is in late spring after flowering and when new growths are several inches tall. Single-bulb divisions will establish well, but three-bulb divisions will make normal-sized new growth and usually flower the very next year.

Note: Verdins and goldfinches are fond of eating the flowers. If you have many of these birds, you may want to protect the plant when it’s flowering.

Other species

The genus *Eulophia* has about 300 species, many of which are xerophytic succulents with beautiful flowers. Most, unfortunately, are very difficult to find. *Eulophia speciosa* has fleshy strap-shaped leaves from underground bulbs and 2-foot tall spikes of bright yellow flowers that look like flying birds. *E. orthoplectra* is similar in size and shape, but its flowers are purple on the front and yellow on the back. *E. keitii* and *E. leachii* have nonsucculent and succulent leaves, respectively, atop above-ground bulbs, and 1-foot spikes of small green flowers. Other species such as *E. guineensis* are herbaceous, bulbous perennials that grow in wet habitats, but also perform well outdoors in Tucson if kept well watered during the growing season.



10 foot tall *Aloe dichotoma* with frost protection frame on right. The commonest variety of *Eulophia petersii* in cultivation is this robust form with large pseudobulbs and very thick leaves. Other clones have smaller pseudobulbs and longer, more slender leaves.



The common form of *Eulophia petersii* in cultivation has brown flowers.



A green-flowered clone of *Eulophia petersii*. The plant is more gracile than the brown-flowered one



Eulophia speciosa is worth growing, if you can find it

Mammillaria

A Genus for Everyone

By Norm Dennis

One of the perennial favorite genera for cactophiles is Mammillaria. The genus is commonly referred to as Mamms or pincushions. The reasons for this are several: a wide range of forms, profuse flowers twelve months of the year, cultivation demands that range from very easy to challenging, the presence of local species, mostly inexpensive and locally available from nurseries.

The genus ranges from the southwest US to Texas and down to the northern part of South America and some Caribbean islands. Most species are found in Mexico, but Arizona has *M. grahamii*, *M. thornberi*, *M. heyderi*, *M. mainiae*, *M. wrightii*, and *M. lasiacantha*. They are characterized by: tubercles or nipples, areoles on the end of the nipple, flowers from the axils at the base of the nipples, and a fleshy fruit containing the seeds.

Mammillarias typically have two growth forms. Here is a cylindrical form of *M. fraileana* and a globose form of *M. deherdtiana*.

Flowers emerge from the previous years growth and open during the day. They can be solid or striped, in pink, red, white, yellow and cream. Some



M. fraileana



M. deherdtiana

species when injured will exude a milky latex sap. Many Mamms develop showy red fruits, which can persist for several weeks or until found by rodents, birds and ants who in turn disperse the seeds.



M. haageana



M. rubrograndis

In Tucson, starting in January and February, *M. haageana*, and *M. rubrograndis* are two examples of good bloomers. They may also be acclimated for use as landscape accents in filtered light.

Cultivation includes many different aspects. For the most part, all of the species can be grown inside on the windowsill. Of course some will get quite large with age, forming impressive multi-headed clumps, while others will remain small. *M. magnifica* pictured below will make clumps up to three feet across, while *M. herrerae* stays small enough to fit in a 6 inch pot. Many of the larger forms are appropriate for use as landscape plants in less sun intense areas.



M. magnifica

Typically Mamms prefer a very open potting mix with 50% or more inert material such as pumice. They do best if watered only after the soil has dried out during the growing season, which usually falls in the months March through October here in Tucson. Of course your conditions may vary. Monthly feeding during the growing season with ½ strength balanced water-soluble fertilizer is a good recommendation, or use a time-released fertilizer for convenience. Regular feeding will encourage growth and flowering.

Some growers keep their plants in heated greenhouses and have the benefit of a longer growing season,

while other growers have plants outside with only protection from rain overhead. Of course there are some species that benefit from our winter rains like *M. grahamii* and *M. heyderi*. Others are prone to rot when watered too much, especially with lower temperatures. Also pictured on the following page is *M. grahamii* along with *M. heyderi* v. *macdougalii* – both of these are local species.

With good care, many species of *Mammillaria* can grow into nice specimen plants faster than one might expect. For example, *M. plumosa* can grow from a two inch plant to a 16 inch plant as pictured below over a period of 7 years. An important precaution is that *M. plumosa* is very sensitive to over watering, and in addition should only be watered from the sides or below, and never on the top of the plants – otherwise the plant is very likely to rot. A shallow pot is recommended rather than a deep one that can stay too wet.

In a period of 5 years, *M. hahniana* can grow from a two inch plant to a 10

inch or larger specimen plant and flower each year. This species offers a good opportunity as it is easy to grow and readily available. Some forms (as pictured) are *M. hahniana* forma *supra*, and are known for their ready formation of offsets and clumps.

Of course, many of us are unable to provide the space for large plants, so why not grow a specimen of one of the many small Mamms, such as *M. huitzilopochtli*. Over a period of 5 years, the plant may attain a size of 8 inches.

Some of the more difficult species include *M. tetrancistra*, *M. lasiacantha*, *M. humboldtii*, *M. solisiodes*, *M. albicoma*, and *M. glassii*. These are sometimes available from our local nurserymen. Easy species include *M. hahniana*, *M. magnimamma*, *M. spinosissima*, *M. haageana*, *M. compressa*, *M. gemnispina*, and many others. Most of these are easily found in our local nurseries, along with dozens of other species in the genus.

If you are curious or want to grow *Mammillaria*, you will find yourself in

good company. The TCSS has several members who are fans of the genus, as are our nurserymen. So be sure to ask questions of our members and growers – take advantage of their experience to enhance your fun in growing these always popular plants.

If you are reading this and are not in the Tucson area, remember to consult with your local experts for more information on growing mamms in your area.

For additional information on *Mammillarias*:

Book: “**Mammillaria**”, by John Pilbeam 376 pages., 425 color photos

www.tucsoncactus.org/cgi-bin/MySQLdb/DisplayCollection.php?Collection=Gallery5

mammillaria.forumotion.net/forum.htm

www.mammillarias.net



M. grahamii



M. heyderi v. *macdougalii*



M. herrerae



M. plumosa



M. hahniana forma *supra*

Some of Mark Dimmitts photos from his article on Growing Succulents in the Desert



Twenty five bulbs of *Lachenalia aloides* planted in a 14-inch square flat. This is the most common species in cultivation, and one of the most vigorous. It flowers in March in Tucson.



Lachenalia rubida is the earliest species, flowering in November in Tucson.



Lachenalia matthewsii is another miniature species, growing 4-6 inches tall. The yellow flowers appear in April.



Lachenalia viridiflora is a small species that blooms in February. The flowers on 6-inch spikes are a rare metallic blue-green color that is difficult to capture in print.



Lachenalia bulbifera is the largest species; the leaves and flower spikes can be a foot long. The flowers range from orange to red. This clone is a good red. It flowers March and sometimes into April if not too hot.



Two lachenalias of unknown identity found at Trader Joe's.



Lachenalia orthopetala is a small species, about 6 inches tall. The white flowers bloom in April.



**Some of Mark Dimmitts
photos from his article
on Growing
Succulents in the Desert**

Lachenalia mutabilis is named for the flowers which change color as they age. It flowers in March.



Lachenalia aloides var. *quadricolor* is the most colorful member of the genus.



Lachenalia glaucina is a robust plant with lavender flowers in March.



Lachenalia arbutnotiae bears bright yellow flowers in late March into April.

welcome. So put your thinking caps on and come join us to improve and expand this important community outreach project. If you have any questions or want more info see me at the regular TCSS meeting on March 4, or e-mail me at funfest@tucsoncactus.org.

John Swarbrick

Growing Succulents in the Desert by Mark Dimmitt

March 2010: Lachenalias at their peak in March

Winter-growing bulbs are a great source of winter and early spring color. A huge number of species occur in Mediterranean climates (mild, wet winters and hot, dry summers), including Europe, the Pacific coast of North America, South Africa, and parts of South America. Some of the showiest and easiest to grow are lachenalias, also called Cape hyacinths. The genus *Lachenalia* contains about 110 species from South Africa, of which a couple dozen are worth growing. Most species bloom in March in the desert Southwest.

Whether bulbs are succulents is an unsettled question. (See a discussion of the subject on the Desert Museum's website at www.desertmuseum.org/programs/succulents_definition.php) The fleshy perennating organ stores mostly starch, not water. The starch provides energy (and, when metabolized, produces water as well) for a surge of growth that enables the plant to complete its life cycle in a short growing season. Most bulbs do not sprout until the surrounding soil gets wet. A few bulbs use the starch and water to begin growing before the rains come; these are true succulents. Succulent or not, bulbs are definitely xerophytes, and are appealing to many succulent collectors.

Lachenalias can be grown in the ground if you don't have rabbits, packrats, or quail. They are best grown in pots on benches, and put on display when in flower. Plant a single bulb in a 4-inch pot, or several in larger pots in fall. (Larger pots produce bigger plants with more flowers.) A well-drained humus-rich medium is best. Begin watering when the nights fall into the 50s. Water sparingly until the leaves are well up, then keep the medium moist through winter. Be sure to feed them generously during the growing season. After the flowers fade and the leaves begin to turn yellow, stop watering and store in the pots in a dry location over the summer. (And separate the pots or cut off the old spikes. Otherwise seedlings will volunteer all over the place, and soon you won't know what you have.) Some species will rot if they receive much summer water.

Lachenalias are sporadically available from mainstream nurseries and mail order catalogs. You can purchase bulbs in the fall from specialty bulb catalogs. Some local nurseries offer them, and they occasionally appear at stores such as Trader Joe's.

Reference: "The *Lachenalia* Handbook". G.D. Duncan. 1988. *Annals of Kirstenbosch Botanic Gardens* vol. 17.

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Everyone is Welcome!

**Bring your friends, join in the fun,
and meet the cactus and
succulent community.**

March Refreshments

**Those with family names beginning with
E, F, G, H, I, J, and K please bring your
choice of refreshments to the meeting.
Your generous sharing will be greatly
appreciated and enjoyed!**

GROWING SUCCULENTS IN THE DESERT

Ocotillo: Guaranteed to Flower in April

by Mark Dimmitt



Figure 1: A flowering ocotillo in the Tucson Mountains.

Ocotillo (*Fouquieria splendens*, Figure 1) is one of the most distinctive shrubs in the desert Southwest. Nothing else can be mistaken for it. It occurs in all three warm North American deserts. (The Great Basin Desert is too cold for it.) The species ranges from western Texas to the desert's edge in California, and from the base of the Mogollon Rim in Arizona to central Sonora and the central Baja California Peninsula. There is also a population in the Grand Canyon. The species is one of only 11 in the genus, which in turn is the only genus in the family Fouquieriaceae. The family has no close relatives.

Ocotillo is one of a tiny handful of our regional plants that flower every year without fail. They flower even after a year with no biologically effective rain events (roughly 0.2 inches). In 2002-2003 Tucson suffered a 13 month period with no rain over a quarter-inch. Ocotillos were the only plant that flowered well. Even prickly pears failed to bloom that spring, and the saguaro flowering was very sparse. Moreover, the flowering time is also very consistent. Around Tucson the

bulk of the population flowers throughout the month of April. To the west and south, where it gets warmer earlier, they flower a month or more sooner.

The spikes of beautiful bright red to red-orange flowers (Figure 2) borne at the tips of the long, mostly unbranched canes look like little torches, and some say that's the source of the common name. The word ocote applies to numerous species of pine tree, the pitch of which is used for torches. Ocotillo is the diminutive form of the word. The red-tipped stems do indeed look like little torches. Other sources say that the word means a coachwhip, also an apt name.

Is ocotillo a succulent? This author says yes, definitely. The plant has all the traits of a succulent except for swollen stems or leaves. They have widespread, very shallow root systems that can take up water after very light rains. They can also respond quickly to rain. Ocotillos are leafless during dry seasons (Figure 3). New leaves can be seen emerging from the stems just 24 hours after a summer rain, and will be fully expanded in about 5 days (Figure 4). This rapid response requires something that only succulents possess – idling metabolism. Nonsucculents such as creosotebush take a couple of weeks to resume full growth from their dormant condition. Succulents are never completely dormant; they maintain a low level of metabolism all year. Like an idling car that can rev up to full speed much faster than one that has been turned off over a subzero night, succulents can leap into full growth very quickly. The idling tissue in ocotillo is apparently the thin layer of green tissue just below the bark (Figure 3).

Ocotillos can produce two or more crops of leaves per year. After a wet winter, they leaf out when weather warms in spring (as early as January in the low desert, March in Tucson). They shed the leaves during the foreshummer drought, then leaf out again with the summer rains. The leaves turn yellow and drop a couple of weeks after the last rain. At higher elevations or late autumn in the desert, colder nights cause the leaves to turn orange before falling (Figure 5). Plants at higher elevations also often flower again in the late summer or fall. The population in Texas Canyon east of Benson is an example.

Hummingbirds are the primary pollinator in most ocotillo populations. In dry years ocotillo flowers are almost their only food source as they migrate into or through the Sonoran Desert in spring. The flowers are also pollinated by carpenter bees. Although these bees “cheat” by chewing holes in the bases of the flower tubes to get at the nectar, they still pick up pollen while crawling on the inflorescences. In the eastern part of ocotillo's range in Texas where there are few hummingbirds, carpenter bees are the main pollinator. The flower tubes are shorter there, and the bees don't have to

Continued on page 4

cheat. Other animals such as verdins and woodpeckers steal nectar by poking holes in the flower bases; they are probably not effective pollinators.

Ocotillos are easy to transplant, whether leafy or bare. It is crucial to excavate about a foot of each lateral root without breaking it. Plants from the wild that have been damaged by being roughly torn from the ground, breaking off or splitting the laterals, have a high mortality. Replant at the same depth as they were originally. Plants will reestablish more quickly if the canes are sprayed with water several times a day until they leaf out. Do not water the roots heavily until there are signs of new growth.

While ocotillo is a common, widespread species, there is concern that they are being overharvested for the landscape trade. Ocotillo cane fencing is especially popular. The cut wild plants will regrow, but it takes years. Seed-grown ocotillos have recently become available, and are a greener choice for your gardens. They grow rapidly with generous watering.

Future articles will feature some of the other excellent species of Fouquieria.

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Figure 2: An ocotillo inflorescence. This plant consistently bears unusually long spikes.



Figure 3: A leafless ocotillo stem. A spine has been bent aside to reveal the layer of thin photosynthetic tissue that probably provides the idling metabolism.



Figure 4: A stem in full leaf.

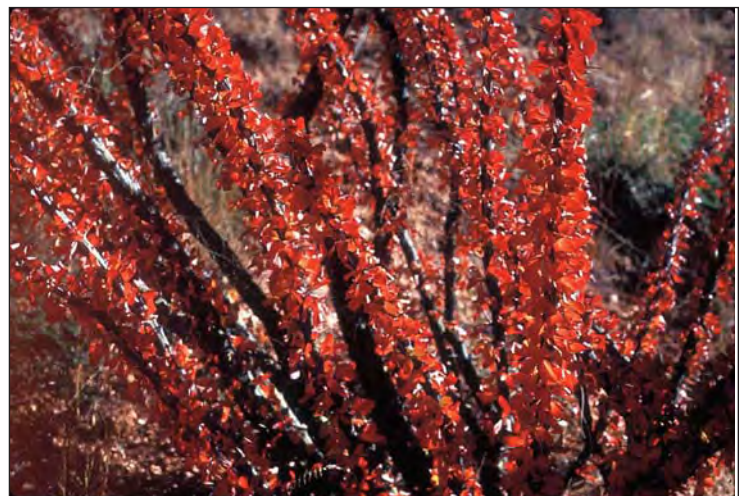


Figure 5: Ocotillo leaves turn orange in the fall if the nights are cold enough.

TRICHOCEREUS HYBRIDS EXPLODE IN MAY (AND BEYOND)

by Mark Dimmitt and Mark Sitter



A bed of Trichocereus hybrids in flower.

Trichocereus hybrids, sometimes called torch cacti, put on magnificent displays of large, brilliant flowers. Collectors will throw impromptu parties when all their plants bloom on the same day. Locally, blooms may start as early as mid March. However, the first big flush of blooms is usually in early May, followed by more through mid summer. The best cultivars will bloom massively every 10 days to two weeks over a span of three months. There are often occasional flowers in between the big shows, and sometimes continue into autumn. Each flush lasts one to three days. If you want to snarl traffic or cause streams of onlookers or photographers to congregate, these are the cacti you want to plant in your front yard or other public place.

First, a Taxonomic Note: Botanists have lumped most of the members of this large group of South American cacti in to the single huge genus *Echinopsis*. The former genera included *Echinopsis* (sensu stricto), *Lobivia*, *Trichocereus*, *Helianthocereus*, *Soehrensia*, and a few more. Many horticulturists, including the authors, do not accept this. The great majority of species easily fit into one of the former genera, and each has distinctly different growth forms, flowers, and cultural needs (Figure 2). A brief summary of the most commonly grown ones:



Figure 2; Comparison of flowers of (left to right) Echinopsis, Lobivia (2 fls), Trichocereus, Helianthocereus (2 fls).

Echinopsis (sensu stricto): Smallish globular plants (mostly 6-12 inch tall stems) with large, white or pale pastel, nocturnal, moth-pollinated flowers with very long floral tubes. The dried fruit can be easily crumbled to release the seeds.

Lobivia: Small globular plants with small, brightly colored, diurnal, bee-pollinated flowers with shorter tubes than those of *Echinopsis*. Same fruits as *Echinopsis*.



'Radiance', a stunning orange.



'Sunset' bears large deep fuchsia flowers with an orange midstripe on each petal.



'Yes!' was Dimmitt's last Trichocereus cultivar to be released. The cross was made in 1983, but the plant was very slow growing. The main reason is that it spends most of its energy producing great quantities of large flowers, the most intensely colored of all his creations – deep purple with red midstripes



B&B Cactus Farm created 'Epic', which is a very large purple-pink and a profuse bloomer. Bob White named it 'Epi' because of its Epiphyllum-like flower, but it got corrupted to 'Epic' in the trade. Bed photographed at B&B Cactus Farm.



'Apricot Glow' is an extremely floriferous Dimmitt hybrid.



'Embers' Mostly orange with a flush of pink on the tepal edges.

Growing Succulents in the Desert series

Welwitschia

by Mark Dimmitt



Figure 1. An ancient *Welwitschia mirabilis* in Namibia. Photo: Ernst Van Jaarsveld.

Almost any plant nut will agree that welwitschia is among the top two or three strangest plants on the planet (Figure 1). Also one of the ugliest. But the plant becomes more fascinating the more you know about it.

There is a single species, *Welwitschia mirabilis* (*W. bainesii* is a synonym), and is the only species in its family and order (in other words, it has no close relatives). It's a conifer, and technically a woody tree. Its closest (rather distant) relatives are *Ephedra* (which includes Mormon tea and ma huang), and a tropical liana, *Gnetum*. The plant is native to the Namib Desert in Namibia and Angola. Big plants, which may be more than a millennium old, look like stranded octopuses.

The bizarre growth habit of *Welwitschia* accounts for its strange appearance. Seeds germinate in a normal way, and produce two cotyledons (seed leaves), soon followed by the first pair of true leaves (Figure 2). Then the apical meristem dies! The plant can produce no more leaves for the rest of its life. Instead, the two straplike leaves lengthen and widen from their bases for as long as the plant lives. Eventually the leaves split lengthwise; thus old plants may appear to have more than two. They die and fray at the tips; the living portion may be a meter or more long.

CULTURE

Small seedlings are susceptible to damping off, but once a plant is a few months old, *Welwitschia* is very easy to grow. There are only two important things to know. First, protect it from hard freezes. Second and most critical, NEVER let it dry out. In a small pot it will die almost overnight if the medium dries out. That's because *Welwitschia* is NOT a succulent. It has no water storage organ. In habitat the roots go very deep and access permanent moisture, much like mesquite trees. Ernst Van Jaarsveld, horticulturist and curator of the conservatory at Kirstenbosch National Botanical Garden, says that in nature they also have shallow lateral roots that take up moisture from fog. But in cultivation I have never seen anything but roots that go straight down.

Contrary to popular myth, a deep pot is not necessary. The roots will wind around the bottom with no problem. However, a large deep pot is beneficial to reduce the risk of drying out if you forget to water it for a few days. Potting medium is unimportant as long as it is well drained. But again, a finer-grained medium will dry out more slowly.

Growth rate increases with plant size. Seedlings grow a few inches of new leaf on each side per year. Leaves of larger plants (Figure 3) can elongate a foot per year. I have one in the ground in my yard (Figure 4), and it has done well. On

cold nights I cover it with two layers of cloth, and it has survived 17 degrees F (-8 C) with no damage.

If you have a Welwitschia on display, it's sure to be a conversation-starter.



Figure 2. Six-month old Welwitschia seedlings. The longer "leaves" are the cotyledons; they will die in about a year. The shorter pair are the only true leaves the plant will ever grow, because the apical meristem has died



Figure 4. This 10-year-old Welwitschia has been in the ground in Tucson for six years. It's covered when frost threatens.



Figure 3. A 20-year-old Welwitschia. The cut stems held the cones, which recently matured and were removed.

Growing Succulents in the Desert series *Cochemiea* – The Red-Flowered Pincushions

by Mark Dimmitt



Figure 1. Flowers of *Cochemiea poselgeri*.

What would you get if a *Mammillaria* adapted to humming-bird pollination? You would get a *Cochemiea*. A typical pincushion flower is a small pink funnel. Imagine elongating that funnel, making it narrowly tubular, and changing the color to bright red. Now you have a *Cochemiea* (Figure 1).

Cochemiea is a small genus of only five species, all endemic to Baja California. The plants vary from tight clusters of stout stems like a hedgehog cactus (e.g., *C. setispina*, Figure 2), to long, thin, creeping stems (e.g., *C. poselgeri*, Figure 3). All five species have clusters of tubular red flowers that are borne at the stem tips following summer rains.

Culture

Cochemieas are as easy to grow as most *Mammillarias*. *Cochemiea setispina* tolerates desert heat and nearly to completely full sun. It is also hardy to at least the mid teens F. *Cochemiea poselgeri* is very heat tolerant, but its creeping stems require filtered sun. This tropical species is also frost tender. The other species grow along the Pacific Coast of Baja California, and are less heat tolerant than the first two.

In habitat these cacti experience a long winter dry season, which does not seem to be critical in cultivation. However, if

they are kept dry for several months, a good watering during the hot season will trigger a big flush of bloom that lasts about two weeks. (Figures 4, 5). With regular watering they tend to flower sporadically and sparsely over a longer period.

Unfortunately, this beautiful genus is difficult to find in nurseries.



Figure 2. Several *Cochemiea setispina* plants in habitat in central Baja California. They are growing in the open in hot, dry desert.



Figure 3. *Cochemiea poselgeri* growing in the shade of a *Jatropha cinerea* near San Ignacio, Baja California Sur. Stems that creep too far into the open ground will sunburn and die. In fact, this species' stems are often burnt anyway.



Figure 4. *Cochemiea setispina* blooming at the Arizona-Sonora Desert Museum.



Figure 5. *Cochemiea poselgeri* in the Cape of Baja California, flowering massively after a summer rain. Photo: Gene Joseph.



Figure 6. *Cochemiea pondii* is endemic to Cedros Island off the Pacific coast of Baja California.

Growing Succulents in the Desert

Stapelia flavopurpurea: A sweet starfish flower

by Mark Dimmitt



A large specimen of Stapelia flavopurpurea in full flower during late summer. The medium in this rock pot by Steve Holmes is only one to two inches deep, which helps prevent overwatering

Most succulent collectors have grown at least a few stapeliads, a tribe of the former milkweed family Asclepiadaceae (The family was recently combined into the dogbane family, Apocynaceae). All stapeliads are succulents, and they bear a wide range of flower sizes and shapes. Most species share the trait of being pollinated by flies and carrion beetles. Therefore the flowers look and smell like dead things. There will be a future article about these.

The featured species is one of the few exceptions; it isn't a "carrion flower". The flowers don't look like rotting meat, and they have a powerful and delightful sweet fragrance. They're still fly-pollinated, but they offer nectar (energy food) instead of the false promise of a place to lay eggs. However, the flowers appear to produce no nectar; they're still apparently relying on deceit to get pollinated.

The flowers are born in late summer; healthy plants produce many one-inch star-shaped flowers with a plethora of frills, spikes, and warts. The color ranges from brown to bright

yellow-green, often with purple centers. The penetrating fragrance is reminiscent of honey or some cookies or candy being baked in grandma's kitchen.

Culture

This species is easy to grow. It does best in filtered sunlight in any well-drained potting medium. Protect it from frost in the winter. Like most stapeliads, plants become senescent after several years, so they should be restarted from cuttings when growth and flowering slow. The best time is in late summer when they're growing most actively. The one problem I've encountered is that if the stem is even partially buried, the plant will usually rot. Cuttings should simply be laid on the surface of the potting medium. Healthy young plants grow rampantly. An easy way to propagate them is to place empty pots filled with medium adjacent to a plant when it begins to run over the edge of its pot. Masses of stems may hang a foot or more over the edge of a pot for a time, but the joints are loosely attached and easily broken.

Stapelia flavopurpurea

Photos by Mark Dimmitt



A brown-flowered form of Stapelia flavopurpurea



A flower of Stapelia flavopurpurea. While you're getting close to enjoy the fragrance, the flower offers a visual treat too. Spikes, fur, and wrinkles; a punk flower?

Aloe 'Hercules' and Agave ovatifolia - Two great Succulent plants to create focal points in your landscape

by Tom Gatz

(modified and reprinted with permission from the Gatherings, the Desert Botanical Garden volunteer newsletter)

I usually wait a few years after new plant varieties are introduced at the plant sales and nurseries until we see how well they actually do here before recommending them to friends. Here are two where the waiting is over. I love these plants!

Aloe 'Hercules' (dicotoma X barberae)

You can't miss this massive tree aloe with a beautiful trunk when you first enter the new Succulent Gallery at the Desert Botanical Garden. This fast growing tree aloe was created by crossing two species of aloe: Aloe dicotoma and Aloe barberae (formerly bainesii). It is believed that a phenomena known as "hybrid vigor" may explain why the hybrid 'Hercules' is hardier and grows faster than either of its parent. It should survive temperatures down to at least 20 degrees. Jim Elliott at Arizona Cactus Sales in Chandler had a 6 foot-tall specimen survive (but with upper leaf damage), uncovered two nights in the mid to low teens during the deep freeze of January 2007 that killed a nearby Aloe dicotoma. It has since recovered and is now over 10 feet tall. My specimen survived two nights of temperatures down to 21 degrees in my north Phoenix yard (under a frost cloth with a low voltage light) with only a little tip damage. Acquired as a foot-tall specimen in 2004, it is now 7 feet tall. An eventual height of over 30 feet is possible so make sure you don't plant it under a tree or an overhang! I water mine deeply in



Aloe 'Hercules' (on left) with Chad 'Hercules' Davis, Agave and Aloe Horticulturist (on right). Photo by Tom Gatz

the fall and spring months about twice a month, cutting back the amount and also the frequency to once a month during the heat of the summer and in the winter. Jim Elliott doesn't water his at all from November through February and waters overhead every other week the remainder of the year. It appreciates some afternoon shade in the heat of the summer here but likes lot of winter sun. Jim Elliott's specimen has outgrown its shade and does okay in full sun with some lower leaf scalding. San Marcos Growers reports that it will eventually produce beautiful green-tipped salmon colored flowers from spring to fall. Don't confuse this hybrid with Aloe 'Goliath', a hybrid between Aloe barberae and Aloe vaombe, which has heads so heavy that it is prone to breakage.

Whale's Tongue Agave (Agave ovatifolia)



Whale's tongue agave is named after its wide, short, cupped leaf blades. Photo by Lee Brownson

Displayed for the first time at the Desert Botanical Garden in the new Berlin Agave Yucca Forest, this low and wide pale powder-blue beauty was only recently described in 2002 by Tucson nurseryman Greg Starr and his Mexican colleague Jose Angel Villareal. It can be acclimated to full sun but also appreciates filtered sun or afternoon shade in the low desert. Lee Brownson, executive director at the Wallace Desert Gardens, installed a specimen in a landscape in full sun against a south-facing wall in 2004 and it is now 3 feet tall and 4 feet wide. This species apparently really takes off if well watered. Greg Starr reports that it does not produce "pups", survives temperatures down to at least 5 degrees and can reach 5 feet tall and 6 feet wide, so give it plenty of room. I kept one in a large pot for several years where it was never really happy, so I recently transplanted it into the ground. The only possible downside with this species is its apparent susceptibility to agave snout weevils. Ty Peterson at Arizona Cactus Sales lost a stunning 4 year-old specimen growing in full sun in spite of treatment for weevils every other month from March to October. See the "Good Growing Guides" under "Gardening Help" on the Desert Botanical Garden's website for weevil control tips.

Both of these plants will likely do best in soil with fairly good drainage and both have been available at recent Desert Botanical Garden plant sales. If you have the room, give one of these showstoppers a try. If you like the whale's tongue agave and want to go with a nautical theme, consider adding the squid agave (Agave bracteosa), the octopus agave (Agave vilmoriniana), Arizona fishhook cactus (Mammillaria grahamii) and the octopus cactus (Stenocereus alamosensis) to your garden palette!

Roots...



Roots are always interesting when digging up native cacti to be rescued. Normally we are trying to find the roots to chop them off so the plant can be removed. The soil type has a huge impact on root structures. Are they fine roots, heavy, stay near the plant or go for several feet getting their water collector system out as far as

possible. Some roots go straight down to give taller plants support. Saguaros and ocotillo have tap roots to provide stability but they also have shallow roots for water collection.

Continued on page 6

Growing Succulents in the Desert

Hoya pachyclada

by Mark Dimmitt



Hoya is a genus formerly in the milkweed family, now in the dogbane family Apocynaceae. There are at least 300 species, all native to the Old World. Almost all are vines, and range from thin-leaved delicate tropicals to semidesert succulents. This month's featured species is one of the most succulent of all.

Hoya pachyclada (Figure above) does not vine; it is much slower growing than almost all other hoyas. Stems are usually short and densely clothed with very thick leaves. If overwatered and overfed, however, it will produce lengthy stems with long internodes. The leaves continue to thicken over several years. Old leaves may be more than a quarter-inch thick. Plants bear good-sized umbels of white flowers in summer (Flower to right).

This species is native to dry tropical forest in Thailand, where it is typically an epiphyte on trees. It grows well in a humus-rich potting medium. Keep it in a very small pot. Overpotting will usually result in a rotted plant. It can be



grown outdoors in Tucson most of the year, tolerating heat quite well in at least half shade. (Despite its hard succulent leaves, it does not like desert sun.) It can also tolerate cool weather, but keep it well above freezing in winter.

Like many desirable plants, this one is a challenge to find. Even nurseries specializing in hoyas often don't have it, probably because it grows and propagates so slowly.

Growing Succulents in the Desert

Trichocereus terscheckii: the Argentine “Saguaro”

By Kevin Barber

Photos by Kevin Barber and Mark Dimmitt



Figure 1. *Trichocereus terscheckii* at Boyce Thompson Southwestern Arboretum



Figure 2. Two-foot tall *T. terscheckii* ready for planting in 2005.

Many of us would love to have a large stately Saguaro in our yard, but aren't lucky enough to have one already or don't have decades to wait for a small one to grow up. The alternative could be an Argentine saguaro (*Trichocereus terscheckii*, Figure 1). Also known as *Echinopsis terscheckii*, it is called cardón in its native land. Not only is this a

beautiful plant in its own right, it is extremely fast growing if given a little TLC. Who says cacti are slow growing? Extra water, good soil and a smidge of fertilizer will make this plant rocket at over a foot per year in average growth (Figures 2, 3). (I have seen them grow 18 inches a year –MAD).

The plant has beautiful golden spines that seem to grow larger and more colorful as the plant matures. Give it a western exposure and it will glow in the afternoon and evening (Figure 4).

This arborescent cactus loves full sun and is hardy to at least 15 degrees F; it shouldn't have much of a problem anywhere in the Tucson area. It will eventually reach upward of 25 feet and will form numerous branches.

Remember this plant is going to get big! Don't plant it close to other plants even when small. Dig a good size hole (shallow and wide) and add some coarse soil mix to ensure good drainage and allow for root growth. A little slow release fertilizer (Osmocote) will foster rapid growth during the first season. During our dry periods give it some extra water to keep it growing. The plant will let you know if it needs water. You will be able to see the pleats in the plant shrink noticeably. Your objective is to keep it plump and happy to maximize it's growth. Once it's large enough to satisfy you, it needs only a watering once a month during the warm season to keep it flowering. (They like more water than saguaros.)

Saguaros flower almost every day in May and June with 3-inch flowers borne near the tops of the stems. *Trichocereus terscheckii* blooms all over its stems with huge flowers up to 8 inches across (Figure 5). They open after dark and stay open until the next afternoon. Individuals vary in abundance of bloom. The best clones flower in waves several times from April through October if well watered.

It is available in a variety of sizes at many Tucson Cactus and Succulent nurseries. I suggest getting one (or more) at a foot or so in size. Add water and watch it shoot up!

Harrison Gerald Yocum

Passed away on August 31, 2010 at the age of 87. He was born on April 23, 1923 in Bethlehem, PA.

Harrison is the founder of the Tucson Botanical Gardens and a member of TCSS for more than 40 years.

Trichocereus terscheckii: the Argentine “Saguaro”

Photos by Kevin Barber and Mark Dimmitt



Figure 3. One of the plants in Figure 2, now 7 feet tall in 2010. This species can grow even faster.

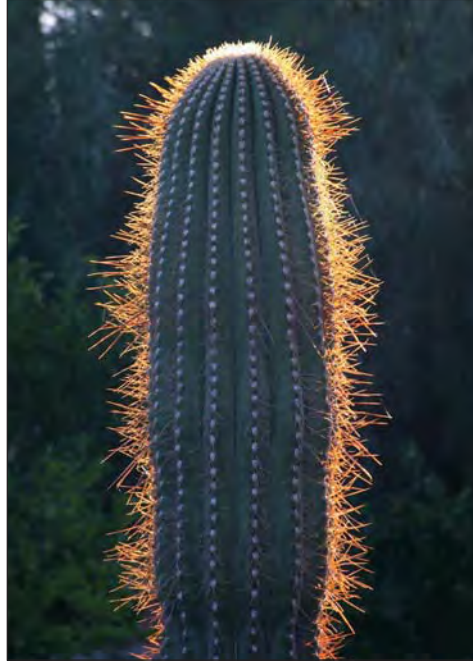


Figure 4. The long spines glow when backlit.



Figure 6. *Trichocereus terscheckii* in a flush of full bloom, which it can do several times a year. This plant was 19 years old from a 6-inch pot when photographed.



Figure 5. The very large flowers of *T. terscheckii*.

Growing in the Desert Series: *Agave zebra* and *Agave pelona*

By Mark Dimmitt

Photos by Mark Dimmitt unless noted



Figure 1 *Agave pelona* (left) and *A. zebra* in the Sierra del Viejo.



Figure 2 *Agave zebra* in habitat. Notice the strong banding and bud imprinting.



Figure 3 *Agave pelona* in habitat.

I'm treating these two very different but equally beautiful agaves in the same article because they grow together in the same habitat (**Figure 1**) and have the same culture. They are endemic to the Sierra del Viejo, a limestone mountain southwest of Caborca, Sonora. This range is in the Central Gulf Coast division of the Sonoran Desert. The climate is hot and very arid. All of these traits make these agaves well adapted to the climate and often caliche-laden soils of southern Arizona.

The similarities stop there. *Agave zebra* (**Figure 2**) is in the subgenus *Agave*, the one with paniculate inflorescences. *Agave pelona* (**Figure 3**) is in the subgenus *Littaea* and has spicate inflorescences. The former species forms offsets, while the latter is always a solitary rosette. The leaves of *A. zebra* are broad, gracefully recurved and channeled, and have beautiful gray banding and very toothy leaf margins that leave bud imprints on adjacent leaves. *Agave pelona* has many narrow, straight, toothless leaves; they're dark green with a smooth white margin.

Both species grow slowly, so they will grace your garden for many years before they flower and die. *Agave zebra* flowers are bat-pollinated and are a dull brownish white. Although the flowering rosette dies, offsets will keep the clone going. But the final act of *Agave pelona*'s solitary rosette is a spectacle. The spike shoots up to about 15 feet tall, densely packed with flowers of a strange brownish-red hue (**Figure 4**). My plants took 20 years from seed to mature, and that was with regular watering.

These agaves are only sporadically available, especially *A. pelona* because it can be propagated only from seed. Each one has look-alike species that can be substituted. Some clones of the variable *Agave colorata* (**Figure 5**) closely resemble *A. zebra*. It's a tropical species, but it tolerates our frost and nearly full desert sun. *Agave ocahui* var. *ocahui* (**Figure 6**) looks almost exactly like *A. pelona*. Most clones are non-offsetting; its inflorescence is a more ordinary yellow.



Figure 4 The striking inflorescence of *Agave pelona*.

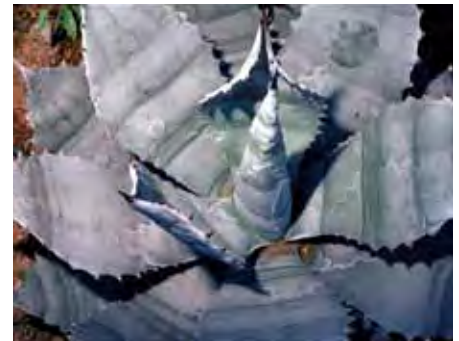


Figure 5 *Agave colorata*, a particularly broad-leaved, strongly banded clone.



Figure 6 *Agave ocahui* var. *ocahui* in habitat near Magdalena, Sonora. Photo by T.R. Van Devender



Figure 7 *Agave zebra* (shown) and *A. pelona* typically grow on the high ridges of the Sierra del Viejo.

Growing Succulents in the Desert

Tillandsia ehlersiana: A Superb Succulent Bromeliad

by Mark Dimmitt

Some succulent bromeliads (family Bromeliaceae) are popular with succulent collectors, primarily the terrestrial genus *Dyckia*. Most succulent collectors have neglected the genus *Tillandsia*. The approximately 600 species of tropical rosette plants in this genus range from terrestrials to epiphytes (and saxicoles) in habitats from wet rainforests to near-deserts. The arid land epiphytes are called atmospheric bromeliads, more commonly and incorrectly known as “air plants”. Atmospherics tend to have only a few roots for anchorage on the host tree or rock. The leaves perform nearly all of the water and nutrient uptake, through specialized scales called trichomes. The trichomes are so dense on species from the brightest, most arid habitats that their foliage is white. Finally, some of the atmospheric tillandsias are succulent.

Most atmospheric tillandsias are difficult to grow outside of a greenhouse in desert climates. They lose water rapidly to the dry hot air, and even watering twice a day is not sufficient to keep them alive in June. I’ve been growing tillandsias for over 40 years, and I’ve settled on one species that I think is the best

adapted to fitting into typical succulent collections without special care. It’s also a very beautiful one.

Tillandsia ehlersiana (Figure 1) has many traits that should appeal to succulent collectors. It’s squat and fat. It has bright white leaves. It has attractive flowers. Best of all, it’s easy to grow among other succulents. This species has a substantial root system for an atmospheric bromeliad, which confers two benefits. It will firmly anchor in a pot (most atmospheric species will not). The root system is functional at taking up water, so a potted plant can be grown outdoors in the desert.

The root system is still tiny relative to the size of the plant. The one in Figure 1 is in a 2-inch pot. That pot has been set into a 12-inch Mark Muradian pot filled with gravel to keep the plant upright and to provide attractive staging.

To grow this plant outdoors in the desert, give it very bright light to keep the foliage white. Full summer sun is too much, but it will do very well under the edge of a mesquite or palo verde tree. Soak both leaves and roots three times a week during the summer, and once a week or so during cool weather. Protect it from frost.



Figure 1. A mature single rosette of *Tillandsia ehlersiana*. It’s in a 2-inch pot, set into a 12-inch pot.



Figure 2. Inflorescence of *Tillandsia ehlersiana*. The actual flowers are the violet tubes; the pink bracts attract hummingbirds. 3

Growing Succulents in the Desert

Tillandsia ehlersiana: A Superb Succulent Bromeliad

by Mark Dimmitt

When mature, a branched inflorescence grows from the apex of the rosette; the pink bracts produce tubular violet flowers over many weeks (Figure 2). A flowered rosette will die in another year or two, but will first produce three to five or more offsets. Offsets mature and flower in two to three years. They can be removed from the mother plant when about $\frac{1}{4}$ to $\frac{1}{3}$ mature size and potted separately, or they can be left to grow into a clump (Figure 3).

If grown in a greenhouse or humid climate, you can mount the plant on a branch (Figure 4). Tie or glue it securely, and in a few months the roots will hold it fast.

Tillandsia ehlersiana is rarely found in succulent nurseries. Look for it in bromeliad nurseries.



Figure 3. A colony of five Tillandsia ehlersiana rosettes. This is the same plant as in Figure 1, two years older. The original rosette is dying and barely visible amidst its offsets.



Figure 4. This Tillandsia ehlersiana was mounted on a stick three years before being photographed. A bigger branch would have made a better ornament.

Growing Succulents in the Desert

What is a Succulent, Anyway?

By Mark Dimmitt

If you're reading this article, it's a pretty sure thing that you're a succulent collector. But do you know what a succulent is? You might be surprised to learn that there is no clear definition of the term. I've been trying to answer the question throughout my long career both as a botanist and a horticulturist. I've discussed the issue with many other professionals, and most of them are unclear too. Gordon Rowley, who has written many books on succulents, freely acknowledges that it's often difficult to decide whether any given plant is succulent. When I asked Park Nobel, a molecular biologist renowned for his research on the special metabolism of succulent plants (particularly CAM photosynthesis), he punted. He basically answered that a succulent is whatever people agree to categorize as such. I want a better definition than that. So, after much thought and considerable trepidation, I'll make a stab at one.



Figure 1. Cut leaf of *Agave parryi truncate*; the inside is almost all water storage.

The basic definition is simple. In general, the word "succulent" means juicy. A succulent plant is one that stores water in its tissues; hence it's juicy (Figure 1). Sure, but how much water is enough to qualify? That's where the disputes begin. There is no doubt about some plants such as lithops (Figure 2), which are almost all water. But what about, say, yuccas, which are much less juicy. Some try to avoid the question by calling them semisucculents. But we shouldn't go there. Now you have two gray areas, not just one, to decide on. Is it succulent or semisucculent, or is it semisucculent or nonsucculent? See where that leads? So let's try to be more rigorous.



Figure 2. *Lithops* are extreme leaf succulents.

I found one good stab at a technical definition, which includes the plant's function in addition to just having lots of water inside. Von Willert et al. (1992) define a succulent as any plant that possesses a succulent tissue, which is "... a living tissue that... serves and guarantees a ...temporary storage of utilizable water, which makes the plant... temporarily independent from external water supply...". In other words, the water stored in succulents functions to help them survive dry seasons. They further defined these plants as xerophytic succulents, ones that live in dry habitats. There are also succulent halophytes that live in saturated, saline soils. Their succulence serves some function, yet unknown, other than drought adaptation. From now on, I'm talking only about xerophytic succulents.

Now we need some additional traits to distinguish some of the less obviously succulent plants from nonsucculents. The main ones are:

1. Nearly all succulents have extensive, very shallow root systems that are adapted to absorbing lots of water after very light rainfalls.

2. Succulents aren't just juicy. Most of them use their stored water to continue metabolic activity when there is no available water in the soil. That is, they may grow during the dry season.

3. In order to be able to do the above two functions, many succulents have a special variant of photosynthesis called CAM. Without going into technical detail, CAM plants are ten times more efficient with water consumption than non-CAM plants. This is very important where water is scarce. It's important for growers to know that CAM requires a big day-night temperature differential to work, at least 15 degrees Fahrenheit. If you keep CAM plants at the same temperature, they will die. Almost all succulents that have

Growing Succulents in the Desert

Photos by Mark Dimmitt

succulent leaves or stems have CAM. But succulent-stemmed plants that have nonsucculent leaves are not CAM, e.g., *Bursera* and *Adeniums*.

So which of the plants we love are succulents and which are not? Here is a partial list. (More than 25 plant families have at least one succulent species.)

Agave family (Agavaceae): All species of *Agave* are succulent. Some are CAM, some not, and some can switch depending on how moist the soil is. *Yuccas*: Some are succulent, others not. The nonsucculent ones (like soap tree, *Y. elata*, Figure 15) have thin leaves and deep roots.

Aloes (Aloaceae): Oh yeah, and CAM (Figure 3).

Bromeliad family (Bromeliaceae): *Dyckias* are definitely succulent, and CAM. Succulent collectors tend to ignore the genus *Tillandsia*, which has numerous succulent species (Figure 4).

Cactus family: Almost all cacti are succulents. Contrary to popular lore, there are exceptions. *Pereskias* (Figure 5) are just woody shrubs and trees. Their leaves look succulent, but they are shed during the dry season; they don't help the plant get through droughts. All succulent cacti are CAM.

Cycads: NO! They have no water storage tissue. Deep roots, no CAM. Figure 6.

Euphorbia family: This huge group has all growth forms from nonsucculent herbs like the spurges that grow in your yard, to woody shrubs and trees like poinsettias and *****, to the fat ones which are definitely succulent (Figure 7). There are many species in between that have slightly juicy stems, and can be difficult to classify. Examples are *****. All succulent euphorbias are probably CAM. Many *Jatropha*s are also succulent, and some *Pedilanthus*.

Dogbane family (Apocynaceae, including former milkweed family Asclepiadaceae): Many growth forms. Oleander, jasmine, and many milkweeds are nonsucculents. Many others are quite succulent: the stapeliads (Figure 8), most hoyas, adeniums, pachypodiums. Stapeliads probably CAM; adeniums and pachys not. *Plumerias* (Figure 9)? Well, they probably qualify, but not CAM.

Geophytes (bulbs): Many families have bulbous or tuberous plants, and many of these bulbs are pretty juicy. But most don't qualify; they're dormant during the dry season. Some begin growing before the rains come. These might be legitimate succulents; possible examples: *Boopane* (Figure 10), *Synandropadix*.

Mesems (Aizoaceae): Yep, almost all succulents, and CAM. *Lithops*, *Conophytum*, etc.



Figure 3. *Aloe claviflora* is an example of a leaf succulent.



Figure 4. *Tillandsia cacticola* is a leaf succulent. It grows epiphytically on cacti in the Peruvian desert, where it endures 6 months without rain.

Ocotillo family (Fouquieriaceae): Probably all 11 species are succulent, including ocotillo (Figure 11). It doesn't look very fat, but it has all the other traits of a succulent—the broad, shallow root system, and the ability to leaf out within a couple of days after a rain. That latter feat is impossible for nonsucculents. Reportedly not CAM, but they must have something like it.

Growing Succulents in the Desert

Photos by Mark Dimmitt



Figure 5. *Pereskia grandiflora* (rose cactus) is a woody deciduous tree to 60 feet tall, from the dry forest of Brazil. No succulent tissue.



Figure 6. Succulent collectors tend to love cycads because they're weird looking. But they are not succulents.

Orchid family (Orchidaceae): This huge family is almost completely ignored by succulent collectors, but there are many succulent orchids. Some of the most xerophytic ones such as *Eulophia petersii* (Figure 12) are showing up in succulent nurseries.

Stonecrop family (Crassulaceae): Mostly succulents, and CAM. Echeverias Torchwood family (Burseraceae): Includes



Figure 7. *Euphorbia abdelkuri* is a leafless stem succulent.

many succulents, such as *Bursera* (Figure 13), *Boswellia*, and *Commiphora*. These genera also have species that are probably not succulent. This family has no CAM.

Welwitschia: NO! No water storage, no CAM (Figure 14). If the pot dries out for even a day, it's dead. In habitat, they probably have very deep roots that find a perennially moist layer. In cultivation the roots dive straight down, very un-succulent.

For more technical explanations and references, see the story on the Desert Museum's website: desertmuseum.org/programs/succulents_definition.php.

Growing Succulents in the Desert

Photos by Mark Dimmitt



Figure 8. *Caralluma russelliana* (*Desmidorchis acutangula*) is a good stem succulent, one of the largest stapeliads.



Figure 9. *Plumeria rubra* (photographed in Baja California) is one of the iffy ones. Kinda succulent, but not sure.



Figure 10. Some bulbs may be true succulents if they use their stored water to get a jump on the growing season before rains come. In cultivation at least, this *Boophane haemanthoides* doesn't leaf out for me until I water it.



Figure 11. Ocotillo stems have a thin layer of succulent tissue beneath the thorny bark. It is metabolically active during the dry season when the plants are leafless.

Growing Succulents in the Desert

Photos by Mark Dimmitt



Figure 12. *Eulophia petersii* is a very succulent orchid native to dry habitats in Africa and Saudi Arabia.



Figure 13. *Bursera microphylla* is a good stem succulent. It has nonsucculent leaves and is not CAM. The cross section of stem (inset) shows that it is not woody, but filled with water storage tissue.



Figure 15. *Yucca* (*Hesperoyucca*) *whipplei* (left) is slightly succulent, but *Y. elata* is not. The latter species has roots that tap deep soil moisture to survive the dry season.



Figure 14. *Welwitschia* is easy to grow, IF you are careful never to let it dry out. It has no water storage in its tissues, and will die very quickly if it can't pull in water through its roots.

Ferocactus of the Month

Ferocactus latispinus and *F. latispinus* ssp. *spiralis*

by Chris Monrad



Figure 1: *F. latispinus* in bloom

Ferocactus latispinus and *F. latispinus* ssp. *spiralis* (formerly known as *Ferocactus recurvus* or sometimes as *F. nobilis*) are two more of the winter blooming ferocacti, with various specimens of *F. latispinus* typically blooming in local cultivation from late October through late January. *Ferocactus latispinus* ssp. *spiralis* generally blooms two to three weeks later than *F. latispinus*. *F. latispinus* is widely available in the trade and is well known for its vivid solid purple flower (**Fig. 1**) and displays a cream colored flower in the lesser-available and blond-spined variety. *Ferocactus latispinus* ssp. *spiralis* and its darker purple striped blossom (**Fig. 2**) is generally seen less frequently for sale but can be found locally at some TCSS member nurseries. I suspect that *F. latispinus* is better established due to its propensity to bloom at a smaller size and therefore being more aesthetic and marketable in this regard. The blooming periods can vary from specimen to specimen depending upon growing conditions, weather and perhaps just kismet.

If seed production is desired, hand pollination is recommended due to the sporadic to non-existent insect pollinator activities associated with the seasonally cold weather in Tuc-



Figure 2: *F. latispinus* ssp. *spiralis* blossom

son. Unfortunately, local hard frosts may cause fruits to abort prematurely even if the initial pollination is successful. Native to Puebla, Oaxaca and surrounding tropical locales in



Figure 3: Upright growth habit of *F. latispinus* ssp. *spiralis*



Figure 4: *F. latispinus* ssp. *spiralis* frost damage at 22F

Mexico over 1000 miles south of Tucson, these species are a long way from home and their naturally occurring pollinators. *F. latispinus* ssp. *spiralis* has a larger and more upright growing habit and twists as it grows (Fig. 3), hence its epithet. It also has a longer central spine and a simpler yet very sturdy spine cluster, in that it lacks the more delicate spider-like lateral spines of *F. latispinus*. As with many cacti, various clones are more frost hardy than others. The recent cold snap of early January burned the ribs of one of my specimens of ssp. *spiralis* at an unprotected 22F (Fig. 4), while several other specimens in my yard were unharmed and held their flower buds through the same 22F, also with no protection whatsoever (Fig 5). It is still possible that the buds will

ultimately fail to open due to the frost but the plant itself is unharmed. These plants are suitable for full sun conditions in pots or in the ground, but do benefit from well draining soil and regular supplemental watering when stressed. Time-release granular fertilizer administered in May will carry the plant nicely through the monsoon season.

As seems to be the case with the dedicated cultivation of ferocacti in the suburban and rural Tucson area, our native *Cactobrosis fernaldialis* moth and its Blue Cactus Borer larvae (not to be confused with the invasive *Cactoblastis* moth that preys upon *Opuntia* species) can cause damage or sometimes death to small and occasionally even larger specimens if enough larvae infiltrate the plant. (Fig. 6) portrays the entry points in which several female moths have laid eggs within the tissue of a *Ferocactus latispinus* and (Fig. 7) shows the blue larvae and the damage to another plant resulting from its feeding and attendant rot. Non-native exotic ferocacti are definitely more susceptible than our native *F. wislizenii*, but the *Cactobrosis* moth will also target sick or stressed natives. If you live in Southern Arizona outside of the urban Tucson core, you are likely to see calloused-over circular infiltration points on ferocacti of many species if you look closely for them. The persistent and rigorous use of systemic insecticide is known to be effective in limiting the damage of the moth larvae but can be costly, time consuming and may have food-chain implications on the pollinator community. For this reason, one may be advised to just cultivate a few more plants to allow for the occasional loss. After all, the moths were here first.

Photos by Chris Monrad



Figure 5: *F. latispinus* ssp. *spiralis* with profuse buds

TCSS Financial Statement - Year 2010

INCOME

Memberships, Raffles	\$ 13,954
Cactus Rescue Sales	\$ 32,910
Sonoran VIII Conf. Income	\$ 24,930
Sales Cultivated Cactus, Auction	\$ 7,793
Investment Income-Savings/CDs	\$ 423
Donations/Grants Received	\$ 1,280
Florilegium Donations	\$ 1,475
Prickly Park Donations	\$ 1,930
Total Income	\$ 84,695

EXPENSES

Meetings & Newsletters	\$ 11,512
Cactus Rescue Program Expenses	\$ 20,200
Sonoran VIII Conf. Expenses	\$ 31,764
Tours, Workshops, Auction Exp.	\$ 2,188
Operational/Insurance/Library	\$ 6,492
Grants Awarded, Educ. Expenses	\$ 5,333
Florilegium Expenses	\$ 5,346
Prickly Park Expenses	\$ 1,809
Total Expenses	\$ 84,644

CASH ASSET ALLOCATIONS

TCSS Operating/Discretionary	\$ 34,354
Cactus Rescue Program Reserve	\$ 10,000
Education Outreach Fund	\$ 17,947
Research Fund	\$ 15,385
Conservation Fund	\$ 1,495
Florilegium Preservation Fund	\$ 963
Prickly park Fund	\$ 1,371

Total **\$ 81,515** (includes \$937 in outstanding checks)

BANK ACCOUNTS

Checking Account	\$ 18,834
Savings Account	\$ 20,024
CD#13 matures 03/13/11 (0.75%)	\$ 11,214
CD#15 matures 10/05/11 (0.45%)	\$ 10,933
CD#16 matures 01/24/11 (0.30%)	\$ 10,373
CD#17 matures 04/05/11 (1.00%)	\$ 11,074

Total **\$ 82,452**

Ferocactus of the Month

Ferocactus latispinus and *F. latispinus* ssp. *spiralis*

Photos by Chris Monrad



Figure 6: *F. latispinus* with native blue cactus borer (*Cactobrosis fernaldialis*) damage



Figure 7: Native blue cactus borer (*Cactobrosis fernaldialis*)

Library Update

Sonoran Desert Spring by John Alcock

The book covers the months from February through June. It has a few pages of information on various plants, birds, snakes, tortoise, animals and insects.

Cactus & Succulents, a care manual by Tony & Suzanne Mace

Cacti, An Illustrated Identifier to over 150 Representative Species by Marcus Schneck

Both of these books are basic beginners books with plenty of photographs accompanied with descriptions.

Cactus & Succulent Journal Aloe Issue

Two new species are described along with an article on tree aloes and more.

March 2011

Ferocactus of the Month Ferocactus hystrix and F. Echidne

by Chris Monrad

Ferocactus hystrix and F. Echidne are two of the late winter / early spring blooming ferocacti, with specimens typically blooming in local cultivation from February into March. Both of these species display smallish yellow flowers and are native to central and eastern-central Mexico some 1000 miles SE of Tucson.

In my experience, these species are readily pollinated by our native desert bees that are up and around this time of year. The fruits of each species are gelatinous and are tricky to collect upon ripening, as they tend to collapse quickly into the plant tissue within the spines once ripened. The spines of F. hystrix (Figs. 1 and 2) are far more dense and long than F. echidne. Given the sparse spination of F. echidne, protection in the form of wire mesh or chicken wire may be necessary to preclude predation by our local varmints and critters. Both species can usually be found locally at several TCSS member nurseries.

The local hard frosts of early February appear to have spared my specimens of any apparent damage, although the buds of the F. hystrix were badly damaged. F. echidne has (thankfully) started budding since the freezing weather (Fig. 3).



Figure 1: The spines of F. hystrix



Figure 2: The spines of F. hystrix



Figure 3:

A Roundtable Discussion on *Ariocarpus* and *Astrophytum*

April 21, 2011 from 7:00 to 9:00 PM

Junior League Building, 2099 E. River Rd.

Ariocarpus and *Astrophytum* - For many people, these two genera are among the most interesting of the cacti. The plants of these genera, many of which are spineless, can look like artistic sculptures with white flocking variably displayed. These

plants produce striking flowers, and tend to be slow-growing which makes them attractive to collectors with limited space. Join us and share your experiences with them growing from seed, selecting/breeding new forms, display ideas, care through the year and problems you've experienced. This discussion is open to all of our members; please plan to come out and share your experiences with these interesting plants.

Dave Palzskill

April 2011

Ferocactus of the Month *Ferocactus pilosus*

by Chris Monrad

Spring brings a very showy (but smallish) flower and vivid spination in *Ferocactus pilosus*, native to the San Luis Potosi region of Mexico. The red spines are often very thick and robust in better specimens, many of which are readily available from our member nurseries. The spination quality is best when grown in full sun, although our piercing summer sun and low humidity can cause some discoloration of tissue and sunburn. A reasonable compromise is to place the plant on the extreme south edge of

the drip line of a Palo Verde such that the plant is in full sun most months of the year excepting three or four weeks on either side of the summer solstice. Older plants will often grow offsets. Specimens in my yard appear to have withstood the extreme cold of this winter, but I am aware of some casualties in other parts of town. In any event, this species is a must have for the *Ferocactus* aficionado.



Ferocactus of the month *Ferocactus pilosus* ssp. *pilosus*

Similar in form and flower to last month's *Ferocactus pilosus*, this month's *Ferocactus pilosus* ssp. *pilosus* is a form also native to the San Luis Potosi region of Mexico with markedly denser woolly spines and generally finer central spines (Photo 1.) Most of my plants have finished blooming except for a few late buds (Photo 2). This plant tolerates full sun better than its less furry brother due to its inherent

shading provided by the hairy fur. Planting locations from which the spines can be seen backlit by the sun later in the day offer excellent photographic opportunities (Photo 3). Photo 4 also includes a rare white spined specimen of *Ferocactus pilosus* to the right. Both forms and various intergrades of *Ferocactus pilosus* can be found at several of our members nurseries.



Photo 1



Photo 2



Photo 3



Photo 4

Ferocactus of the month *Ferocactus cylindraceus*

Ferocactus cylindraceus occurs throughout many regions of the Mohave desert and in the more arid regions of the Sonoran desert. Its extensive range includes Baja California, north through the Anza-Borrego area and the Mohave desert up to the Utah/Nevada/Arizona border confluence along the Colorado River, and also easterly to Phoenix as well as the Marana/Tortolita mountain complex. Flowering is generally in May and June and usually consists of yellow blossoms, although red flowers are seen in some populations. Spine colors seem to vary regionally from straw / pale to pink, red and a dark maroon color. The red spination gives the plant the common name of 'Fire Barrel'. The plants occurring in areas of 'more' rainfall (approx. 6 inches of rain per year) such as those in the Sonoran

desert seem to have wider spines but in a slightly less dense pattern (Fig. 1 and 2), while the Mohave Desert plants survive on 2 inches or less of rain per year. These specimens often have thinner spines in a very dense clusters, as if to provide the plant with its own built in shading systems (Fig. 3 and 4). The blossom size is often constricted by the density of the spines of the respective plant. This species is known to rot in local cultivation if overwatered, as it is quite well adapted to small amounts rainfall in its native ranges. (Local rainfall of 12 inches on average per year is well above that experienced in its normal habitat.) In any case, this species is a striking and care-free addition to local landscapes (Fig 5) and is readily available from many of our member nurseries.



Figure 1



Figure 2



Figure 3



Figure 4



Figure 5

July 2011

Ferocactus of the month

Ferocactus rectispinus

Ferocactus rectispinus is endemic to central Baja California, with Cerro Colorado and Bahía Concepción as renowned locales for sizeable populations. Suitable for full sun cultivation, it is well adapted for very modest rainfall and intense summer heat. Flowering season

can begin in late May and extends throughout the summer. The best clones will have long, straight spines from 6 to 10 inches in length with no curvature whatsoever. This species readily hybridizes and such plants can usually be identified by their arcing spines (figures 4 and 5).



Figure 1



Figure 2



Figure 4



Figure 5

August 2011

Ferocactus of the Month

Ferocactus pottsii

by Chris Monrad

Ferocactus pottsii is a summer bloomer and displays large yellow to peach colored flowers. Native to Chihuahua, Sinaloa, and Sonora Mexico, it will locally tolerate full sun despite its sparse spination and lack of self-shading. Though its spines

are not dense, they are very stout with interesting micro-ribbing. Our native desert bees are fond of this species and fruits readily set. This plant can be found at several of our member nurseries.



Three headed crested barrel

Photos by Ed Bartlett

On Sunday, July 24, 2011 several TCSS members rescued this large crested barrel from the Granite Company site. The 3 headed barrel was located by Chris Monrad during a survey

of the property. The plant was a truly amazing find and it took 5 people to load into the transport truck.



September 2011

Ferocactus of the Month

TCSS Golden Fishhook

by Chris Monrad

It has been ten years since the TCSS Cactus Rescue Crew found its first specimen of a golden spined and vivid yellow flowered version of our native *Ferocactus wislizenii* at the 700-acre Saddlebrooke rescue site. Nearly 200 of the offspring from this rare plant (and four other similar plants found by the Cactus Rescue Crew from 2002 thru 2006) have now found their way into public landscapes around Tucson.

Five year old specimens, many of them in flower in August as this was written, can be found in planters surrounding the Pima County Superior Court Building, the Jewish Community Center, and the two new University of Arizona dormitory complexes at the northeast corners of Sixth Street and Euclid and Sixth Street and Highland.

The five year old plants exhibit the hand-pollinated heritage of their parents with robust golden spination as well as large bright yellow buds and flowers that can be seen from the public roadways and viewed even better from the adjacent sidewalks.

Known to be extremely frost hardy and fast growing with far showier buds, flowers and fruit than the non-native 'Golden Barrel' (*Echinocactus*

grusonii), it is hoped that the TCSS Golden Fishhook will become the golden-spined barrel cactus of choice in Tucson landscapes.

Extremely limited quantities of this form may be available at selected member nurseries, but many more plants are in production and should be in the market in the coming years.

My utmost appreciation and a big 'Thank You' is given to all of the TCSS Cactus Rescue Crew volunteers, developers, contractors, design professionals, municipalities, and school districts that have sustained the Cactus Rescue program since its inception in 1999, Mike Reimer at the AZ Dept. of Agriculture, the various nursery-men and women that have offered advice and produced numerous seedlings over the years, and to the TCSS Board that helped to support the widespread promotion of this plant since I developed this crazy idea about six years ago.



October 2011

Ferocactus of the Month: *Ferocactus peninsulae ssp. viscaiensis*

by Chris Monrad

Native to Baja California, its form is reminiscent of *Ferocactus wislizenii* but its spination is much more consistent from plant to plant with regard to robust and striking central fish-hook spines. The white radial spines are also 'well organized' and symmetrical, almost looking painted on due to their uniformity. Its

deep red flowers are known to be large, as are the buds. Its blooming season closely mimics *Ferocactus wislizenii*, with flowering extending into late September and early October. It is cold hardy and will tolerate local full summer sun. This species can be found for sale at selected member nurseries.



Good Time Silent Auction... Fun for All!

TCSS volunteers really know how to pull off an event in short order. A little planning helps, but members just show up and it all gets done in no time. We had 189 Silent auction items for bid as well as hundreds of \$2, \$5, and \$10 plants/pots and many, many free plants, cuttings, pots and plant stands that disappeared in a few minutes. There were 80 Bid numbers issued and almost everyone went home with one of their choices. The free ice cream served up with many toppings to choose from as well as prickly pear sorbet were big hits as always, as evidenced by the 200 plus cups served.

Our gross sales income was about \$4,300 and after expenses we netted about \$3,400. A special thanks to Norma Beckman's family for making many of her plants available to the society as well as Paul Cook who had to significantly cut back on his collection. Profits from the sale of Norma's plants will be used for her memorial fund and other profits will be used for Pima Prickly Park development.

Joe Frannea



Ferocactus of the Month:

by Chris Monrad

A hybrid of uncertain heritage, this specimen has vivid red-orange flowers reminiscent of *Ferocactus pilosus*, but its thick,

straight spination and fall flowering season is not consistent with *F. pilosus*. This plant blooms from October into November.





President's Message

What do you want to do? What do you want to know? What do you want to take part in? What do you want to see and hear at meetings? What new project should be started? What changes would make our monthly meeting better? What else?

I am always listening for new answers and want to hear from you. This Society has a lot on its plate. We really try to engage in numerous activities so that there is something for everyone's interest. Vonn Watkins, our VP and program chairman has arranged 100s of presentations and is always interested in new speakers and program ideas.



In this upcoming year our focus will include a substantial effort for Sonoran IX. The Sonoran Conference is a mixture of speakers, workshops, a cactus and succulent plant show, vendor sales, silent auction, lunches, dinners and much more. The date is April 28 & 29 with set-up on April 27. Your input and help is always needed and there will be planning meetings on all the aspects in early January. The information will be in the January newsletter.

Pima Prickly Park will consume a great deal of our effort. Although, this is a long term project, we need to make substantial progress each year. The projects we hope to start next year are improvements to Saguarohege, an Agave garden, the entrance WOW garden and an Opuntia test garden. All of these projects are long term. Ten year from now we will be very proud

of our efforts and glad we started them early. There are limited funds and so fund development will be very important as will grant writing. If these topics are your specialty please help us.

I hope many of you are growing plants for the Garden and soon we will be able to receive these plant from you and take care of them on site. There will be an opportunity to work with many plants in our new growing facility at the Garden. We should have it up and running in January.

In January we will have a library site at the Junior League building to house our lending collection and make it much easier for our librarian Joie Guinta. As you know she has had to bring suitcases of our books to every meeting. We are all looking forward to this project being completed.

Our rescue program is well over 50,000 rescued plants and is the backbone of our positive activities to save many Sonoran Desert plants. The program continues to grow in spite of the down turn in the economy. Our reputation is well known for performing rescues in a safe, legal and effective manner. Thanks to all of you who participate and maintain our excellence is this area.

You can take part in many other activities of the society. We will have our regular monthly meetings, spring and fall round table discussions, Sarsef and Funfest activities, September Good Time Silent Auction, Board and Committee meetings and more. Hope to hear from many of you.

Thank you.

Richard Wiedhopf, President

Ferocactus of the Month

by Chris Monrad

December 2011

Ferocactus latispinus is native to San Luis Potosí, Mexico and is well known for its vivid purple blossoms and ability to flower at a fairly small size. Typical blooming period locally is from late October through December, it is a key species to own if you want to have a Ferocactus in bloom every month of the year. It is suitable for container growth or in the ground, generally hardy into the mid-20's with no rib damage.



Photo courtesy of www.wellgrowhorti.com

TCSS Events of 2011

The garden tour committee consists of Patsy Frannea, Ed Bartlett, Nancy Reid, Rim and Marija Tallet-Kelpsa, Robert Ellis, and Bill Salisbury, chairman.

In 2011 there were two very successful tours. The spring tour in April was at Robert and Donna Ellis's garden. The fall tour in Oct. consisted of 8 members gardens. Both tours had over 125 members and guests visit these gardens. The committee thanks all the garden owners and the many volunteers that made these tours such a success. The next tour has been scheduled for Sat. March 31, 2012. More information to follow.

Bill Salisbury

Article series "Growing in the Desert"

This was the second year of the newsletter article series "Growing in the Desert". The first year's articles were written mostly by Mark. 2011 was a 12-month series on ferocacti by Chris Monrad. Mark will resume authoring and cajoling contributions in 2012.

In April Mark was interviewed on KUAT's Arizona Illustrated about the big freeze and TCSS. The story is in the AZ Public Media archive at www.azpm.org/news/story/2011/4/13/1830-facing-the-freeze-facts/

Mark Dimmitt

January 2012

Growing in the Desert Series Coping with Wet Winters by Mark Dimmitt

In early 2011 Southern Arizona gardens suffered from a hard freeze, the worst since 1978. Now we have to deal with another potential problem that we haven't seen for a couple of decades – a very wet winter. Weather statistics fail to capture the issue. 2011 will go down as a barely above average rainfall year. Even if you look at the totals for November and December, neither of these months was anywhere near setting a record. The problem was in the frequency of storms. It rained at least once a week for seven weeks. Biologically that is very wet, because the soil has been continuously moist for all that time.

Roots, like all plant tissues, require oxygen for respiration. When soil is saturated, all the air is displaced by water, so respiration becomes impossible. There is usually no problem for plants in the ground. Rainwater percolates downward, and in non-clay soils the root zone does not remain saturated for more than a couple of days. Potted plants, though, are in danger; water cannot percolate beyond the bottom of the pot. After a heavy rain or irrigation, the bottom few inches of the potting medium remain saturated until the water evaporates or the roots absorb it and the plant transpires it. But many of the cacti and other succulents we grow are winter-dormant; they have minimal metabolic activity during the cooler months. In addition, there isn't much evaporation when the weather is cool. After several days without air, roots suffocate, die, and then rot.

The best solution to drowned roots is prevention. Plants can be kept under a rain shelter while they're dormant. If grown in the open, make sure that the potting medium is very well drained. In my opinion, most collectors whom I've visited use dangerously tight potting media. Most commercial growers also use very tight media. They have valid reasons: 1. Many of their plants are under cover where rain is not a problem. 2. They can't afford the additional time and cost of irrigating hundreds of thousands of plants in coarse media. That's the only negative – the coarser the medium, the more frequently plants must be watered during the growing season. Collectors,

however, should be more concerned with the long-term survival of their cherished specimens than how often they have to water. Remember: succulents are better adapted to drought than to soggy roots.

An important side note: Placing a layer of coarse material such as rocks or plastic peanuts in the bottom few inches of a pot does NOT improve drainage; it makes it worse! This is a law of physics that cannot be broken. Water cannot move from a finer textured medium into a coarser medium until the bottom of the upper layer is saturated. So a layer of coarse material beneath a regular potting mix simply moves the saturated layer higher in the pot, closer to the base of the plant and thus increasing the danger of rot.

If you have a succulent that is rotting at the base, unpot it immediately, wash off the medium, and cut off dead tissue. Consider treating the cuts with a fungicide such as dusting sulfur. Store the plant upright in a dry place until its growing season begins. Then repot and hope for the best. And before you repot, consider changing your medium.

I couldn't find a rotting succulent among my several thousand potted outdoor plants to illustrate this article. Three years ago I changed my potting medium to one that is at least half coarse coir. (Coir is coconut husk. For succulents it must be nearly all fiber with no dust. The fine grade that looks like peat moss is deadly; it stays soggy for days after watering.) Drainage of fibrous coir is superb. It holds lots of moisture, but is impossible to saturate; the medium is well aerated immediately after watering. Since I began using it, I've had almost no root rot. In fact, the only plants I've lost in this mix are two *Caralluma socotrana*, which are notoriously sensitive to root rot.

A final note: Winter-growing plants like most *Crassulaceae* and aloes are prone to rot if they're too wet during their summer dormant season.



President's Message

Please read the Education Outreach article. John Swarbrick and his dedicated committee do so much to enrich this society in the eyes of the community that it is important when he asks for more volunteers, we step up. Contact John and see how you can help. Please!

In mid February you will receive in a separate mailing all the details and registration materials for Sonoran IX. This is a 2 day event that includes our only

plant show of the year, a multi-vendor sale of plants, pottery, books, art, a great silent auction, a special dinner and program presentation, plus a conference with great speakers and workshops of interest. The Conference has a registration fee and includes 5 speaker, 4 workshops of your choice, lunch and dinner on Saturday, April 28 and lunch on Sunday, April 29. The Saturday night dinner and speaker is specially priced for all members and guests not registered for the conference.

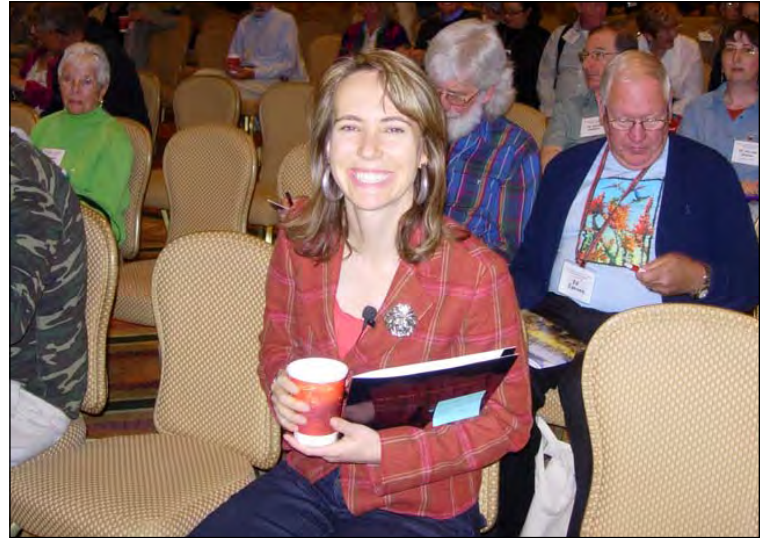
We all need to get our plants ready for the show and silent auction. We want Tucson to "Know What We Grow". I hope this will be the largest display of cacti and other succulent plants that we have presented. For large plants we will have 2 trucks to pick-up on Friday, April 27 and return them on Sunday, April 29. We will need volunteers as drivers and helpers. We will also need a bunch of volunteer for all aspects of the Sonoran Conference and these will be explained in the mid February mailing.

I am especially pleased that Arizona Illustrated featured Pima Prickly Park (PPP) on their Wednesday, January 18 program. A link to the program is on our website. In cooperation with our good friends at the Pima County Natural Resources, Parks and Recreation (NRPR)

more and more changes to this 9.4 acre parcel are happening. It is changing in front of our eyes. You are always welcome to join us at our PPP meetings on the 1st Tuesday of every month at 7pm at the College of Pharmacy, Drachman Hall Room A326. Visit PPP and let us know how we are doing.

Finally, a non-partisan thank you to Congresswomen Gabrielle Giffords for her support of our Society. I found a great picture of her from the CSSA 2009 convention as she was waiting to give the opening remarks.

Thank you,
Dick Wiedhopf, President



Education Outreach Continues to Grow

Our Education Outreach Program, with the Let's Build A Cactus Model exercise as the flagship, continues to snowball. In January TCSS participated in the Beyond Tucson event at Reid Park, participated in a school science night at Senita Valley Elementary School in Vail and provided model kits for a Plant Science Night at Wright School. In February we will participate in our big event of the year – the Math, Science and Technology Funfest at the TCC on Thursday and Friday 16 & 17 Feb. This will be our fourth year at Funfest. We have again been invited to the Cochise College "Experience Math and Science" event in April for the third year and the Pima County Parks and Natural Resources Earth Day Event at Agua Caliente Park also in April. This translates to approximately 1500 kids going through our model building exercise – and we are only one month into the year! We are also in discussions with the Arizona Sonora Desert Museum wherein TCSS will provide model kit materials and instructor training so that they can incorporate the cactus model in their Docent School Outreach Program. Our Cactus Model exercise has also been adapted by the U of A Extension as part of their Rainwater Harvesting teacher lesson plans website (see extension. arizona.edu/catchtherain/pgf/rainbarrelcactus/pdf). With the exception of the repeat events, all of these opportunities came up because the event organizers came to us, TCSS, not because we contacted them. What this means is that TCSS is becoming known and recognized as a significant community education resource. We can and should be proud of this but it does not come without a challenge. We need more volunteers to help assemble the model kits and to staff the booths at these events and lead the kids in the model building exercise. We have had a very dedicated cadre of model building volunteers to support the program in the past but as the number of events grows we can't always lean on this same group. So... if you believe that education outreach is a key part of the mission of TCSS, as the Board and many of us members do, please consider signing on to be part of the model building team. Our immediate need will be to staff the booth at Funfest. There will be 2 shifts (9am – 11am and 11am – 1pm) on both days. Please see me at the February monthly meeting or contact me at funfest@tucsoncactus.org.

John Swarbrick

February 2012

Growing in the Desert Series Plant Agaves During Cool Weather

by Mark Dimmitt

Most agaves are not desert plants. The great majority of species grow in higher, cooler habitats (Figure 1). When planted in the hot desert, they grow mainly during the mild weather of spring and fall. They are quiescent during peak summer heat and during the cold of winter. The milder weather is also the best time to select and plant out agaves in desert climates. They need time to establish and be ready for the summer heat.

Mark Sitter of B and B Cactus Nursery learned this from some of his snowbird customers who have had problems. They bought and planted agaves in their landscapes in late April, just before leaving for the summer without intention to water them. Under these harsh conditions, even nearly indestructible agaves will fail to thrive, and may even die. Even with watering, summer-planted agaves tend to languish until fall.

Agaves in the landscape should be watered mainly during spring and fall. It is okay to withhold water during summer heat and winter cold, when most won't grow much anyway. Many species will fold their leaves



Figure 1. Huachuca agaves grow mostly in the oak-pine woodlands in the mountains of southeastern Arizona. Nonetheless, this species will adapt to full desert sun. Some agaves need afternoon shade in the desert to look their best.

vertically, reducing heat load and water loss (Figure 2). This is normal, not something to be concerned about.

Before the 1990s, few agaves were available except *Agave americana*. It gave the genus a bad reputation among gardeners; it's much too large for most residential landscapes. In the past couple of decades numerous smaller and more attractive agaves have become widely available in succulent nurseries. Standard nurseries carry several of the most popular types. Huachuca agave (Figure 1) is one of them. Its relative *A. parryi truncata* (artichoke agave) is even more beautiful (Figure 3). It is being mass-propagated by tissue cultured and is becoming common in Southwestern landscapes. The very compact rosettes grow to about two feet across, and slowly form large colonies. They rarely flower.

Agave victoriae-reginae (Queen Victoria agave, Figure 4) is a gorgeous plant with very rigid leaves marked with strong white lines. The regular form grows to about two feet across, and the compact form only one foot in about ten years.

Agave 'Blue Glow' is stunning when the red edges of the blue leaves are backlit by late afternoon sun (Figure 5). It was introduced by Edward Hummel, and is probably a hybrid between *Agave attenuata* and *A. ocahui*. The non-offsetting rosettes grow to about two feet across.

The most recent agave introduction is *A. ovatifolia* (whale-tongue agave, Figure 6). Although it had been in cultivation decades earlier, Gregg Starr rediscovered it in habitat and named the species in 2002. The very broad leaves form a striking rosette four to six feet across and less tall in only five years; it does not offset.

Agave bovicornuta (cowhorn agave, Figure 7) is a non-offsetting type with rich green leaves and yellow to cinnamon reddish, hooked marginal teeth that resemble the horns on a cow. Plants can get 2-3 feet tall by 3-4 feet across. Place it under filtered light for best appearance. It can be damaged in cold Tucson winters.

Don't plant agaves for their flowers. While those of some species are very showy (Figure 8), it takes 10 to 20 years in cultivation for a rosette to mature. Then it dies. Landscape architect Carol Shuler recommends planting penstemons with agaves, because they have the same watering needs. The penstemons provide splashes of color in the spring. The rest of the year the penstemons are inconspicuous, and the agaves beautifully fill the garden space. Greg Starr of Starr Nursery also recommends planting other perennials and small desert adapted shrubs along with agaves, including *Baileya multiradiata*, *Calliandra eriophylla*, *Chrysactinia mexicana*, *Ericameria laricifolia*, *Glandularia gooddingii*, *Salvia greggii*, and *Tetranneuris acaulis*.



Figure 2. Left: Summer heat and drought causes the rosettes of *Agave deserti* to close up. The vertical orientation and tight clustering reduce heat load and water loss. Right: The rosettes of the same species open up during cooler, wetter weather. This is one of the few agaves native to desert habitat.



Figure 3. *Agave parryi* var. *truncata* is even more compact than Huachuca agave.



Figure 4. *Agave victoriae-reginae* has been in cultivation for several decades. This more compact form is a more recent introduction. It's slow-growing and offsets sparingly.



Figure 5. *Agave* 'Blue Glow' is especially beautiful when backlit. Also known as *Agave* 'Edward Hummel'.



Figure 6. *Agave ovatifolia* (whale-tongue agave) is a very attractive and fast-growing new introduction.



Figure 7. *Agave bovicornuta* is greener than any of the other agaves in this article. Photo: Greg Starr.



Figure 8. Left: *Agave pelona* flowering at age 20 years from seed. That was in cultivation with ample watering. It probably takes twice as long in its desert limestone habitat. Right: Huachuca agave inflorescence from a 15-year-old plant, with two woodpeckers and an oriole drinking the abundant nectar. After all this time to mature, the flowering period lasts only about a month.

Library

If you were at January's meeting you saw the new library area. With thanks to Joe Franea we now have permanent library storage at the Junior League. In the next few meetings, the books that have been in storage will also be added to the library. They will be covered and bar-coded before going into circulation.

Jason Eslamieh left a copy of his book "**Cultivation of *Boswellia***" after his talk in September. After a brief introduction, the book covers the care, cultivation and propagation of the genus. The second section covers the various species and their care, along with color photos. It is well written and organized.

Growing in the Desert Series

Cleistocactus strausii (Woolly Torch)

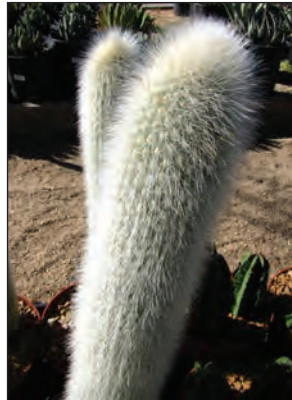
by Mark Dimmitt

Of the many white-spined cacti available in cultivation, *Cleistocactus strausii* is one of the best for southern Arizona. Known as silver torch or woolly torch cactus, this native of montane Bolivia and Argentina is well adapted to both the heat and cold of our desert valleys.

Several to many columnar stems arise from the ground and can grow to about eight feet tall. The dense bristly white spines nearly completely conceal the stems. The narrowly tubular, deep red flowers

are borne freely near the tops of the stems from February into May in our climate, and are visited by hummingbirds.

This species is large and vigorous enough to be used as a landscape subject, either in the ground or large pots. Light afternoon shade is best in the desert. Hardy to at least 20 F, and even lower when sheltered by a tree or other overhang. They appreciate regular irrigation in summer, and should be kept dry in winter to prevent root rot.



Pima Prickly Park Shade Structure Goes Up

A group of 13 TCSS volunteers showed up early Sunday morning a couple of weeks ago to erect our hoop house shade structure. The twelve all metal tubular hoops span thirty feet arching up about fifteen feet in the air and stretching out sixty-six feet. The structure will have a 30% blockage shade cloth placed over the hoops to allow cactus and succulents to be protected prior to planting in the park. The dirt floor will be covered with a weed cloth barrier and then three

inches of pea gravel on top of that. This will also be a good facility to let cuttings grow and mature before planting in the park landscape. We have a fast moving slide show on our web with more construction photos, just click on the Pima Prickly Park link on the left side of the TCSS home page or click on this link to go straight to the Pima Prickly Park hoop house construction photos. http://www.tucsoncactus.org/html/pimapricklypark/hoop_house_construction.html



Acknowledgement of Contributions

The names below represent the Tucson Cactus & Succulent Society members and friends whose donations helped make this year a success. We extend our sincere thanks for your support.

Pima Prickly Park

Robert Pittman
Cirrus Logic

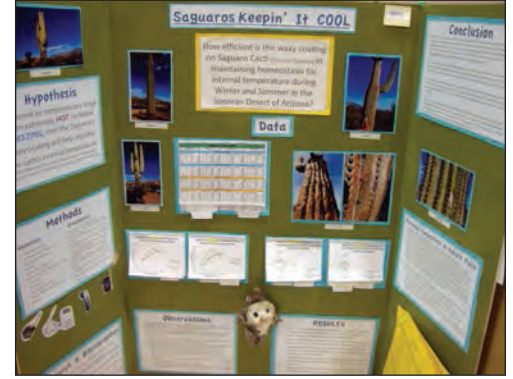
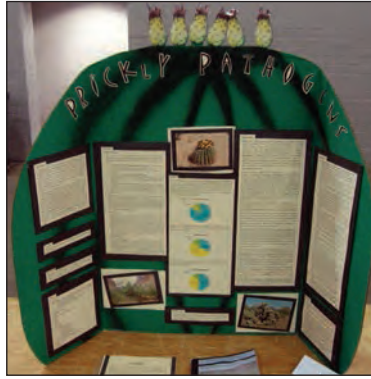
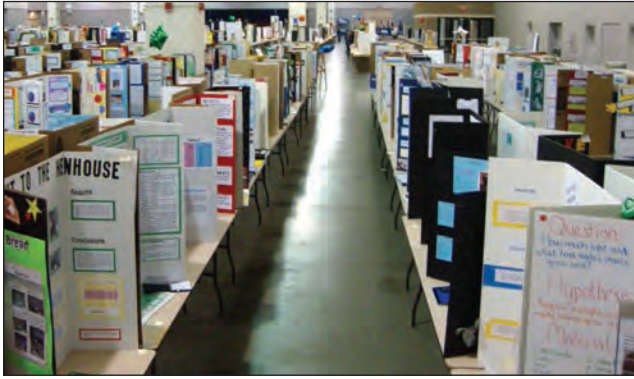
Educational Fund

Michael Burnett
Nanette Burnett

General Fund

John Rivers
Jocelyne Rivers
Shirley Johannesma (plants)

Science Fair Students Shine Again



TCSS was once again treated to some great experiments related to cactus and succulents. Over 1,600 projects were exhibited at the Tucson Convention Center for judging. These are the top ten projects from many schools across Southern Arizona. We have been judging the Southern Arizona Regional Science and Engineering Fair (SARSEF) for our special awards category of cactus and succulents for the past nine years. Our mission is to recognize and encourage students to pursue science, especially areas related to cactus and succulents. We gave cash awards, certificates, and one year honorary TCSS Family Memberships to seven students.

We had two great projects that were both given First Place awards, \$100 cash. Wes MacDonald and Alexia Avey's project was on "Prickly Pathogens". This was an expanded project from last year with much more depth and a lot more science. Cactus spines often have pathogenic microbial species on them that are injected when you get

stuck and can cause serious injury. Some of our Cactus Rescue Crew members can attest to this. Our other First Place winner was Lilyann Dean on "Saguaros Keepin' It Cool". She was curious about the internal temperatures of saguaros with varying outside temperatures. Great work and interesting results.

Second Place, \$75 cash, was awarded to Bryce Harris for his "Saguaro Arm Directions" project. Third Place, \$50 cash, to William Rockwell for his "Does Prickly Pear Juice Lower The Need For Insulin In Humans?" Honorable mentions, \$25 cash, were awarded to Olivia Nanni for "Crassulacean Acid Metabolism And Stomata Area", Meena Ravishankar for her "From What Age Will Saguaro Cacti Have Bird Holes?" and Alejandra Jose and Craig Thomas for their "Famous Cacti Syrup And Their Sugar Concentration" project. Thanks to our judges Ed and Linda Bartlett, Wendell Niemann and Marty Harow.

April 2012

Growing in the Desert Series: Waking up Adeniums

by Mark Dimmitt

Adeniums are succulents related to pachypodiums, plumerias, and oleanders (Figure 1). They are the newest ornamental plant to be domesticated (the process began only 20 years ago), and their popularity is growing rapidly. They are easy to grow if their cultural needs are understood and provided for. Spring is one of the critical times during which many adeniums and other winter-dormant tropical plants are lost.

Whether they have leaves or not, adeniums are dormant over the cooler winter months, meaning that their growth – and therefore water use – has been minimal to zero (Figure 2). Even if they have been blooming throughout the winter, they have still been dormant. The warm weather of April in the desert Southwest causes them to wake up and resume growth. Adeniums need heat to grow, so they should be moved outdoors into the sun this month.

Although spring days may be warm, nights are usually still in the 40s and 50s F, which is still in the danger zone for adeniums. Moreover, spring brings several cold fronts with cold days and may drop nights to near freezing. Adeniums HATE cold, wet roots. The awakening proceeds slowly, and watering properly is critical at this time. The plants don't use much water until nights are above 60, and if the potting medium stays wet for several days, the roots are likely to rot. As long as nights are below 50, water only to wet the upper couple of inches of medium (many of the roots are near the surface). Water thoroughly only if several warm days are forecast, and withhold water if a cold front is approaching. Wait until the medium is fairly dry before watering again.

Once the days are hot, nights are consistently balmy, and the plants have lots of mature leaves, you can increase watering frequency and depth. By mid to late May, adeniums with roots filling their pots can be watered heavily every couple of days. They love water when it's hot.

It is normal for some branches to die over the winter. Spring is a good time to groom the plants. Pull off dead, dried branches (Figure 3) and prune any leggy growth to produce a more compact, more branched plant (Figures 4a-4c).



Figure 1. Adenium 'Starfish', one of many striped cultivars to be created since 2003.

Figure 2. This Adenium arabicum X obesum hybrid is just beginning to leaf out after winter dormancy. It is using very little water and should be watered sparingly until days are hot and it has a full canopy of foliage.



Figure 3. Left: A branch has died and dried, forming an abscission layer. Right: The dried branch can be pulled off; it will break cleanly between the dead and live tissue.

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April Refreshments

Those with family names beginning with J, K, L, M, N, O,
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3

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April 2012

Thursday, April 5, 2012 7:00pm

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Chuck Hanson

Tuesday, April 10, 2012 7:00pm - 9:00pm

Board meeting at the U of A College of Pharmacy

Saturday and Sunday April 28 and 29

Sonoran IX at the Hotel Tucson City Center

**Growing in the Desert Series
Waking up Adeniums by Mark Dimmitt**



Figure 4a. This old 'Crimson Star' has many crowded, overlapping, and droopy branches. It looks messy.



Figure 4b. After pruning, the plant's attractive branching structure is more visible. New growth will be vigorous and will flower better.



Figure 4c. The same plant flowering the summer after it was pruned.

Growing in the Desert Series: *Caralluma russelliana*: The King of Stapeliads

by Mark Dimmitt

Of the many species of stapeliads in cultivation, *Caralluma russelliana* is the most massive (Figure 1). The four-angled, blue-green stems are up to three inches thick and two feet tall. Plants branch freely and form a rather large shrub, creating a sculptural marvel that looks more like a sea creature than a land plant. Tennis ball-sized globes of small reddish-black flowers appear sporadically on stem tips throughout the warm season (Figures 2, 3). Like most stapeliads, the flowers stink of carrion, but the odor does not waft more than a few inches. The species is widespread in the arid lands of East Africa and the Sahel. Synonyms include *Caralluma retrospecticiens*, *Desmidorchis acutangula*, and other combinations of these names.

This species loves heat and sun. However, stems will sunburn in our desert in full summer afternoon sun. They are intolerant of cold. While they can survive near-freezing temperatures, the stems are prone to develop unsightly brown blotches when nights are below 50-55 F. Keep the plants dry in winter to avoid root rot.

Seedlings grow very fast. They can attain full size in two or three years if planted in large pots and watered and fed generously. This is safe if the medium is fast-draining. The roots are prone to rot if the medium stays wet for a few days. Plants seem to be short-lived. Growth slows greatly after the first few years, and few plants survive 10 years in good condition.

The massive stems are heavy and rather brittle, especially where the thin base merges with the roots. Plants can be supported by planting them deep, or using several inches of rock top dressing. Even so, it is best to avoid moving them once they become large.

Considering how ornamental this species is, there is very little information about it on the web except for numerous articles about its chemistry. The stems contain pregnane glycosides that are being investigated for possible medicinal properties.



Figure 1. These three *Caralluma russelliana* plants are just two years old, and one is beginning to flower.



Figure 2, 3. The capitate inflorescence of *Caralluma russelliana* bears over 100 small flowers. They last about a week. Plants bloom several months a year.



Hotel Tucson City Center InnSuites Conference Suite Resort, located at 475 North Granada Avenue, Tucson, Arizona. This hotel is just off of Interstate 10 near St. Mary's Road in downtown Tucson, Arizona.

The Sonoran IX conference program presentations will focus on the family Opuntioideae. The Tucson area is blessed with a great climate and also has a number of native *Cylindropuntia* (cholla) and *Opuntia* (prickly pear). The number of *Opuntia* species grown within

Tucson and the surrounding areas would astound you! The TCSS has gained a great asset to growing and protecting these fantastic and amazing plants with an agreement with Pima County, Arizona to establish, manage and maintain a 9.4 acre garden in Tucson that we have named "Pima Prickly Park"! This park will be dedicated to the Opuntioideae but will also include many other varieties of cacti and other succulents.

The Opuntioideae subject will feature 5 excellent program presentations from some very well known professionals. Professionals for this conference will be, **Peter Felker**, presenting "Opuntia Hybridization and Selection for Choice Fruit Production," **Cheryl Green** and **David Ferguson**, who will be introducing the new *Opuntia* book with a special program presentation, "The Pricklypears of the United States and Northern Mexico," Lucas Majure from the University of Florida who will present his research and findings about "The Opuntias in the Eastern United States," **Raul Puente** from the Desert Botanical Garden in Phoenix, Arizona who will give us an exceptional look at the "Spiny Giants: Arborescent Prickly Pears of Mexico and Guatemala," and **Jon Rebman** from the San Diego Natural History Museum who will share his expertise on "The Diversity of Baja California with an Emphasis on the Opuntioids." If you register for the conference you will get to attend all the speaker presentations as well as 4 workshops of your choosing from 8 excellent workshop selections. Our 8 workshop program leaders will be **Scott Calhoun**, **Norm Dennis**, **Mark Dimmitt**, **David Ferguson**, **Jim Hastings**, **Gene Joseph**, **Barry McCormick** and **Greg Starr**. Please visit our web site for more details about the workshops.

All registrants will also receive 2 buffet lunches and the banquet dinner on Saturday evening. Please see the event schedule on our web site for further details on the conference.

Growing in the Desert Series: *Selenicereus macdonaldiae* : The Champion Cactus Flower

by Mark Dimmitt

Selenicereus macdonaldiae is one of scores of cactus species with the common name “night-blooming cereus” and “queen of the night”. This species is reputed to have the largest flowers in the cactus family; they spread 13 inches across and a foot and a half long. The huge flower is doubly stunning because it emerges from such scrawny stems.

The stems are only about a half inch in diameter, and are studded with sparse spines that are just strong enough to be annoying to handle. The weak stems grow up to four feet a year, branching occasionally. In nature the stems climb trees, clinging by adventitious roots. In cultivation stems need to be tied up to keep the plant manageable. In several years a large tangle of stems will form.

The huge flowers appear in several waves over a period of three to four weeks in late May and June. They are rather sparse; even a large plant will produce only two or three in a night. Many delicate white petals

are surrounded by a crown of thin yellow sepals. The flowers open at dusk and begin to wilt as soon as the sun hits them the following morning.

This species should be grown in filtered sun and protected from frost. Training it against a north- or east-facing house wall under the eaves should be sufficient protection in most years in Tucson. Cuttings root easily and will begin to flower in two or three years.

There are several other species of *Selenicereus*, with flowers ranging from as large as those of *S. macdonaldiae* to only a few inches wide. *Selenicereus grandiflorus* flowers are reputed to reach 15 inches across, but mine have not been that large. A couple of the small-flowered species are frost-hardy. *Selenicereus (Cryptocereus) anthonyanus* has *ric-rac* stems and the flowers have dark purplish-red sepals that starkly contrast with the white petals.



Growing in the Desert Series: *Thelocactus bicolor*: Again and Again and Again

by Mark Dimmitt

The majority of cactus species have distinct and rather short flowering seasons, usually less than a month per year. *Thelocactus bicolor* (glory of Texas, Texas pride, Figure 1) is a sterling exception. The three-inch wide brilliant pink-with-red-center flowers appear in response to watering, as often as every ten days or so throughout the hot season. In southern Arizona that's April through October. Each flower lasts two or three days. That adds up to a lot of bloom time.

The plants are quite attractive too, and there is considerable variation in body size and spine color and density (Figures 2, 3). Add to that the

variation in flower shade (Figures 4, 5) and one could easily fill a bench with a collection of different forms.

The solitary to sparsely-branched plants are small enough to fit several in a 12-inch pot, or 20 or more in a larger pot. If they're watered well after a couple of dry weeks, they will flower synchronously (Figure 6), often with three to five flowers per stem (Figures 1, 4).

Glory of Texas can be adapted to full sun in Tucson, in which case the stems will be compact with very dense spines. They are also fully winter hardy here.



Figure 1. *Thelocactus bicolor*, glory of Texas. This is the most common stem and spine form.



Figure 2. *Thelocactus bicolor*, a tall-stemmed form with long, bristly spines.



Figure 3. *Thelocactus bicolor*, a thick-stemmed form with comparatively few, stout spines.



Figure 4. *Thelocactus bicolor* with flowers of a lighter pink than average.



Figure 5. *Thelocactus bicolor* with large, dark flowers.



Figure 6. Several plants of *Thelocactus bicolor* in a community pot flowering simultaneously.

June Pima Prickly Park Update

- Hoop House plant benches design completed and 12 benches are being constructed, each 4 ft. by 8 ft. surface and 20 inches off the ground. Construction is cement block bases and wood frames with a wire grid covering for the tops. Cost is \$32 each.
- The concrete bench design has been completed. Plans are to construct three of the 44 inch long, 18 inches high and 16 inches deep benches under the large ramada. They will be a light earth tone color, formed and poured in place. Cost is \$55 each.
- Three to five large saguaros to be relocated from a Pima County road widening project for the parking lot islands then smaller plants can move in.
- Entrance Garden and the Agave Garden designs are progressing. Ideas welcomed.
- The first forty chollas were planted in the Cholla Forest area of the park.
- A watering crew has been organized and regular watering schedules have been implemented for both propagation plants in the hoop house and newcomers planted in the park.
- Plans continue for the "Grand Opening" event for the park, Saturday, September 22, 2012 from 9:00 AM to 2:00 PM. Lots of events being planned. Ideas welcomed.
- You Can Help! Park Supporters are being encouraged to plant special cactus cuttings in one gallon containers, especially purple prickly pear, for eventual donation to the park. Please do not bring them until they are well established.
- Want to participate and help with park decisions? Please send an email to us (Park@TucsonCactus.org) to be added to our committee list to be notified of meetings, decisions to be made, work in progress, etc.

***Echinocereus brandegeei*: Another Exception to the Rule**

by Mark Dimmitt

In the natural world there are almost no absolute rules. No matter how consistent traits may be within a group, there is almost always at least one exception. That's why biology is filled with modifiers like almost all, most, typically, and usually. (See how many qualifiers you can find in this article.) The genus *Echinocereus* provides examples. Its 70-some species – most of which are called hedgehog cacti - can be recognized by certain diagnostic characteristics. Most species grow as dense clusters of upright stems, but some have sprawling or solitary stems. Most but not all are densely spined. Most have brilliant pink or purple flowers with green stigmas in spring. In most species the buds don't emerge from the areoles; they rupture through the stem above the areoles.

What's different about *E. brandegeei* (Figure 1)? It doesn't follow the usual habit of the genus of flowering in spring. It blooms from late July into September. The species is common throughout the southern half of the Baja California Peninsula. The summer rains there typically

begin in August, later than in the rest of the Sonoran Desert Region. The flowers are fairly consistent throughout the range: about three inches across, bright pink with deep red petal bases (Figures 2, 3). And oh, yeah; the stigmas are yellow, not green.

The stems are highly variable in different populations on the peninsula. They range from short and erect to long and sprawling (Figures 4, 5). The spines are even more variable, ranging from long and thin to short and stout, and yellow, reddish, brown, or whitish. Where the plants occur with *Grusonia invicta* (= *Opuntia invicta*, Figure 6), the spines tend to be the shortest and stoutest. This may be a case of convergent evolution.

This hedgehog is easy to grow in the desert. It tolerates full sun and does well on southern Arizona rainfall, which is higher than in most of its natural range. It will be damaged in the open by temperatures below 20 degrees F. Unfortunately, it is difficult to find in nurseries.



Figure 1. A larger than average specimen of *Echinocereus brandegeei* near El Arco, Baja California. Its succulent companions in this frame include *Euphorbia lomelii* (formerly *Pedilanthus macrocarpus*), *Bursera microphylla*, *Stenocereus gummosus*, *Pachycereus pringlei*, and *Yucca valida*.



Figures 2 and 3. The summer flowers of *Echinocereus brandegeei*.



Figure 4. A specimen of *Echinocereus brandegeei* with long, yellow spines at Bahía Concepción, Baja California Sur.



Figure 5. A specimen of *Echinocereus brandegeei* with very stout spines near San Ignacio, Baja California Sur. At this location it grows intermingled with *Grusonia invicta* (Figure 6).



Figure 6. *Grusonia invicta* (shown here at San Ignacio, BCS) and *E. brandegeei* look remarkably alike where the two species co-occur.

Growing in the Desert Series: Time to pay attention to winter-growing bulbs.

by Mark Dimmitt

Whether or not bulbs are true succulents, people who collect succulent plants tend to be attracted to bulbs too. If you have a collection of winter-growing bulbs, you probably put the barren pots away at the end of spring, out of sight and sheltered from summer rains. September is the time to remember where you stashed them and prepare them for their coming growing season. It's also time to order any new ones you want to try. Most winter bulbs are activated by cooling nights and soil moisture. They may not show above ground until late October or November, but the roots began to grow a month before you see green. The following task list applies to the great majority of winter bulbs:

1. If the bulbs have multiplied and become crowded, future flower spikes will be stunted. Unpot and divide the clusters, replanting the largest bulbs. Space them to allow two or three years of growth before they become crowded again.
2. Because cooling temperature is necessary to break dormancy, bulbs in clay pots or pots located in the shade will sprout before those in plastic pots in the sun. Plastic pots can be wrapped in aluminum foil or painted white with spray paint to keep them cooler. (You may notice that the bulbs on the south side of the pot will sprout last, and are often smaller than those on the north side. Many winter bulbs are marginally adapted to the desert's warm winters.)
3. In late September or October when nights begin to drop into the 60s F, soak the pots once. Then keep the medium barely moist until you see green sprouts. Some bulbs such as *Ferraria* will sprout at much higher temperatures. Move the pots of sprouted plants into a sunny location if they aren't there already. Full desert sun is a bit too much for most species, especially in spring. So most potted bulbs should be shielded from full afternoon sun. High temperatures can trigger premature dormancy. This is a major reason why those from the coolest habitats do not perform well here.
4. When growth is well under way, water and fertilize generously. Be prepared to cover the tender species on frosty nights. Most species will tolerate nights in the upper 20s in partial shade, while mid to low 20s will damage many if they're exposed to the night sky.

Some of the winter bulbs that do well in Tucson include:

-*Boophane species* (Figure 1): Fan-shaped foliage tops large above-ground bulbs that are covered with papery layers, but have succulent interiors and fleshy roots. Hardy to at least the low 20s under a cover. Dull flowers appear in fall before leaves. (*B. disticha* is summer-active and bears red flowers.)



Figure 1. Most *Boophane species* flower in late summer, then produce a fan of leaves in fall and winter.



Figure 2. *Ferraria crispa*: curls, spots, and a honey-sweet fragrance. What else could you wish for?



Figure 4. *Ornithogalum dubium* is one of the few species of this genus with nonwhite flowers.



Figure 5. Hurricane lilies flowering in August. The bloom season lasts less than two weeks, but what a show!

- *Ferraria crispa* (Figure 2): The flowers are star-shaped with very undulate petal margins, weirdly spotted on a greenish background, and deliciously fragrant. Hardy to the mid 20s.
- *Freesia*: Very easy to grow. Bell-shaped flowers in several colors are lightly fragrant. Hardy to at least the low 20s.
- *Ipheion uniflorum*: A tiny plant no taller than 6 inches. One-inch flowers in shades of blue are borne one at a time in spring. Seems to be completely hardy in Tucson.
- *Lachenalia* (Cape hyacinth, Figure 3): Numerous species, some of which have attractively spotted foliage. Flowers range from inconspicuous to large and colorful.
- *Leucocoryne*: Grasslike foliage and inch-wide star flowers of lavender to purple on tall stems; lightly fragrant. Likes lots of water; hardy to mid 20s.
- *Moraea polystachya*: A small iris with two-inch bluish flowers over a two-month period, usually in spring. Will sprout as early as August with good rains and be in flower by late September. Very easy to grow. In fact, it will volunteer freely in any watered site; keep it away from other bulb pots or you will soon have nothing but moraea. Other species have more beautiful flowers, but most are difficult to grow in the desert. Completely hardy in most of Tucson.
- *Ornithogalum dubium* (Figure 4): Most species in this genus have white flowers with black eyes. But this one has bright orange flowers, or sometimes lemon yellow. Easy to grow; hardy to mid 20s under cover.

Oxalis species

- *Rhodophiala bifida* (hurricane lily, Figure 5): This bulb flowers in August while dormant after a heavy rain, hence the name. Leaves sprout in the fall and die in spring. Bulbs multiply freely, but never set seed. This species needs to be in the ground; for reasons I don't understand, it rarely flowers in pots. Hardy to at least 20. There is also a pink-flowered form.
- *Sparaxis* (Figure 6): These miniature irises bear several one-inch flowers in a wide range of bright color combinations. The flowering season is very short in the desert, only about a week for each bulb, spread over a two-week period. Hardy to mid 20s.



Figure 3. A collection of Cape hyacinths. Clockwise from upper left: *Lachenalia aloides quadricolor*, same, *L. aloides*, *L. viridiflora*, *L. bulbifera*, same, *L. unknown lavender*



Figure 6. A collection of *Sparaxis* hybrids.

October 2012

Growing in the Desert Series: *Coryphantha elephantidens*: A fine fall-flowering cactus by Mark Dimmitt

Coryphantha elephantidens (Figure 1) is one of the most distinctive of the several dozen species in this genus. The stems are three to four inches in diameter, and offset to form clusters of up to a dozen or more heads (Figure 2). (In *The Cactus Family* Anderson says the stems can be nearly 8 inches in diameter, but I have never seen any even close to this.) As the specific epithet describes, the stems have very large tubercles. The few short stout spines don't conceal the shiny green cuticle.

The two-inch pink flowers are not borne in masses as in many cacti. They appear one or two at a time per stem, every few days for about three months from September to November (Figure 3). The subspecies *C. e. greenwoodii* and *C. e. bumamma* have yellow flowers.

The species occurs in Michoacan and Morelos, Mexico. It's winter hardy anywhere in southern Arizona. Grow it in any well-drained succulent medium, in light shade. Water little in winter, and also keep it on the dry side during extremely hot weather to avoid rot.

An important note; please read: I write about what I know, and I am about to exhaust my ideas and images for articles in this series. (My collection is heavily focused on a few kinds of plants; I don't have hundreds of species of cacti, euphorbias, aloes, etc.) The original intent was to encourage other members to write about their favorite succulents. If that doesn't happen, this series will be featuring a whole lot of articles about adeniums. Please send me ideas, a few cultural notes, and especially photos of plants in your collections that perform well for you.



Growing in the Desert Series: Putting Adeniums and other Tropicals to Sleep for the Winter

by Mark Dimmitt

Adeniums are succulents related to pachypodiums, plumerias, and oleanders (Figure 1). They are the newest ornamental plant to be domesticated (the process began only 20 years ago), and their popularity is growing rapidly. They are easy to grow if their cultural needs are understood and provided for. Spring is one of the critical times during which many adeniums and other winter-dormant tropical plants are lost (see article April 2012).

The other critical skill is to recognize when to let them go dormant for the winter. Remember this crucial fact: Adeniums hate cold, wet roots. These plants are nearly indestructible during the hot summer. But only a few days of cold nights can kill the most sensitive clones if the medium is wet. The critical night temperature is about 50 degrees, but it is influenced by the daytime highs, as will be discussed later in this article.

What is dormancy?

Dormancy in plants means a cessation or great slowdown of active growth. The main evidence is that the plant produces few or no new leaves (Figure 2). Below ground, root growth and water absorption greatly diminish, so the potting medium dries out more slowly than it did in summer. A dormant plant may retain leaves, or either shed them all at once or slowly over the winter; don't be fooled by that. A dormant plant may also flower, either with or without leaves. What's important is that it has slowed down and is using much less water than during its growing season. Therefore you must give it much less water, or even none for weeks or months at a time.

This discussion recognizes two horticultural groups of adeniums:

1. Most adeniums in cultivation are *A. obesum* and its hybrids. Almost all of the plants in this group are potentially evergreen if they are kept in tropical conditions (sunny, hot days, warm nights) through the winter (Figure 3). A sunny greenhouse is best; a sunny window in the house is good. If you can't provide such conditions, the plants will go dormant during the cool season. Depending on the temperatures, light, and the particular plant, they may retain most or all of their leaves.

2. All of the other species, except some *A. arabicum*, have an obligate winter dormancy, even if the conditions are sunny and hot. Most species will shed their leaves in fall or early winter, often suddenly (Figures 4 and 5). *Adenium swazicum* may sleep for only a month or two; *A. multiflorum* and *A. crispum* sleep for three or four months. *Adenium boehmianum* and *A. socotranum* often remain dormant for six months. *Adenium arabicum* is extremely variable over its large natural range; you need to learn the individual plant's habits. Some become spontaneously dormant in fall and shed their leaves (Figure 6). Most become dormant but retain most of their leaves well into winter if kept warm (Figure 7). Some clones are potentially evergreen and even grow through winter if kept under hot conditions (Figure 8).

Overwintering Tips

If most of your plant's leaves suddenly turn yellow and fall off, this is a clear signal to greatly reduce or cease watering (Figure 9). This may happen as early as the fall equinox, or more likely after the first cool nights later in the fall. A more common response is that the plant's water consumption greatly diminishes. It often happens quite suddenly. One week you need to water three times, and the next week only once or not at all. Monitor the moisture in the potting mix of each plant carefully in autumn in order to catch this change and respond accordingly.

If your adeniums are overwintered in a hot greenhouse, almost all of them will still use much less water even if they keep growing. My Adenium house gets up to 100 degrees F on sunny days, and is heated to 45 at night. Most of my plants stay in leaf and often flower well into winter. Those with obligate dormancy enter it at different times; some keep growing slowly until January, when the short days finally stop them. *Adenium obesum* and its hybrids keep growing under these conditions, taking only a brief rest about March, just before they begin growing again. As long as my plants have leaves, I water and lightly feed them every week or two.

Gene Joseph has an unheated greenhouse that also gets to 100 F or more on sunny days, but drops to near freezing on the coldest nights. The hot days seem to average out the cold nights, and his adeniums stay active well into winter.

If you store your adeniums in cooler conditions, you must keep the potting medium very dry to avoid root rot. Plants in 8-inch pots or larger can be left unwatered for the three to five months of cold weather. Smaller plants will probably need a light watering every couple of weeks, just enough to keep the stems from shriveling. Most species and cultivars will survive near-freezing temperatures if the medium is bone dry. (*Adenium swazicum* can take a few degrees of frost, even with moist medium. *Adenium crispum* and *somalense* are the most susceptible to rot in cold weather.)

Most Adenium growers in climates with cool or cold winters recommend culture similar to that in this article. But those who have a warm greenhouse (or live in the tropics) can have the pleasure of seeing adeniums at their best. Under warm conditions, most modern cultivars flower from September through May, while summer is spent on vegetative growth. Forcing dormancy of *obesum* and its hybrids that would prefer to stay active causes a deep shutdown and a slow awakening in spring. This may cause the plants to miss the spring flowering season, replaced by a more meager summer bloom.

Another advantage of keeping evergreen or late-dormant adeniums warm into fall and winter is caudex growth. Leafy adeniums that are not growing new stems need something to do with all the solar energy being captured. That energy goes into fattening the caudex. The evidence of this is that most of my pots split during fall and winter.

See the article in this series from April 2012 for how to wake up adeniums in spring.

Other succulents with similar winter needs

Many tropical succulents are native to semiarid tropical habitats with sparse to ample summer rain and dry winters. These plants must also be overwintered as described above. They vary greatly in how susceptible they are to rot if overwatered while dormant. Examples include

Pachypodium	Scadoxus
Plumeria	Dorstenia
Cyphostemma	Sansevieria
Alluaudia	Euphorbia (summer growers)
Bursera	Caralluma & many other stapeliads
Commiphora	Uncarina
Boswellia	
Cacti (many tropical species)	



Figure 1. *Adenium* 'Beautiful Mule' is a nearly perfect example of what adeniums are: It has a massive caudex and bold stem architecture (sculptural elegance) and showy flowers borne in abundance over a long season (floral extravagance).

Growing in the Desert Series: Putting Adeniums and other Tropicals to Sleep for the Winter

Photos by Mark Dimmitt



Figure 2. The *Adenium arabicum* X *obesum* hybrid on the right is active – it's growing new leaves. The one on the left is not, and is in the process of going dormant. Both can be watered whenever the potting medium becomes dry, which will be less often as the weather cools. The *A. socotranum* (inset) is also not growing new leaves and is semidormant.



Figure 3. *Adenium obesum* (left) is growing new leaves in December, so it is still active. If days are hot and nights are above 50 F, it can be watered regularly. *Adenium obesum* complex hybrids with other species, such as the crispum hybrid 'Starfish' (right) are also active year round under tropical growing conditions.



Figure 4. This *Adenium multiflorum* was a mass of green foliage only a week earlier. In mid October the foliage suddenly turned yellow as nights cooled. The message being broadcast is that it needs no more water until it leafs out in spring. The hybrid 'Beautiful Mule' in the right corner is still in leaf, is especially sensitive to rot if the roots are cold and wet. For that reason, watering was stopped October 1, and it will soon shed its leaves.



Figure 5. The same *A. multiflorum* as in Figure 4, in flower in January. Don't be fooled by the flowers; it's still dormant and needs little or no water.



Figure 6. This clone of *Adenium arabicum* 'Ram Gandhi' sheds its leaves in fall, and flowers while still leafless in spring. The photo was taken in March. It needs no water until it begins to leaf out in April.



Figure 7. This clone of *Adenium arabicum* keeps leaves almost all winter, even if not watered for four months. It also flowers year round.



Figure 8. This dwarf *Adenium arabicum* is not only evergreen, it grows as well as flowers year round under tropical conditions. I water it regularly even in winter. Drought will force it into a leafless dormancy.

Growing in the Desert Series: Putting Adeniums and other Tropicals to Sleep for the Winter

Photos by Mark Dimmitt



Figure 9. *Adenium boehmianum* (left) and *A. sp. nov. Oman* both have a long winter dormancy. When the leaves yellow and fall, don't water them until they awaken, which might be as late as early summer. Again, ignore the flowers; both plants are dormant and using very little water.

Book Review

by Gene Murphy, Tucson Landscaper (retired)

“Intermountain Flora Vascular Plants of the Intermountain West, U.S.A. Volume Two, Part A Subclasses Magnoliidae-Caryophyllidae”

By Noel H. Holmgren, Patricia K. Holmgren
and James L. Reveal and Collaborators

New York Botanical Garden Press

The scope of this book is phenomenal! It starts off with water lilies and some 634 pages later ends with cactus. In between it described probably the most diverse flora ever set in type. Family after family, page after page: no treatise could be more eclectic. Some families are so little known as to be from another planet.

Maps on the back of the front cover and duplicated on the back cover includes a vast area of the interior of the Western States and a small portion the Northwest corner of Arizona.

Being volume two, Part A one might expect there is a volume two, Part B. Such is the case, this being the latest in a series of 8 books that were left to last, because of the eccentricities of the plants involved. After reading this volume, I doubt if one plant has been omitted. Scientifically, this volume with its companion volumes are without a doubt definitive.

Naturally, the Tucson Society's interest is the cactus family, pages 634-698. Cholla, prickly pear, hedgehog, barrel etc, abound in their various forms, such as eagle claw, fishhook, pin cushion, etc. I like common names and thank the authors for their use of them throughout the book. A great deal of small print is incorporated and the notes, which are at the end of the species description, are what I've found to be the greatest interest. The particulars and details found there are tidbits not listed probably not found in any other publication.

I would be remiss if I did not mention the illustrations which appear on every other page. To most, the meticulous line drawings are considerably more than adequate. However, the tantalizing colored photo at the beginning of the book makes one want more.

Apparel Program table

Need a unique gift for the holiday season? How about a warmer shirt or sweatshirt for those cool weather Cactus Rescues? Stop by the Apparel Program table to review the catalog and order a TCSS Denim Shirt (starting at \$19.98), Sweatshirt (starting at \$14.98), Hoodie (starting at \$29.98), Windbreaker (\$30 and up) or many other items. These are only available here! Any questions, don't hesitate to contact us at tcss_apparel@centurylink.net.



There's a New Park in Town

by Reporter Odalys Catalan, AZVA

**Note: This great story was written by a fourth grader,
originally published in the October issue of
“Bear Essential News for Kids”**



Like the mystical Phoenix rising from the ashes this park has risen from the depths of an old gravel pit. On Sept. 22, I attended a much anticipated park dedication and opening. The park is called Pima Prickly Park and it is built on an old abandoned gravel pit. Awesome!!

It has so many trees, cactus, birds singing and butterflies gliding through the air. “1, 2, 3!” the people said as they cut the green silky ribbon. As seven or eight pieces of the ribbon floated to the ground many camera shutters went off at a single moment.

Fortunately, I was able to interview Rafael Payan, the director of Pima County Natural Resources, Parks and Recreation. He has been with PCNR for 33 years!

“This dedication was about opening this amazing park and ...the restoration of a gravel pit,” Payan states. “This park should teach the community to protect and love the desert, as well as care for it. We...started restoring about 7-8 years ago and also installed the trails about one year ago!” Payan credits the hard work of numerous volunteers and the Tucson Cactus and Succulent Society. “Without their help and cooperation this park would not have been possible.”

Payan feels that with over a mile of trails on this nine and half acre oasis visitors will get an education and some exercise as well. Moving on to the trail, there is some eye-catching stuff. We saw, my favorite, the unforgettable Saguarohege.

Saguarohege is a group of saguaros growing in a circular pattern sitting majestically on high ground overlooking the park. This memorial will “provide a sacred place for reflection and pondering the ancient relationships between people and the Sonoran Desert.” This monument pinpoints the beauty of the desert and also is the soul of the park.

I had the opportunity to plant a baby Saguaro cactus, took home my own cactus, met some artists and conservationists and so much more!

Inside the PCNR building nestled in the park, visitors were met by some really cool creepy crawlies. There was a bark scorpion, horse lubber grasshopper (that was outrageously humongous), beetles (not the vehicle), and a team of praying mantis. It was pretty cool.

Other features of the park include Cristates, an Agave Garden, the Cholla Forest Maze and Cholla Rose Garden, and a Hummingbird Garden. The Pima Prickly Park is located at 3500 W. River Rd.



President's Message

Let's talk about the weather. Here it is the last week of November and we are still experiencing temperatures in the 80's and more important low temperatures in the 50's. What happened to the good old days when frost started in mid November and ended in mid April? Are we starting to experience real climate change? Will there be a serious effect, good or bad,



on our native cactus and succulents? What plants will show a major change to their culture? What can or should we do?

In 2013, I want us to start examining some of these questions especially from the plant growing perspective. You are 1,000 contributors of data plus we also have Pima Prickly Park as a great laboratory. Now is the time to put our collective heads together and encourage participation with others to understand how best we can take advantage of this continuing climate change. This is just another challenge for those who grow plants in the Sonoran Desert.

For more than a decade Chris Monrad has served on the Board of Directors and has been one of the leaders of our rescue program. He is also one of the four founders along with Vonn Watkins, Lois Ludwig (move to Idaho) and me. In 1999, we did our first rescue on a school site in Oro Valley and the rest is history. His standards for details, adherence to the law and exact compliance to our Rescue Partner requirements has

made our rescue program successful. He has always been an important factor in dealing with the development community.

For the last several years, Chris has been the person responsible for the free plants and door prizes at meetings. We do need someone to take over that responsibility in January.

I hope you all realize that Chris is the one responsible for the yellow spine variety of our native barrel which is now in production and can be seen in many developments. It was his keen eye and interest in Ferocactus that lead to the breeding program for this spectacular variety. He made it possible to give every attendee at the 2009 CSSA Convention one of these plants. This is just one of his amazing accomplishments.

Chris, from all of us, thank you for everything you have done for this Society. We sincerely appreciate your years of service on the Board of Directors.

Just a reminder, the Holiday Party is December 2 at 3:00pm. Please bring your food by 2:30pm. The gift exchange will be different this year, more like "Let's Make a Deal" where you can chose what's behind box 1, 2, or 3. That will be your gift and you can open and show it to everyone. Gifts should be valued around \$10.00. If you forgot to RSVP, give us a call at 256-2447.

Thank you.

Richard Wiedhopf, President

December 2012

Growing in the Desert Series: Succulent Cymbidium Orchids – Try Something Different

by Mark Dimmitt

Orchid collectors grow orchids; succulent collectors grow succulents. But why do so few succulent collectors grow succulent orchids? There are many, and some are adapted to our desert climate. I've already dealt with the most extreme desert species, *Eulophia petersii* (January 2010). Here's another worth trying, and it's one of several that are called "black orchids".

The Asian genus *Cymbidium* has numerous species that grow in the ground in moist, cool-tropical habitats. Their hybrids (Figure 1) are extremely popular in mild-climate areas such as Southern California. They are not very succulent, although they do have water-storing pseudobulbs at the base of their long grasslike leaves. More important, they fare poorly in the desert because our autumn nights are too warm for the plants to set flower spikes.

Cymbidium canaliculatum (Figure 2) an oddball in the genus. It is widespread across tropical northern Australia, where it grows on the

branches of eucalyptus trees in hot, arid climates. It is a very succulent species; it has to be in order to survive several months a year with no rain. An abundance of one-inch, chocolate-scented flowers are borne in spring; they range from green to dark brown (Figure 3).

The species is quite difficult in cultivation, but hybrids with standard cymbidiums are robust and easy to grow in hot climates. *Cymbidium canaliculatum* is dominant in its hybrids, so all of them to date have the small, dark, chocolate-scented flowers and succulent foliage. The most commonly available is a grex (cross) called Little Black Sambo (Figures 4 and 5). *Cym. Australian Midnight* (Figure 6) has an even darker flower. Look for them in orchid nurseries; succulent dealers have not yet discovered these wonderful plants.

CULTURE

These orchids have thick roots that need a coarse potting medium for good growth. My favorite mix for nearly all plants these days is coir

(coconut husk fiber, not dust). Pure coir chips (quarter- to half-inch), or a mix of coir and pumice or perlite works well for cymbidium hybrids. A peat-based medium also works if it's made coarse by adding at least 1/2 by volume of large pumice or perlite (sponge-rock).

The plants need very bright light; the best location provides full morning sun and filtered afternoon sun. Water and feed them generously during the spring to fall growing season. They seem to need drier conditions in winter to set flower spikes, but don't let the medium become bone-

dry. The plants can tolerate temperatures in the low hundreds in summer, to near freezing in winter.

Flower spikes become visible in February or March; they bloom for several weeks in April and May. Little Black Sambo's spikes are arching, while those of Australian Midnight are more pendant. These hybrids are vigorous growers and can become very large plants. Divide clumps in spring after the flowers fade; break or cut out at least 3-growth divisions.



Figure 1. A collection of standard cymbidium hybrids in Santa Barbara, California. These will not flower in hot climates.



Figure 2. *Cymbidium canaliculatum* var. *sparkesii* is a tough succulent species that grows on eucalyptus trees in tropical Australia. It's difficult to grow, but its hybrids are easy and flower well in hot climates. This variety has very dark flowers.



Figure 3. The flowers of *Cymbidium canaliculatum* range from green to dark brown.



Figure 4. *Cymbidium* Little Black Sambo 'Ink Spot' is an easy hybrid to grow in hot climates. It bears arching spikes of 50-75 small flowers in spring; they smell of chocolate.



Figure 5. *Cymbidium* Little Black Sambo 'Black Magic'



Figure 6. *Cymbidium* Australian Midnight 'Tinonee' is a new and still rare hybrid, but worth searching for. It grows larger than Little Black Sambo, and its pendant spikes have almost black flowers.

Growing in the Desert Series:

Adeniums for Winter Color

by Mark Dimmitt

Most people who grow adeniums in cool-winter climates let them go dormant for the winter (Figure 1). If they can't be kept at least in the 80s F during the day and above 50 at night, this is the safest way to prevent rot. They are often stored in a poorly lit location and given little or no water. Some will flower sparingly under these conditions. But if you have a hot, sunny location, many adeniums will flower profusely throughout the cold months (Figures 2, 3). They are a great way to provide color during a time of year when few succulents are in bloom.

If kept hot and bright all year, the majority of commonly sold adeniums begin flowering when summer heat breaks (about late September in Tucson), and flower well into winter or all the way into May (Figure 4). All adeniums produce most of their annual vegetative growth in summer, and bear fewer or no flowers during this season. (Plants forced into dormancy tend to shift their flowering season to summer.)

The simplest suitable location is a south-facing windowsill; an east or west exposure may also be adequate. If it's uncomfortably hot to hold your hand on the sunny windowsill, adeniums and other plants are likely to burn. Light shade such as from a window screen or a leafless tree outside the window may be necessary. Increasing air circulation with a small fan may be sufficient to avoid burning. Smaller cultivars such as 'Happy Princess' (Figure 5) or dwarf strains of *A. arabicum* (Figure 6) are well suited to windowsill storage.

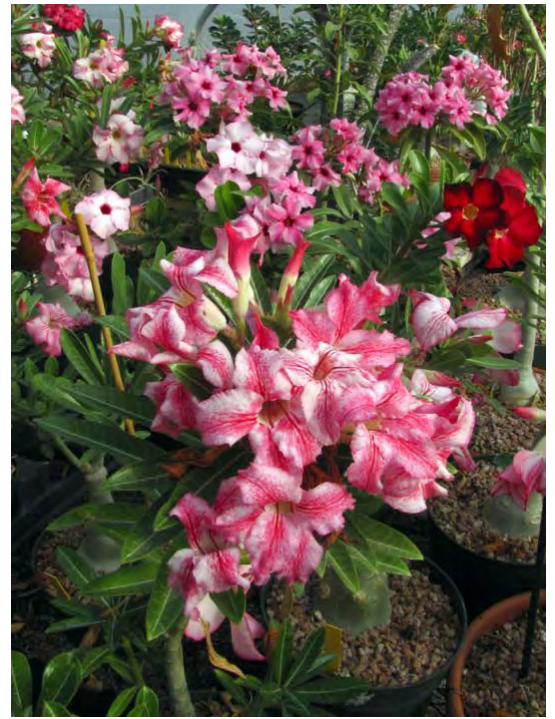
For more plants, a simple lean-to greenhouse can be built on the south side of the house, consisting of a PVC or conduit frame covered with clear plastic. Build it over a window, and leave the window open at night to provide heat. Of course, nothing beats a greenhouse once you get hooked.

As already stated, the majority of adeniums in cultivation are potentially evergreen and winter-flowering if kept under tropical conditions and watered regularly. Those plants that are in leaf should be watered every couple of weeks, just enough to keep the caudex firm. The deciduous species should be given much less water, even if they are in full bloom. Larger plants with substantial caudexes may not need any for months at a time. This group includes all the pure species except *Adenium obesum*. (*Adenium arabicum* and *A. socotranum* may retain most of their leaves all winter, but they still need very little water when not growing.)

Some adeniums flower only during winter. These are rarely found for sale. Nurseries tend not to carry them because few customers buy adeniums in winter. *Adenium multiflorum* (Figure 7) sheds its leaves when the weather turns cold, and flowers profusely from January to March. The plant can grow quite large, but as with most succulents, size can be controlled by keeping it underpotted and fertilizing sparingly. One of this species' few hybrids, 'Winter Remedy' (*A. multiflorum* X *A. swazicum*, Figure 8), has the same habit, but some flowers continue into early summer.



Figure 1. Ignore the flowers; both of these *Adenium arabicum* are dormant. Neither is actively growing new leaves and stems, and they are therefore consuming little water. The leafless one in a 12-inch pot will need no water for at least three months. The leafy one in a 6-inch pot may need a light watering once a month to keep the caudex firm.



Figures 2 and 3. Dimmitt's adenium house in mid-December. Many of these plants will continue to bloom through spring.

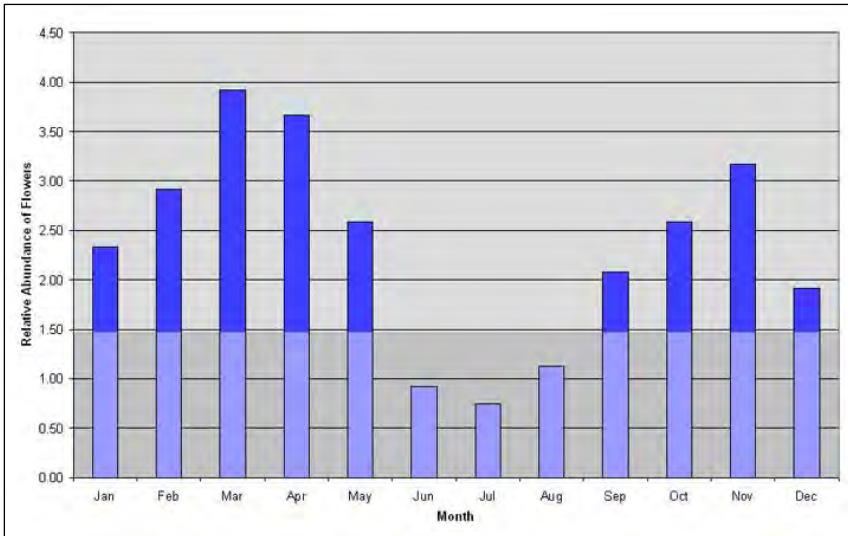


Figure 4. Flowering chart of a typical modern Adenium hybrid. If kept warm and watered all year, it will flower fall through spring. The dark blue bars indicate lots of flowers; light blue ones below flowering level one indicates only a few flowers.



Figure 5. Adenium 'Happy Princess' is an outstanding compact Taiwan hybrid of *A. crispum* that is almost always in flower. Photo taken in mid-December.



Figure 6. Some populations of *Adenium arabicum*, such as this Soodah Dwarf strain in a 4-inch pot, are evergreen and everblooming under tropical conditions. This year-old plant was photographed in mid-December in front of the caudex of a large specimen of a standard *A. arabicum* that is deciduous and flowers mostly in spring. *Adenium arabicum* is quite a variable species in growth and flowering habit.



Figure 7. *Adenium multiflorum* from South Africa and Mozambique sheds its leaves and flowers profusely in winter.



Figure 8. *Adenium* 'Winter Remedy', a hybrid between *A. obesum* and *A. swazicum*, is mostly deciduous and flowers heavily in winter. Some flowering continues until late spring.

Growing in the Desert Series: Winter-Blooming Pachypodiums

by Mark Dimmitt

This series is devoted to featuring succulents and other xerophytes that are well adapted to the desert climate of southern Arizona. It also tends to favor unusual species that are not often found in collections. Even though we are blessed with usually mild winters and plenty of sunshine, there are rather few succulents that put on a good flower show in winter. Here are two pachypodiums that will brighten any greenhouse or sunny windowsill.

Pachypodium decaryi (Figure 1) is rare in cultivation, probably because it is very slow growing. The specimen in the photo is in a 14-inch pot and stands about three feet tall at 31 years old. With age it develops a modest caudex, topped with a few somewhat spiny stems. In summer the stems are tipped with large Plumeria-like leaves. Foliage is shed in fall, then in winter the bare stems produce large pure white flowers for about two months (Figure 2). The photo was taken in late January, about halfway through the flowering season.

This species likes ample water in summer, and should be kept dry in winter. It is a bit sensitive to extreme summer heat; I keep

my plants under a mesquite tree from April through October. Protect it from frost in winter. It can tolerate low 20s under a roof and covered with a blanket.

Pachypodium brevicaule is a stunning dwarf, essentially stemless species that looks much like a monstrose potato. Many people find it difficult to grow; I have never been able to keep one alive for more than a couple of years. *Pachypodium densiflorum* is a spiny shrub that reaches about two feet tall and wide. Both species are prone to rot in high summer heat. Hybrids between the two are much easier to grow. The plant in Figure 3 is a five-year-old *P. brevicaule* X (*P. brevicaule* X *P. densiflorum*), making it $\frac{3}{4}$ *P. brevicaule*. It looks like a super-compact *P. densiflorum*. Like *P. decaryi*, it is winter-deciduous and -flowering. The brilliant yellow flowers are borne on nearly every stem in January and February (Figure 4).

Culture of this hybrid is about the same as for *P. decaryi*, except that I water more sparingly in summer. It has a small root system that doesn't draw much water.



Figure 1. A 31-year-old *Pachypodium decaryi* in full flower in late January. The vine with clasping leaves is *Hoya imbricata*.

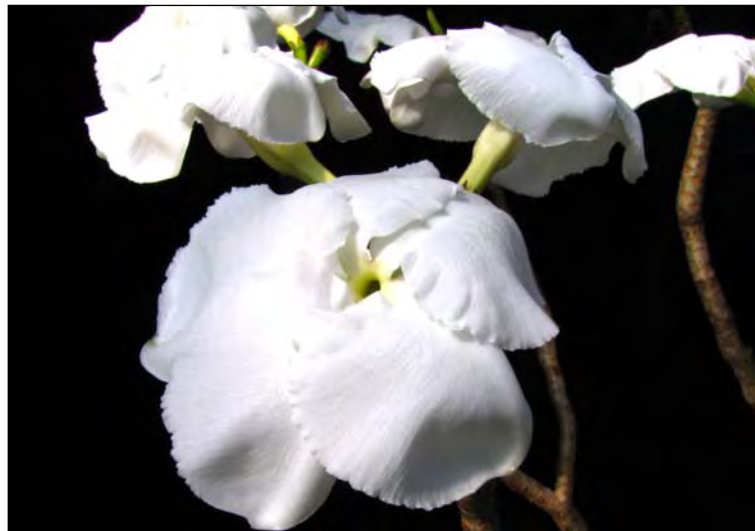


Figure 2. The brilliant white flowers of *P. decaryi* are nearly three inches wide.



Figure 3. A five-year-old plant of *P. brevicaule* X (*P. brevicaule* X *P. densiflorum*).



Figure 4. The brilliant yellow flowers of the *Pachypodium* hybrid in Figure 3.

Growing in the Desert Series: Another Record Freeze!

by Mark Dimmitt

What? Again? Southern Arizona had catastrophic freezes in 2007 and 2011, which were both rated as 30- to 50-year events. Now we've had another in January 2013, the third severe freeze in six years. The 2011 freeze was the worst in most of the Southwest, largely because it was accompanied by high winds that added to the heat loss and blew away many frost covers. (It has long been assumed that it cannot freeze in Tucson if there is any wind, which prevents cold air drainage.) The lows in February 2011 at my place at the eastern base of the Tucson Mountains were two nights of 18° F, with a high of only 36 between them. It was colder on the east side of the basin.

There are numerous microclimates in the greater Tucson area. On our normally calm winter nights cold air drains downhill. Therefore the coldest areas are valley bottoms and washes that drain the mountains; these areas experience several nights in the teens almost every winter. In contrast, south-facing slopes such as in the Catalina foothills may not have any frost for a decade or more. But this general rule can be broken on windy nights and severe Arctic outbreaks, during which the coldest areas are wherever the frigid air mass descends to the ground. In 2011 the Catalina foothills were as cold as the valley bottoms, and the normally safe tropical plants there were seriously damaged.

This year's January freeze broke many temperature records, but in the absence of wind there appears to have been less damage than from the 2011 freeze in most areas. (See reports from a few colleagues below. But I wonder if the reports of less damage stems in part from the fact that so many plants perished in 2011 and weren't around to be tested in 2013?) My neighborhood seems to have taken the worst of the 2013 event. I'm normally 6 degrees colder than the "official" airport temperature. That was true for this freeze too, but the forecast was spectacularly wrong, as usual. (In my 34 years in Tucson, the weather service has not once forecast a severe freeze more than a day in advance. It appears that their models are so heavily weighted toward the mean temperature for the date that they can't predict extremes.) On the morning of the fourth day of the five-day freeze, the forecast was for a low of 23 F. But that night it fell to 17 at the airport, and 11 at my house. A thermometer at the lowest point on my property recorded 7. In 2011 I did not have the high winds that most people suffered, so consequently this was the most damaging frost I've ever had.

A list of survivors and casualties in my collection during the past two freezes are contained in Table 1. Some noteworthy results:

- *Welwitschia mirabilis* planted in the ground and covered with a blanket froze to the caudex, but is already regrowing (Figure 1).
- *Boophone spp.*, including *B. ernesti-ruschii*, suffered only minor leaf damage under a clear plastic cover (Figure 2). *Boophone disticha* in the ground in the open lost nearly all foliage.
- *Encephalartos horridus* is unscathed (Figure 3); it was in an enclosed patio that got down to 24°.
- *Zamia furfuracea* next to the *Encephalartos* above and covered with a blanket lost all its leaves for the second time in three years. *Zamia floridana* in the open outdoors also lost all leaves, but another one against a wall is undamaged. Gene

Joseph reported the same pattern. This is a pretty tough cycad.

- *Euphorbia decaryi* in the patio at 24°: undamaged.
- *Aloe claviflora* was untouched under a cover. My several other supposedly hardy aloes, except for *A. variegata*, suffered severe damage in the open.
- *Trichocereus pachanoi* plants were badly damaged, especially unestablished cuttings (Figure 4 foreground). Cuttings of the related *T. scopulicolus* (background of Figure 4) were undamaged, as was the mature plant (Figure 5).
- *Ferocactus herrerae* (Figure 6) were severely damaged; some will probably die. I have most of the barrel species except those from the far south of the genus' range, and none were damaged except this one.
- *Haworthia truncata* in the patio and under a blanket: undamaged (Figure 7). *Crassula argentea* (jade plant) on the same bench perished.

So have we learned anything yet about landscaping in Tucson? With each of these catastrophes, we add to our knowledge of what is reliable here, and which plants need protection at what temperature. But a bigger lesson is becoming clearer.

The events of the past few years are consistent with the models of global warming. The actual warming is barely noticeable at our latitude. A more significant effect of the warming is climate destabilization, resulting in more frequent extremes. If the models are right, we can expect both more hard freezes AND more heat waves; more droughts AND more floods. Moreover, the models predict that the waves in the jet stream will slow down, meaning that extreme events will be not only more common, but will last longer. January's freeze lasted five consecutive nights; that hasn't happened since 1971. If this is our future, we should be considering: a) choosing hardier plants for our collections; b) spending more money on frost blankets; or 3) moving south. (Hint: Aduana, near Alamos in southern Sonora, has never recorded a frost. Sounds great, huh?)

Notes from around town

Bob Web reported from the Barry Goldwater range in western Arizona: "I noticed that quite a few native plants were damaged by the freeze, which my companion said reached 15-17 F over there. *Encelia farinosa*, *Parkinsonia microphylla*, various *Ambrosia* (particularly *A. ambrosioides*) were seriously damaged, with dead or dying leaves and branches." (My palo verdes seem to be undamaged. -MAD)

Matt Johnson (far east side): "It got down to 8 F in my shade house, which is a new record low. I didn't have a thermometer placed in the lower part of our lot, but it usually runs another 4 F colder in that area. For the five coldest nights, my lows were 14, 12, 12, 8 & 15 F. I don't recall a previous freeze when the coldest night was so far into the cold spell.

Too early to tell about damage on a lot of things, but the two large *Agave vilmoriniana* in the patio that made it through both 2007 and 2011 with relatively minor damage have extensive yellowing, and my last surviving *Stenocereus alamosensis* also appears to have suffered considerably more damage

than in 2011. It looks like a few individual plants of at least two *Thelocactus* species in containers in the shade house were hit, in spite of being covered. I haven't seen that before. So far, senitas (which had stem tips covered) appear to be okay."

Michael Chamberland: "I was in Sonora during the first night of this run of cold weather. In Magdalena the freeze made the front page of the local newspaper. There was a photo of someone holding up a sheet of ice. Later in the day, driving through Curcurpe, the river crossing was strewn with masses of ice - and there were organ pipes on the hills. We explored around El Bajio and I found organ pipes, *Fouquieria macdougalii*, and *Jatropha cordata* growing on rocky hills, all regrowing from damage from the 2011 freeze.

Fortunately I had covered or moved indoors hundreds of plants before the trip. I returned in time to move hundreds more inside, not to trust mere covering, before the coldest night set in. At my house I had a minimum of 18F. I do not know how accurate my thermometer is, but the same device recorded a maximum low of 13F in 2011. Between the "warmer" temperature, lack of wind, and unprecedented number of potted plants I moved into the house, I expect the damage will be far less than in 2011."

Gene Joseph (west of U of A): "I had 15° out back at our home property. I still haven't entirely figured out why it's so cold back there (drainage? shaded during day?), but our porch was 19°. My regular thermometer was under frost cloth, so I can't count that. The damage this year was not as bad as '11, I think primarily because of the lack of wind. Mark, that wind was a whole new aspect of cold damage that will be hard to pin down in a frost damage list.

In 2011 I resolved not to change my protocol for severe cold, based on one year of extreme cold, supposedly a multi decade event, but now I have done a 180°. I am planning heaters for more greenhouses and setting up more frost cloth (which worked very well this year because of the lack of wind). I hate global weirding!!"

David Palzkill: "I had 15F at my nursery on Ina; this is the coldest I've ever recorded there. I've gotten down to 16F several times over the past 10 years. South side of *Ferocactus* in containers damaged."

Miles Anderson (Avra Valley): "We were 14.4, the lowest we've ever have had, but without the wind, not as bad as 2 years ago (15F)."



Figure 1. This *Welwitschia* is planted in the ground, and is covered with a double layer of cloth on freezing nights. Photo was taken two weeks after the 5-night freeze. The leaves were killed to the base, but are already beginning to grow out. This is a



Figure 2. *Boophone ernesti-ruschii* (in back) survived with only minor damage under clear plastic. Of two *Boophone haemanthoides* (front two plants), one had slight damage, while the other clone with less mature leaves lost half of them.



Figure 3. *Encephalartos horridus* survived undamaged. Damaged plants around it include (l to r) *Sansevieria cylindrica* 'Skyline', *Pachypodium decaryi*, *Billbergia rosea*, and



Figure 4. Unestablished cuttings of *Trichocereus pachanoi* (foreground) were mostly killed; older plants suffered severe tip damage. Cuttings of *T. scopulicolus* (greener stems in background) were undamaged.



Figure 5. *Trichocereus scopulicolus* was completely untouched, even the exposed tips. The species is essentially a more robust, hardier San Pedro (*T. pachanoi*).



Figure 6. *Ferocactus herrerae* with ribs badly frozen on the southeast side of the plant.



Figure 7. *Haworthia truncata* skated through under a fiberglass roof and a tarp. The jade plant (*Crassula argentea*) perished.

FROST RECORDS 2011 & 2013 Address: Oxbow Road Location: eastern bajada of Tucson Mts
 February 2011: Low-high-low: 18-36-18 F
 January 11-15 2013: 5 day lows 20, 18, 19, 11, 19 (4° colder at bottom of property in orchard)
 8-10° warmer in patio, lowest was 24 F

PLANT	EXPOSURE 2011	RESULT 2011	EXPOSURE 2013	RESULT 2013
Adenium Arabian Ruby	unheated enclosed glass patio 22°	Killed to 2" stems		
Adenium arabicum	Unheated enclosed glass patio 22° + covered	Killed to ½" stems	unheated enclosed glass patio 24°	Killed to ½" stems
Adenium somalense nova	unheated enclosed glass patio 22°	Killed to 3" diam. stems		
Agave bracteosa	desert tree	OK	desert tree	OK
Agave colorata	open	OK	open	OK
Agave ovatifolia	desert tree	OK	desert tree	OK
Agave parryi truncata	open	OK	open	Small pups damaged
Agave pelona	open	OK	open	OK
Agave titanota			open	Killed; sheltered pup OK
Agave victoria-reginae compact	desert tree	OK	open	OK
Alluaudia montagnacii	unheated enclosed glass patio 22°	Foliage killed; stems?	unheated enclosed glass patio 24°	Dead
Aloe capitata	double cover	Half of leaves killed		
Aloe claviflora	covered	OK	covered	OK
Aloe cryptopoda	double cover	OK	open	OK
Aloe excelsa	double cover	Severe damage		
Aloe hereroensis	double cover	OK		
Aloe Kelly Griffin hybrids	double cover	Leaf tips killed		
Aloe marlothii	against wall	Minor tip damage	Against wall	Minor tip damage
Aloe peglerae	double cover	killed		
Aloe reitzii	double cover	Terminal 1/3 of leaves killed	open	Severe damage
Aloe saponaria	open	Outer halves of leaves killed	open	Outer 2/3 of leaves killed
Aloe variegata	open	Leaf tips killed, smaller rosettes killed	open	Minor damage
Aloe vera (pure)	open	95% killed	open	95% of biomass killed
Aloe vera hybrid	open	Outer halves of leaves killed	open	Outer 1/2 of leaves killed
Ansellia africana	unheated enclosed glass patio 22°	killed		
Astrophytum capricorne	open	OK		

PLANT	EXPOSURE 2011	RESULT 2011	EXPOSURE 2013	RESULT 2013
Astrophytum myriostigma	open	? Stems solid, but discolored		
Billbergia kuhlmannii			Unheated enclosed glass patio 24°	OK
Billbergia rosea			Unheated enclosed glass patio 24° +cover	Nearly killed
Bletia purpurea	unheated enclosed glass patio 22°	OK		
Boophone 4 spp.	double cover	OK		
Boophone disticha			open	Leaved killed
Boophone ernsti-ruschii			cover	Minor leaf damage
Boophone haemanthoides			cover	1 OK, 1 leaf-killed
Bursera fagaroides (odorata)	unheated enclosed glass patio 22°	Killed to ½" stems		
Bursera penicillata	unheated enclosed glass patio 22°	Killed to 2" stems		
Calliandra californica	open	Top-killed	open	Tk
Cheiridopsis purpurea	unheated enclosed glass patio 22°	OK	Desert tree	Dead
Citrus incl. lime			Unheated enclosed glass patio 24° +cover	OK
Clivia miniata	unheated enclosed glass patio 22°	80% foliage killed	Unheated enclosed glass patio 24°	Severe foliage damage
Clivia miniata	Unheated enclosed glass patio 22° + covered	OK	Unheated enclosed glass patio 24°	OK
Cochemiea setispina	open	Tips killed	Open	Major tip damage
Coryphantha elephantidens	desert tree	Tubercles killed; small heads killed	cover	Some tubercles killed
Costus barbatus	unheated enclosed glass patio 22°	top-killed	Unheated enclosed glass patio 24°	All but one stem killed
Cotyledon orbiculata flat leaf	covered	90% killed	cover	Wilted but recovering
Cotyledon orbiculata other forms	double cover	OK	cover	OK
Cotyledon orbiculata terete leaf	open	OK	open	OK
Cylindropuntia molesta	open	OK	open	OK?
Cymbidium canaliculatum hybrid	unheated enclosed glass patio 22°	OK	Unheated enclosed glass patio 24° +cover	OK
Cymbidium hybrids	unheated enclosed glass patio 22°	OK		

PLANT	EXPOSURE 2011	RESULT 2011	EXPOSURE 2013	RESULT 2013
Cynanchum marneirianum	unheated enclosed glass patio 22°	OK	Unheated enclosed glass patio 24° °	¾ killed
Cyphostemma juttae	double cover	OK		
Dendrobium speciosum			Unheated enclosed glass patio 24° +cover	OK
Deuterocohnia brevifolia	unheated enclosed glass patio 22°	OK		
Dioon edule	open	OK	open	Some leaf tips dead
Echinocereus brandegei	open	Severe damage	open	Nearly dead
Encephalartos horridus	unheated enclosed glass patio 22°	OK	Unheated enclosed glass patio 24°	OK
Encyclia adenocarpa	unheated enclosed glass patio 22°	Some foliage killed		
Eriocereus jusbertii	desert tree	Killed to ground	Desert tree	Most stems top-killed
Eulophia petersii	Unheated enclosed glass patio 22° + covered	OK		
Euphorbia cylindrifolia	unheated enclosed glass patio 22°	OK		
Euphorbia decaryi			unheated enclosed glass patio 24°	OK
Euphorbia Zig Zag	double cover	Killed		
Ferocactus emoryi southern Son.	open	OK	open	OK
Ferocactus herrerae	open	Minor rib burn?	open	Severe rib damage
Ferocactus latispinus	open	OK	open	OK
Ferocactus rectispinus	Open	OK	open	OK
Ferraria crispa	Double cover	80% top-killed		
Fockea edulis/crispa	Unheated enclosed glass patio 22° + covered	Foliage killed		
Fouquieria columnaris	open	Foliage killed (tips covered, OK)		
Fouquieria macdougalii	unheated enclosed glass patio 22°	OK		
Gardenia	open	OK		
Gerbera jamesonii	desert tree	Top-killed		
Grusonia invicta	open	??	open	Looks awful, but that's normal
Haworthia truncata	unheated enclosed glass patio 22°	OK		
Hippeastrum papilio	unheated enclosed glass patio 22°	OK		
Hippeastrum papilio	covered	Major leaf damage		

PLANT	EXPOSURE 2011	RESULT 2011	EXPOSURE 2013	RESULT 2013
Hippeastrum reticulatum striatifolium	covered	top-killed	covered	Top-killed
Hylocereus undatus dragonfruit	Unheated enclosed glass patio 22° +covered	OK		
Justicia candicans	open	Top-killed		
Justicia spicigera	open	Major damage		
Justicia spicigera	desert tree	OK	Desert tree	Top-killed
Lachenalia aloides quadricolor	double cover	OK	cover	OK
Lachenalia spp.	double cover	Leaves wilted; most recovered		
Lemon Meyer dwarf	Unheated enclosed glass patio 22° + covered	OK		
Leucocoryne hybrids	double cover	OK		
Lithops spp.	unheated enclosed glass patio 22°	OK	cover	OK
Lophocereus schottii monstrosus	desert tree	6" tips killed	Desert tree	6" tips killed
Lophocereus schottii monstrosus	open	Severe damage to killed		
Lophocereus schottii schottii, thick- stemmed form	open	Ribs killed	open	Less mature stems killed
Mammillaria geminispina	open	Tips killed		
Mammillaria geminispina	Desert tree	OK		
Mammillaria guelzowiana	desert tree	Killed		
Mammillaria littoralis	unheated enclosed glass patio 22°	OK	cover	½ of stems killed
Mammillaria plumosa	desert tree	OK	Cover	OK
Mammillaria rubrograndis	desert tree	OK		
Mammillaria saboae haudeana	desert tree	OK	30% shade	OK
Myrciaria cauliflora			Unheated enclosed glass patio 24° +cover	Minor leaf damage
Nyctocereus serpentinus	desert tree	90% killed	Desert tree	95% killed
Olneya tesota	open	Foliage and twigs killed	open	Foliage & twigs killed
Opuntia ficus-indica hybrids	open	Most pads killed; one clone OK	open	Hardy clone: terminal pads shattered
Opuntia leucotricha	open	80% killed	open	90% killed

PLANT	EXPOSURE 2011	RESULT 2011	EXPOSURE 2013	RESULT 2013
Opuntia sulfurea "A clone"	open	OK, but pads disarticulated		
Ornithogalum dubium	double cover	OK		
Ornithogalum juncifolium	double cover	OK		
Ornithogalum pyrenaicum	double cover	Leaves killed		
Pachycormus discolor			Unheated enclosed glass patio 24° +cover	Major damage
Pachypodium geayi	unheated enclosed glass patio 22°	Killed to 2" stems		
Pachypodium lemarei ramosum	unheated enclosed glass patio 22°	Killed to 4" stems		
Pachypodium namaquanum	unheated enclosed glass patio 22°	OK		
Pancratium maritimum	desert tree	OK		
Papaver paeoniifolium	covered	Moderate damage, recovered	open	Severe damage
Peniocereus striatus	unheated enclosed glass patio 22°	OK		
Peniocereus tepalcatepecanus	unheated enclosed glass patio 22°	OK		
Phacelia campanularia	open	Most foliage killed; recovering	Open, 7°	Minor damage
Rhodophiala bifida			open	OK
Sansevieria cylindrica	unheated enclosed glass patio 22°	OK		
Sansevieria cylindrica	unheated enclosed glass patio 22°	OK	Unheated enclosed glass patio 24°	¼ of leaves killed
Sansevieria fischeri	unheated enclosed glass patio 22°	OK		
Selenicereus macdonaldii	unheated enclosed glass patio 22°	Some stems killed		
Sparaxis hybrids	double cover	About half of plants killed		
Sparaxis hybrids	open	Killed		
Stapelia flavopurpurea	unheated enclosed glass patio 22°	OK		
Stapelia gigantea	unheated enclosed glass patio 22°	OK		
Stapelia gigantea			unheated enclosed glass patio 24°	1 clone OK; other ½ dead
Stenocereus eruca	open	90% of stems killed		
Stenocereus eruca	Desert tree (Larrea)	OK		
Strelitzia reginae juncea	unheated enclosed glass patio 22°	OK		

PLANT	EXPOSURE 2011	RESULT 2011	EXPOSURE 2013	RESULT 2013
Trichocereus hybrids	open	OK (9° killed some in Sierra Vista)	open	OK
Trichocereus pachanoi	open	6" tips killed	open	Unrooted cuttings killed; established plants major tip damage
Trichocereus scopulicolus	open	Minor rib burn	open	OK
Trichocereus terscheckii	open	OK	open	OK
Triteleia uniflora	desert tree	OK	open	Few leaves killed
Tritonia crocata	double cover	OK		
Urginea maritima	open	Leaves wilted; most recovered	Open	Leaves wilted, recovered
Welwitschia mirabilis	double cover	¾ of leaves killed; regrowing	Double cover	Killed to caudex, regrowing
Zamia floridana	Desert tree, against wall	OK	Against wall	OK
Zamia floridana			open	Leaves killed
Zamia furfuracea	unheated enclosed glass patio 22°	Most leaves killed	Unheated enclosed glass patio 24° +cover	All but 1 leaf killed
Zamia furfuracea	double cover	Top-killed (one leaf OK)		

Growing in the Desert Series – April 2013

Echinocereus pentalophus – Common but Extraordinary
By Mark Dimmitt

Echinocereus pentalophus (alicoche, lady finger cactus), has been in cultivation for a long time, but it is one of the finest cacti available. It is easy and vigorous, completely hardy in southern Arizona deserts, and has one of the most beautiful flowers in the cactus family (Figure 1, Figure 2).

The species ranges from extreme southern Texas well into northeastern Mexico. The plants are rather variable in stem form. They range from about a half-inch to over an inch thick, with four to eight ribs. The thin-stemmed forms creep horizontally across the ground, while some with thicker stems will grow erect for almost a foot before drooping.

Plants will burn in full desert sun. Grow them in filtered sun beneath desert trees or shrubs (or under 30-50% shade

cloth), either in the ground or in pots. The stems root as they creep, and some clones are stoloniferous. Therefore the best specimens will develop in wide, shallow pots or flats. Stems that grow beyond the pot will hang down for two feet or more (Figure 3). Once the plants sprawl over the pot, they become difficult to repot. The easiest solution is simply to start over with a few cuttings in a new pot. They are so vigorous that a new specimen will develop in just two or three years.

Flowers bloom for about two weeks in April, with mass bloom occurring only a few days. The season is short, but a big plant with dozens of flowers is memorable, and you'll eagerly await the next year's spectacle (Figure 3, Figure 4). So don't neglect this wonderful species just because it's an oldie.



Figure 1. The flower of *Echinocereus pentalophus* is over three inches across, opening flat to reveal concentric circles of bright color.

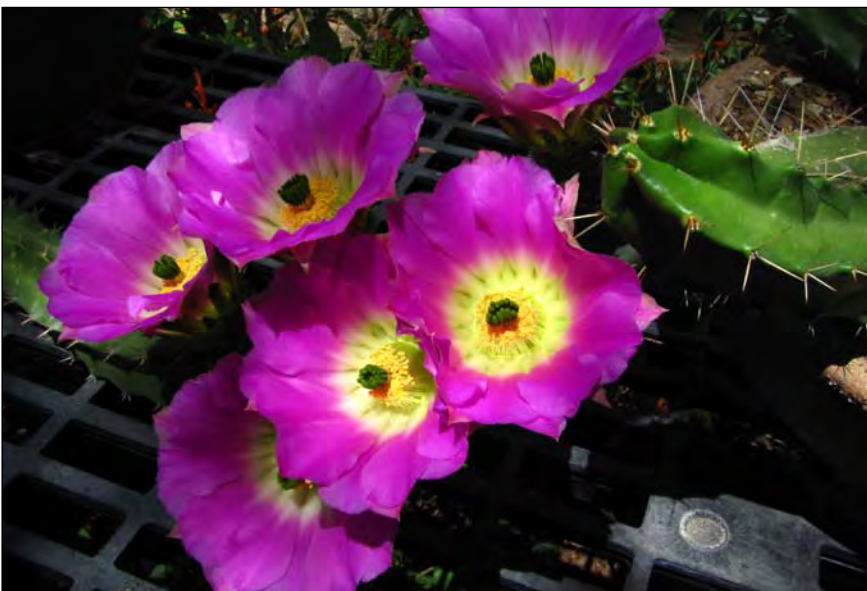


Figure 2. Alicoche flowers are often borne several to a stem.



Figure 3 and Figure 4. For a few days a year alicoche plants will bear a dozen or more open flowers at once, creating a dazzling display.

Growing in the Desert Series: Coir (Coconut Husk Fiber): A Universal Potting Medium?

by Mark Dimmitt

What is coir?

Coir (pronounced “koyer”) is the fiber from the husk of the coconut, the part between the hard inner shell and the outer coat. It has long been used to make doormats, mattress and upholstery stuffing, rope, and fishing nets. But mainly it is a waste product of the coconut industry; mountains of the stuff have accumulated in tropical countries where coconut palms abound.

Coir has been used in the USA as a potting medium for a variety of plants for at least two decades, especially in Florida. Until recently its availability has been undependable and the quality highly variable. These problems have been solved, but few horticulturists are aware of recent developments.

Dispelling coir’s bad rap

1. *Coir is soggy muck that drowns plants.* Until a few years ago the main coir product sold in the USA was “cocopeat”, a fine dust that looks much like horticultural peat moss (Figure 1). This product holds even more water than peat, and because of its fine texture, it remains saturated for days after irrigation. I have tried it, and even when mixed 1:3 cocopeat:pumice or perlite, it killed nearly every plant that requires good drainage. This stuff is indeed deadly.

The product discussed in this article consists of fiber and small chips, with almost no dust (Figure 2). Even when it’s saturated, it contains abundant air pockets and therefore roots will not suffocate.

2. *Coir is dangerously salty.* Coir used to be washed in seawater, and was therefore quite toxic to most plants. It had to be thoroughly leached before use, especially the larger chunks used for growing orchids. Modern coir processed for horticultural use has been fresh water washed, and is very low in salt. Tucson tapwater is five times more salty than today’s coir.

3. *Coir comes in hard bales that must be laboriously broken up by hand.* Cocopeat was usually sold in compressed bales. The bales were very difficult to moisten, and even after soaking for several days they had to be physically broken up. This was difficult and time-consuming. The newer fiber and chip products often come in compressed blocks of one-half cubic foot (Figure 3). When a block is submerged in water, it saturates and falls apart in a few minutes, expanding to two cubic feet (15 gallons, Figure 4). It’s very easy to use.

My experience with coir

Potting medium is a common topic of discussion whenever and wherever horticulturists gather. A huge variety of ingredients have been used, with varying degrees of success. I’ve been growing plants since the 1960s, and have spent most of that time experimenting in the hope of finding the ideal medium for my growing conditions and the plants I like. For the past 15 to 20 years most of my media have used peat moss as the primary organic component, amended with different proportions of pumice or perlite for aeration and drainage. (The product is Sunshine Mix, which is about 90% peat with some perlite and

pH buffers.) I had good success with these ingredients, but I was never completely satisfied. One of my two main complaints is that the peat retained moisture too long during cool weather, encouraging root rot of sensitive plants. The other complaint is that peat breaks down in a couple of years in our hot climate, so plants needed to be repotted regularly even if they had not filled the pot.

Now I have found a product that thrills me. I discovered good coir in 2008, when I visited Tropica Nursery near Mumbai, India (with Kevin Barber). The nursery covers many acres and produces a wide range of plants, including tropical foliage and flowering plants, succulents, food plants, and orchids (Figure 5). All of them are grown in 100% coir. Owner Dr. Ashish Hansoti has been a pioneer in developing coir as a growing medium. One of his contributions is his research to determine the nutritional needs of plants grown in coir.

I began experimenting with coir when I returned home the same year. After one growing season I was so pleased with the results that I began repotting almost my entire plant collection into coir-based mixes. After four years’ experience with it, I have concluded that coir is by far the best all-around organic potting medium that I have ever encountered. Succulents that have performed superbly in media consisting of from 30% to 100% coir include: Adenium, Pachypodium, Plumeria, Aloe, Agave, Sansevieria, Trichocereus, Mammillaria, Stapeliads, Caralluma, Bursera, Boswellia, Fouquieria, Haworthia, terrestrial and epiphytic bromeliads, terrestrial orchids, and some Euphorbia (I have only a few). Nonsucculents have done excellently too, such as citrus, figs, peaches, blackberries, melons, tomatoes, corn, Asclepias, Hibiscus, and many bulbs including Gladiolus, Lachanalia, Scadoxus, Hippeastrum, and Boophone.

I have been using 2/3 to pure coir for tropicals, including tropical succulents such as adeniums. For more xerophytic species I use 25-30% coir, with the rest being perlite and/or pumice. The only plants that have not done well are some extreme xerophytes such as Mohave Desert cacti, Ariocarpus, many mesembs, and Caralluma socotrana. But I have never had much success with these plants in any medium.

Horticultural properties and availability of coir

I have found coir to have numerous advantages over all other organic components of potting media that I have ever used, and few drawbacks. The main ones are summarized in Table 1. The number one best trait is that it has both high water-holding capacity and simultaneously retains plenty of air. This means that it’s nearly impossible to overwater most plants during their growing season – you simply cannot suffocate the roots. It is highly resistant to oxidation and microbic breakdown; it lasts at least four years with tropical plants when it’s kept continuously moist, and longer for more xerophytic ones. Unlike peat, it does not shrink when dry, and is easy to rewet when it’s time to awaken a plant from dormancy. Since I eliminated peat-based media, I have had almost no problem with fungus gnats, although others have reported that these flies can live in coir. In my four years of experience with coir, loss from root rot has fallen to a small fraction of that with peat media. In fact, I have

had almost no root rot of most plants including adeniums, cacti (except extreme xerophytes), aloes, and agaves. Research indicates that coir suppresses the growth of several pathogenic fungi.

Coir lasts two to four times longer than most other organic potting components. In our hot desert climate peat will break down into muck or oxidize to nothing in only a year or two. I have had adeniums in the same pot for four years so far, and the coir is still largely unchanged after all this time of being watered three times a week during the hot season (Figure 5).

Another result I and some others have noticed is that one can grow larger plants in smaller pots. The apparent reason is in the root distribution within the media. With peat-based and other tight media, the roots are concentrated around the inner surface of the pot, especially of clay pots. In coir the roots are abundant throughout the volume of the medium; this is most likely a result of the superior aeration provided by coir (Figure 6).

The disadvantages I've encountered so far are minimal. Small pots (up to about 7 inches) need more frequent watering than in peat-based media. This has not held true for larger pots. Coir is so loose that it exhibits little capillary transport; therefore the center of a mass of it tends to remain moist until roots absorb the water.

Coir is also very low in nutrients. It's even more important than with other media that plants are fed regularly with a complete

fertilizer containing all macro- and micronutrients. And because it's organic it has low cation exchange capacity, so cations leach rapidly. For that reason I add a small amount of vermiculite (expanded clay) to provide cation exchange. I also add dolomite limestone to provide the macronutrients calcium and magnesium (or gypsum for plants that need a neutral to acid medium). Plants that have not been repotted into new medium for more than a year get topdressed with gypsum annually. (I do this with all plants in all media; calcium depletion results in root death.)

The best news is that coir is now readily available in several grades of uniform quality, from fine granules for seeds and seedlings (this product is much better than the old cocopeat) to large chunks for orchids. Riococo (riococo.com) has eight large production plants in Asia, all with the same equipment that produces identical products that are OMRI-listed (omri.org). These products are distributed by Eco Gro in Tucson, in quantities from single blocks to containers.

My experience so far is anecdotal, although the variety and number of plants I grow is very large. I have just begun controlled experiments to precisely measure the performance of adeniums and several other succulents in coir. Dave Palzkill and hopefully others are doing the same. But I already have enough confidence in this product to wholeheartedly recommend its use for a wide variety of plants. Most will perform superbly in it (Figure 7).

Table 1. Comparison of some common characteristics of coir- and peat-based media.

Trait	Peat-based media (30-50% peat)	Coir-based media (50-100% coir)
Water-holding capacity	Very high	Extremely high
Air content (drainage)	Low to moderate	High, even immediately after saturation
Drying response	shrinks	Does not shrink
Wetting after drying	Hydrophobic; very difficult to rewet	Rewets quickly
Longevity in hot climate	<u>1-2 years</u>	At least 4 years, probably longer
Sustainability	Mined from ancient peat bogs overexploited	renewable
Biological activity	Fungus gnats and water molds thrive in it	Fungus gnats seldom colonize it. Coir suppresses the growth of several pathogenic fungi.
Chemical reaction	Neutral pH	Very acidic (Sunshine Mix is buffered to be slightly acid)

* Acme Sand and Gravel (Tucson) PotB potting blend, a 1:1 mix of compost and 3/8" pumice. It's used by several area nurseries.



Figure 1. This compressed bale of cocopeat has been out in the Tucson weather for at least five years, and is still largely intact. After days of soaking water has penetrated only a few inches into it, and then it must be broken up by hand. Miserable work! Once wet, it stays saturated for many days. This product is deadly even when mixed with up to three-quarters pumice or perlite.



Figure 2. Closeup view of crushed coir (Riococo's S2 grade), consisting of fiber and small chips. The photo was taken minutes after the sample was saturated. Notice the abundant air spaces among the bits of very wet coir.



Figure 3. Coir is commonly sold as blocks of about a half cubic foot.



Figure 4. When the block in Figure 3 is submerged in water, in about 15 minutes it expands into two cubic feet (15 gallons) of loose product. When packed into pots, it compresses to about 10 gallons in volume.



Figure 5. Tropica Nursery near Mumbai, India, 2008. Among the succulents visible, all grown in nearly 100% coir, are Adenium, Haworthia, Sansevieria, Opuntia, Agave, succulent bromeliads including pineapples, Euphorbia milii hybrids, and Kevin Barber. The health and vigor of these plants stimulated me to try, and quickly to switch to coir.



Figure 6. *Adenium* 'Arabian Ruby' root ball unpotted after four years in a 10-inch pot of pure coir. The fibers and chips are still largely intact. The plant is four feet tall.



Figure 7. *Adenium* 'Rainbow', a Hansoti selection, grown for two years in a 15-inch pot of 2/3 coir and 1/3 pumice-perlite. Plants grown in coir exhibit excellent vigor and color.