A big thank you to all the authors, photographers and newsletter editors who so freely share knowledge from their Affiliate groups with To The Point. Your participation makes this publication possible.

Share your knowledge. It is a way to achieve immortality. ~Dalai Lama

A Cactus Quest to Catalana Island

Join Hunter @CactusQuest on his trip to find giant cardons (*Pachycereus pringlei*), the tallest *Ferocactus*, and *Bursera* on an uninhabited island in Baja, CA. This is Part 3 of the series.

Watch the Video

*World’s tallest Ferocactus grows on an uninhabited island in the sea of Cortez*
A C&S Collection in Midlothian, TX

Alix Nelson, Ft Worth, TX
Reprinted from The Cowtown Connection, May 2023, Fort Worth
Cactus & Succulent Society

I had the opportunity to visit with Dennis and Liz Barclay at their home in Midlothian, TX. Home is 2.9 acres with lots of trees as well as open spaces that put on a beautiful wildflower show every year.

Dennis was initially a member of the Dallas Affiliate (NTCSS). His introduction there was via an advertisement in the Dallas Morning News for their plant sale at the Irving Mall.

Dennis and Liz moved to Midlothian from Houston in the late 80s. They originally lived next door to their current property. When that property became available in the late 90s, they decided to build a new home on it so their daughter could have a horse.

A 14’ x 23’ greenhouse was built at the same time the new house was being built. The greenhouse walls and roof are made of fiberglass panels. It was

All photos (unless noted): Alix Nelson

Figs 1–3. The greenhouse inside and out.
Fig 4. Melocactus spp
Photo: Irwin Lightstone
Fig 5. Astrophytum coahuilense
Photo: Irwin Lightstone
Fig 6. Old Astrophytum plants in the greenhouse.
Fig 7. Spent potting soil goes in the compost for rejuvenation.
re-skinned about 5 years ago; the original fiberglass lasted approximately 20 years. Eight storm windows (obtained very inexpensively) were the ‘foundation’ for the greenhouses’ construction and are evenly spaced around the perimeter walls. They are hung upside down to facilitate being opened and closed. Two fans are used to circulate the air; one set on a timer, the other on a thermostat controlled to run the fan when the temperature gets to 80 degrees. During the summer, the temperature inside the green house can get up to 115 degrees. Dennis uses a shower spray hose attachment to water the plants.

Dennis and Liz have such a lovely collection of cacti, my personal favorites are the astrophytums. They are a slow growing genus; it can take up to 20 years for them to achieve a large softball size.

The Melocactus in Dennis’ collection are over 25 years old. The cephalium, a reddish-hued wool and bristle coated structure that grows atop the plants, begins to form when they are 8–10 years old. This structure

Fig 8. This cactus garden was created in 2011, and has expanded over time. The newest bed is just beyond this large one, both are situated behind the house.

Fig 9. Oh look! Bluebonnets have invaded the cactus bed.

Fig 10. Echinocereus triglochidiatus ‘claret cup’

Fig 11–12. Dennis trims the petals on an Adenium when he is ready to help with the pollination process.

Fig 13. Using forceps and fishing line, Dennis plays Mother Nature.

Fig 14. Once temperatures stay above the low 40s, the adeniums are brought outside. And after the chinkapin oak trees on the property have finished blooming, the rest of the potted plants are brought outside.
led to their common name 'Turk’s Cap Cactus'. Before the cephalium forms, young Melocacti are visually similar to barrel cacti (which is the common name for various members of the Echinocactus and Ferocactus genera).

Along side the greenhouse are three compost bins. The first phase consists of mixing oak leaves from the property, mushroom compost, veggie and fruit scraps. As plants are repotted throughout the year, the re-claimed potting soil and pumice will be mixed into the compost. This mixture is used for everything except cacti since they are not a big fan of compost. When cacti need repotting, they get a mixture of purchased cactus mix and plenty of pumice.

In case you weren’t aware, one of Dennis’ favorite plants is Adenium. He especially enjoys propagating them from seed. Here is an overview of his process.

To get started, you will need two different Adenium plants that have flowered in the last 2–3 days. (If you don’t have two, ask a friend if you can borrow one.) You’ll also need a scissor, a forceps, and a 3” length of 10 lb. fishing line.

Trim the petals from a flower on each plant. Use the forceps to insert the fishing line into the base of the first flower. Twiggle (twist and wiggle) it around several times to grab some pollen from tip of the anther located at the flower’s base. Now insert the fishing line into the base of the other flower. Repeat the twiggling motion to deposit the pollen into stigma of the second flower, also located at the base.

Dennis and Liz enjoy primitive camping, having made several trips to Big Bend and other wonderful places around the country. Recent adventures include white water canoeing and shore camping. They also enjoy gardening, tending a plot that boasts enough potato plants for a 6-month supply.

As with my other interviews, it was a real challenge to limit what to include in Dennis’ article ... so much wonderful content and photos. Thank you Dennis for making time to visit with me. And thank you Irwin for the gorgeous photo stacks of Dennis’ plants.

Fig 15. An Aloe with a seed pod enclosed in a plastic bag so the seeds can’t escape.

Figure 16. Euphorbia unispina with seed pods covered with cotton so the seeds can’t escape.

Fig 17. A variety of Sansevieria spend the warm part of the year outdoors in a bed near the house. When temperatures fall into the upper 40s, all potted plants are brought into the green house. Except for the sansevierias, nothing is watered during the winter.

Figs 18-19. Such an interesting story around the agates and geodes. A neighbor collected them during many years of RV traveling. He would cut and polish them, and really had an eye for identifying those stones that would eventually reveal such beauty. When he passed away, his daughter offered some of the collection to Dennis. They can also be found around the greenhouse and the cactus gardens.

Fig 20. Dennis in the summer garden.
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THREE SMALL GENERA OF SOUTH AMERICAN CACTI

Sue Haffner
Reprinted from Cactus Corner News February 2023, Fresno Cactus & Succulent Society

**Setiechinopsis mirabilis.** This monotypic genus is found in Argentina, growing in unusual saline or brackish areas. Its purple-brown stems rarely exceed 6” in height, but its showy white blossoms tower over it. The blossoms produce large dehiscent fruits and large quantities of seeds. This may be because the plants, themselves, are short-lived (3 to 5 years).

You can find these for sale now and then, but no nurseryman is going to tell you that it only lives for a few years—but it does produce all those seeds, so you can soon go into production yourself.

**Arthrocereus.** This is a genus of solitary or low shrubby plants with cylindrical stems. The large nocturnal flowers, white to pinkish, have long, funnel-shaped floral tubes.

The genus is close to *Echinopsis* but differs in pollen and fruits. Four species are recognized: *A. glaziovii; A. melanurus; A. rondonianus;* and *A. spinosissimus.* All are endemic to the Minas Gerais area of Brazil, with the exception of the latter, which is native to the Mato Grosso. They grow in dry savannas and rocky areas, in the shade of shrubs, near streams.

**Oroya.** This genus is named for the area in which it was first found, La Oroya, Peru. The plants are low, subglobose with the apex frequently depressed. They sometimes become elongated with age; they’re usually solitary, with tuberous roots. The epidermis is fresh green to olive green; the flowers diurnal, self-sterile, with a short floral tube. The outer petals are yellow to greenish or pink to red with an intense yellow heart. It is pollinated by hummingbirds, bees, butterflies and ants.

Two species are currently recognized: *O. borchersii* and *O. peruviana.* In the past, as many as 20 species have been noted, but this was the result of the variability of the two species in habitat. The plants are found in the high valleys of the Peruvian Andes, in full sun, among rocks and grasses. They are frost tolerant and are often covered in snow in winter.
The Dust Bowl of the 1930s gave rise to the formation of the Soil Conservation Service (SCS). According to a National Park Service document, it is they who used Buffelgrass (*Pennisetum ciliare*) as a trial experiment in the 1930s -1980s on reservations and federal lands to help control erosion in many of the southwestern states. The long-lived perennial grass was also planted for cattle forage and for the stabilization of tailings near copper mines. Likewise, during the 1980s the Maricopa County Flood Control District and the Indian Highways Department of the Bureau of Indian Affairs seeded Buffelgrass. Now Africa’s native grass has gone amuck in creating a noxious grass prairie that threatens the Saguaro National Park’s ecosystem that lies within the Sonoran Desert, a park that was first established as a National Monument by President Hoover in 1933, but then later became a National Park in 1994.

It is here the majestic Sagueros have stood the test of time having established themselves 10,500 years ago in Saguaro National Park’s Desert scrub in Tucson, Arizona. They now provide a welcoming home to the Cactus ferruginous pygmy-owl, a species that is now being considered for relisting by the U.S. Fish and Wildlife Service as being threatened. The keystone species is also pollinated by the Lesser long-nosed Bat who sips the white spring flower’s nectar, a bat that was delisted from the U.S. Species Endangered Species in 2018.

Meanwhile the severe threat of Buffelgrass causing a fire with a fuel load of 1 to 4 tons per acre...
and flames lengths reaching 12–18 feet and temperatures of 1,300–1,600°F as recorded in a 160-acre prescribed burn of the Saguaro National Park in 2008 could be catastrophic and real. That is why in 2022 the Bipartisan Infrastructure Law funding allocated $200,000 for the treatment of buffelgrass in order to reduce wildfires, mitigate its impacts, and rehabilitate burned areas. Along with the Tucson Audubon Society locating invasive species and treating them, there are also volunteers from the Sonoran Weedwackers, Catalina State Park Buffel Slayers and the Arizona Sonora Desert Museum who manually remove the perennial bunchgrass. Sadly, there are other pushy contenders like Lehmann lovegrass (*Eragrostis lehmanniana*) and red brome (*Bromus rubens*) too that jeopardize this special place with its two distinguished districts: Tucson Mt. District and the Rincon Mt. District. The Rincon Mountain District (Saguaro East) includes a semi-desert grassland, an oak woodland, a desert scrub, et cetera. The lowland’s ecological community is not readily alterable if a fire should arise, hence the need to control the invasive species. Having said this, it cannot go without saying that spraying of herbicides glyphosate and 2,4-D does occur. Concerning is that the USGS knows that using Surfactants with aerial spraying of glyphosate for better absorption is harmful to aquatic species. These are only 2 of the twelve herbicides listed in the Restoration Management Plan meant to prevent wildfires by controlling the spread of the invasive species of grasses, save a diverse ecosystem and the Tucson economy.

My question to them is, are you making use of the one and only native Biological Control insect, the Spittle bug, *Aeneolamia albofasciata* that lives among the Sonoran Desert wildlife? Word has it the Spittlebug can eat 50% of the buffelgrass that exists above the topsoil, but it is with much dread and irony that I found prescribed burning studies conducted in the mid- to late 1980s that advised ranchers in south Texas, northeast and northwest Mexico to burn buffelgrass during the second and third nymphal stages of the Spittlebug to help control the native insect and not the noxious weed. Later in the late 1990s at Carbo Livestock Research Station in Sonora, Mexico prescribed burning was also conducted to control the population of the Spittlebug. Could this explain why it has been said that the Spittlebug range is moving northward? Some people have the hope that these insects will soon discover the mountains surrounding the Tucson Basin, inundated with buffelgrass, and help themselves to a heavenly feast. Lastly, “Save Our Saguaros” was February 4–March 4 2023. Those wishing to volunteer or support the effort...... https://desertmuseum.org/buffelgrass/pullindex.php.

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*Editor’s note: As far as we know, spittlebugs are not considered an effective control of buffelgrass, and may be harmful to native vegetation, but it’s an interesting possibility that might warrant future research.

Buffel Grass, *Cenchrus ciliaris*, seed heads.
Photo: John Tann, Sydney, Australia
https://upload.wikimedia.org/wikipedia/commons/c/cf/Buffel_Grass_%283236231028%29.jpg
Staging is a term for how the plant is displayed, whether it be for a show, competitive or not, or for the home and garden. In this article I identify some considerations to keep in mind when you repot your plants for show.

Choosing a show plant: A show plant should be free of obvious infestations, scars, and discoloration, because these factors are indications of the condition and health of the plant. Choose a mature plant with uniform growth and not overly etiolated (leggy).

Time of Year to Repot: [https://southcoastcss.org/dormancy](https://southcoastcss.org/dormancy)

For summer growing plants, potting in late April or May into summer, lessens the chances of fungus attacking the damaged or cut roots. Pot up winter-growers in late September into October, preferably prior to the first rains.

Preparing the plant: Clean the roots (get rid of old soil, dead or rotting roots, and weeds), then cut off dead or excessive roots and inspect roots for infestation. Presence of a long tap root will give you a better estimate of the correct pot to use. Remove cobwebs, loose soil, unsightly water spots from the plant itself. Succulents may require shaping with a pruner to enhance the appearance. It is best to totally re-shape a plant either a few weeks before or after repotting, once roots are established.

Choosing a pot: Some plants grow quite well in plastic, but if the planned location is in direct sun all day, a plastic pot is more likely to overheat the plant. However, plastic pots will dry out less quickly and therefore need less frequent watering. Ceramic pots hold more moisture if glazed inside and out or if very thick. Thinner ceramic will hold less water and if not glazed inside are ideal for cacti. Terracotta pots dry out the fastest and are a good choice if you can be attentive to watering. Typically, a judged show will favor pots that are ordinary clay, stoneware, or ceramic over plastic. Inspect your pot for chips or cracks, unsightly stains, or salt deposits. Clean the pot thoroughly, (soak in a
vinegar solution or use WD-40 to remove salt deposits). Choose a pot that is a complementary size, shape, and color for the plant. Remember, you are displaying the plant, not the pot. Try to avoid very light colors that detract from the plant. Ideally, the pot is large enough to give the plant room to grow while not overwhelming the plant for show.

**Potting up:** Cover the drainage hole with thin screen or porous paper, enough to let out water, but to retain loose soil. Fill the bottom of the pot with new soil, then place the plant with its best face forward. In a rectangular pot, this would be along the broader side. The plant should be raised above the level of the rim of the pot and held in place while placing remaining soil up to a cm below the rim of the pot. Judged shows require one plant per pot unless you are creating a dish garden. Pups growing off a main plant, underground connections via rhizomes, or above ground via stolons, all constitute one plant. However, if you separate these pups off the main plant and plant them separately, it becomes a dish garden.

**Top Dressing:** Bare soil does not show well, so addition of top dressing is highly recommended as it gives a well-groomed effect. In a large pot, the plant may be enhanced by placement of rocks, as this simulates natural habitat. Choose rocks that complement and stabilize the plant. Use an odd number of rocks in random placement placed partially beneath the soil. Top dressing should then be placed and may consist of clean gravel, natural looking pebbles, lava rock, coarse sand or decomposed granite. It should never detract from or clash with a plant. Avoid very light or bright colored top dressing that can distract judges and make photography more difficult. The top dressing should reach the rim of the pot.

Lastly, remove the tag, place the correct name on the entry show slip and tape the tag to the bottom of the pot so you don’t lose it. Step back from your plant, make any adjustments and observe the final result. Your plant is now ready to show!

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**All photos: Laurel Woodley, taken at the 2022 36th Annual Intercity Show and Sale**

37th Annual Intercity Show and Sale 2023
August 4–6
Reservations required. Plant Sales 8 AM–5 PM daily.
Show opens August 5–6, 8 AM–5 PM at LA County Arboretum, 301 N. Baldwin Ave., Arcadia, CA 91007
Details: [https://intercityshow.com](https://intercityshow.com)

Top: *Haemanthus deformis*
Middle: *Copiapoa dealbata*
Bottom: *Thelocactus rinconensis*
Ten Thousand Times Hotter than the Hottest Chili Pepper

A common denominator of all the euphorbias is a milky latex sap, known to be a toxic skin irritant. One, *Euphorbia resinifera*, takes the toxicity—and heat—to a deadly level. Find out more about the milky sap of *Euphorbia resinifera*, and the possibilities for medical uses, in this article from Wired, a video from *Everything Science* and a quick explanation of the chemical make-up from Chris A. Martin, Ph.D., Emeritus Professor, Arizona State University.

*Euphorbia resinifera*, the resin spurge, is a species native to Morocco, where it occurs on the slopes of the Atlas Mountains. It contains resiniferatoxin, an extremely potent capsaicin analog tested as an analgesic since 1997.

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**Euphorbia resinifera**

“Resin spurge makes a nice and tidy succulent-like subshrub for xeric landscapes or patio containers. It is low maintenance, clean and care free.....but it does have a dark side.....”

Toxicity Warning: Resin *Euphorbia* emits a thick white milky sap known as latex when stems are cut or damaged. This latex (resin) is poisonous containing some of the most potent irritants known. The chief toxic constituents of the latex is resin, and is known to contain wax, calcium malate, euphorbone, euphorbo-resene, euphorbic acid, potassium malate, lignin, bassorin, volatile oil, and water, with no soluble gums. The latex is particularly dangerous for the eyes, skin and mucous membranes and will produce burning pain in bones and limbs and paralytic weakness in the joints. Also, resin spurge will produce respiratory and skin toxicity symptoms. Handle cultivated plants carefully and use extreme caution to NOT get any latex in eyes or mouth. The acrid resin is soluble in alcohol, and will burn brilliantly, becoming very aromatic.

[Click link for article:](https://www.wired.com/story/resiniferatoxin/)

[Click link for video:](https://www.youtube.com/watch?v=sYg-j2U7iHE)

Thanks to Ray Jorgenson, Chicago's Garfield Park Conservatory for sending this.
J. Reese Brown
Reprinted from the Cactus Courier, newsletter of Palomar Cactus & Succulent Society San Diego, CA USA February 2001

Euphorbias have a strange and varied sex life. It ranges from semi-celibate to wildly promiscuous with a bent toward polyandry. This is all brought about by the varied and different structure of the flowers.

The flowers of the Euphorbia are born in a complex structure called a cyathium (Fig 1). This starts with a cup like appendage, the involucre, that surrounds the actual flowers. The involucre bears a series of nectar glands (usually 5) around the outer rim and (sometimes) bracts at the base. The flowers themselves grow out of the center of the cup and are found with a variety of combinations. Some species are unisexual in


Fig 2. Euphorbia obesa - Male flowers
Fig 3. Euphorbia obesa - Female flowers


Fig 5. Euphorbia cap-saintmariensis close-up of a flower. Photo: Dornenwolf from Deutschland, https://upload.wikimedia.org/wikipedia/commons/0/02/Euphorbia_Cap_Saint-mariensis_%28289162528614%29.jpg
that they have only male or only female flowers in their cyathia. Others are bisexual and have some cyathia with both one female and many male flowers. However, often these same plants also have some cyathia with only male flowers. A commonly encountered cluster of three cyathia with a mixed sexual orientation is called a cyme.

The seeds of the euphorbias are born in a triangular 3-celled seed capsule. It always contains three seeds which are broadcast widely as the capsule ripens. This occurs as the outer shell hardens, shrinks, and then pops open. To collect the seed, the seed capsules should be covered with a collection screen. This can be made from window screening or sheer hosiery.

Of the succulent euphorbias from Africa, the plants in the peduncular spined group (e.g.: Euphorbia polygona, E. horrida, E. mamillaris) are unisexual. Species from the stipular spined groups (e.g.: E. ingens, E. echinus, E. knuthii) and the leafy Madagascar species are normally bisexual. Species with the unisexual flower arrangement are called dioecious meaning “two houses.” This is because two plants (houses) are required to achieve pollination and therefore seed. The bisexual species are called monoecious meaning “one house” as one plant (house) contains all that is necessary for pollination.

The presence or absence of both sexes in one plant tells only part of the tale. Some of the bisexual species are self-fertile. That is, the female flowers on a given plant are receptive to the pollen from the same plant. This is normally the case with the stipular spined...
species such as *E. groenwaldii* and *E. ingens*. Others, however are not self-fertile and pollen from a different plant are required for pollination. *Euphorbia millii* and *E. lophogona* are examples of this class. I suspect that the lack of receptiveness also applies to clones from a common original stock. I have two plants of *E. capsaintmariensis* that I have attempted to cross-pollinate with no success. I suspect that they both came from the same original imported plant by vegetative propagation.

The female plants from the peduncular spined group, which are always unisexual, are receptive to any stray grains of pollen that come along and are always producing mongrel (hybrid) seeds that grow readily and produce equally mongrel and unidentifiable plants. These hybrid plants are often very attractive, and as a result, are to be tolerated despite the confusion that they create to the true *Euphorbia* students and lovers. This same problem was created intentionally by Mr. Edwin Hummel of Carlsbad with his large number of hybrids of the Madagascar species. The “Hummel Hybrids” were made using the various varieties of *E. millii* and *E. lophogona* though the actual lineage has long been lost (if it was ever recorded). Despite the confusion, the Hummel Hybrids are desirable plants, both for their plant and foliage form and for their continuous production of colorful flowers.

As a result of the varied and often capricious nature of the sex life of euphorbias, some species are best propagated by vegetative means only. Others can only be propagated sexually using seed. For these, extreme care must be taken to insure that hybrid seed are not created. There are others that can be propagated vegetatively but the resultant plants will never obtain the true form of a seedling plant. This is particularly true of the caudiciform species. For example, a rooted arm from *E. groenwaldii* will never produce a caudex; it will always be just a rooted arm cutting. In contrast, a rooted arm of *E. ingens* will have all of the characteristics of a seedling plant. Each species must be considered as a separate case.
Beginner’s Guide to ‘Retuse’ Haworthia
Tom Glavich, Los Angeles, CA

_Haworthia_ are incredibly variable and beautiful small plants from South Africa. Almost all the species are easy to grow. The most often collected of all the Haworthias are the ‘retuse’ species. These plants are addictive. Once you have four or five species you are well on your way to having fifty or more as your appreciation for the infinite variation in form, color and pattern deepens. The word ‘Retuse’ is poorly defined, but generally accepted to mean those plants with thick leaves that bend backward near the tips. A retuse _Haworthia_ is often readily visible, but sometimes the subject of expert opinions and discussions.

_Haworthia_, along with _Aloe_ and _Gasteria_ are members of the Asphodelaceae Family. _Haworthia_ are confined almost exclusively to South Africa. The genus has historically and continually posed some significant taxonomic challenges. In 2010 the genus was divided into three, _Haworthia retusa_ a form in cultivation in Southern California, one of many of this popular and easily grown species. It produces offsets rapidly.

Exemplary Retuse Haworthias

_Haworthia mutica_ var _nigra_ is another of the dark brown to purple species. This is another plant often used in hybrids.

_Haworthia, Haworthiopsis_ and _Tulista_. All of the retuse forms remain in _Haworthia_. Because these plants are so variable, most species have been named several times over. There are many names no longer traceable to individual plants or even localities. In cultivation, many species often bear little resemblance to anything seen in habitat. To make a messy situation even worse, it is common for two (or more!) species to transition gradually (intergrade) from one to another over many miles. All of this can lead to a great deal of name confusion. For the beginning grower the best solution is to hang onto the label that came with the plant.

Fortunately, none of this affects cultivation. _Haworthia_ are classic ‘Winter Growing’ succulents. They start growing when the summer heat ends, with growth picking up with the cooler nights of late September and October. They generally stop growing for a while in December and January, when the night temperatures are below 50 degrees for hours at a time, and the sunlight during the day is weak or absent. They start growing again in February or March and can continue to grow until the sustained heat of summer arrives, when they again shut down for a summer dormancy. If kept warm (60 to 70°F),
Haworthia emelyae var comptoniana is a large, smooth topped plant that offsets slowly. The leaves are triangular, and flat topped, covered with a pattern of lines that occasionally break down into patterns of fine white dots. Each clone has a different pattern.

Exemplary Retuse Haworthias

Haworthia magnifica var splendens appropriately named, this is one of the best of the whole genus. Slow growing with wonderful lined patterns.

Exemplary Retuse Haworthias

and under artificial lights they can be kept growing throughout the winter.

When growing they benefit greatly from rainwater and can take surprising amounts without damage. A little light fertilization will bring out the best growth. Too much fertilizer will cause excessive leaf growth, and the whole plant will start to look flabby. It’s best to work for tight firm leaves. Give them enough light to bring out some of the leaf colors (other than green). Good light will bring out complex and subtle shades of dark red, pink and white. Too much light will result in burnt tips. These are rugged plants, some experimentation to get the conditions right won’t hurt the plants in the long term.

Haworthia are tolerant of varying potting mixes and success has been reported with everything from straight pumice to potting soil – pumice or perlite mixes, to plain potting soil, and even garden soil. As long as there is good drainage Haworthia will thrive. Most good growers avoid having peat in their potting mix. Although peat lightens the mix it is hard to wet when dry and seems to promote root loss. Occasionally a potted Haworthia will lose all of its roots to rot. This is generally obvious, the plant with missing roots will start to look wilted, growth will not be uniform with other Haworthias, there are often dead leaves around the periphery of the plant, the top dressing at the edge of the plant will be discolored, and most telling of all, the plant will be loose in its pot. This can be easily repaired. The plant needs to be removed from its current pot, the dead and decaying tissue removed, and the plant repotted in fresh rapidly draining mix. Within just a few weeks signs of new growth will appear.

Haworthia can take light freezes without damage. Temperatures in the high twenties will generally have no effect at all on them, even when wet, as long as they warm during the day. They can be naturalized as a ground cover, placed under shrub cover in warmer areas of the country.

Haworthia are easy to propagate. Most species offset or pup when still relatively young. The pups can be removed (cutting with a sharp knife is best) from the mother plant when five or six leaves are seen. The pups will often have few or even no roots but if potted up and left in the shade, and kept slightly moist, will send out roots and start growth in just a few weeks. Single leaves can be propagated from those plants reluctant to pup. A single leaf needs to be pulled from the plant, keeping at least one of the little ears on the side of the leaf where it attaches to the main stem. The leaves that work best are
Haworthia bayeri is one of the best of the retuse Haworthias. It is slow growing, and often used in hybrids.

Neither the oldest nor youngest, but those that have recently become nearly full grown. These take longer to root and show growth than pups, and not all leaves will be successful. The thicker roots can often be removed, as close to the plant body as possible, and preferably with a little body tissue. If the top of the root is left about a quarter of an inch above the soil, they will sometimes produce new plants. This is not a reliable technique but worth a try with a plant whose appearance is important. Finally, seeds are available. These should be planted as the cooler weather of fall arrives. They require nearly constant moisture, and freely moving air to survive their first winter. The seedlings are very slow at first, but then pick up speed after the first year.

Haworthia are notable for their variety of forms. Almost all of the species have varieties, forms, cultivars, and plants propagated from selected locations that are collected individually. Bruce Bayer’s Haworthia Revisited is the best guide to forms, and intergrades between species. As always with very variable plants, there are lots of other species that have been described as a variety of Haworthia retusa, only to be moved to another species, raised to a species themselves, or lost and forgotten.

Most of the plants in this genus offset easily, and propagation is easy from offsets. Offsets without roots will put out roots in just a few weeks. Seed is sometimes available, and easily germinates in cool weather, with best results coming in October, November and December.
This plant was ordered online in 2020 and was sold as *Mammillaria polythele 'inermis'.* At first, the plant appeared to be, instead, *Mammillaria polythele*—that is until it was turned around. Half the plant is smooth and spineless, like typical *M. polythele 'inermis*', the other half is fully covered with spine-tipped tubercles (Figs 1–3). Variability growth is not uncommon in this species, but such a clearly dual-faced cactus is a bit of a novelty.

Situated in a spot outdoors in an eastern exposure, where it gets about 7 hours of bright morning sun during the summer seems to suit it. Since this plant collection is in Zone 6a (northeastern Kansas), this *M. polythele 'inermis'* spends winters in a cool basement area under florescent lights. A fan gently circulates the air in the room 24/7. Water is withheld while under the lights from mid-October until mid-April. In April, it goes outdoors where it is gradually acclimated to brighter and brighter sunshine. The sunshine and rain outdoors encourages as much compact

* The name, *Mammillaria polythele 'inermis*', has never been officially published according to the International Plant Names Index, https://www.ipni.org/?q=Mammillaria%20polythele
growth as can be attained without a greenhouse. Fortunately this plant is not terribly difficult. When the plant is growing outside, it gets any rainfall along with the occasional supplemental watering. A non-urea fertilizer is applied once a year in the spring. The potting medium is a commercial cactus mix amended with a 1/3-part red lava rock.

It will be interesting to see how this plant continues to grow. (Fig 4) The reason behind the distinctive growth of the two sides might have been caused by a myriad of reasons; an injury when the plant was very young, a genetic misfire, the make-up of the potting medium, the water quality, temperature fluctuations… None of that really matters since the joy is in cultivating something unique.

~Ed.
This is Part 1 of a three-part article about using a raised bed to grow cacti and succulents: the ‘science’ behind a raised bed, how to build one, including a materials list, and planting considerations with some suggested genus and species. At times I reference “cacti and succulents” both, but overwhelmingly, when I only use “succulents” I am including cacti.

I built my first raised bed for growing cacti and succulents over fifteen years ago. Since then, I have never missed an opportunity to transplant cacti and succulents into it in the spring and get them back in their pots in the fall before temperatures dip too low. I have consistently used a raised bed every year since that first summer after I saw such amazing growth results on so many plants.

I realized you can buy smaller, cheaper plant materials and grow them into larger specimens quickly. You can achieve rapid growth keeping your plants in pots by overusing fertilizer but that often results in a forced, leggy, unnatural growth form from growing them with too much fertilizer. I KNOW a raised bed works; but when planning this article, I felt the need to back up my results with the ‘science’—listing and referencing the facts from valid research.

You can amass an extensive library of books specializing in cacti and succulents and many will have at least a little information about growing succulents. Many, in fact, mention suggested parameters for soil, water, light, fertilizer, and types of pots (usually plastic or clay). Some books with even more topics will add information about water or soil pH, potting tools, and staging. The vast majority of books in my collection, however, do not mention anything about growing these plants in a raised bed. I can think of a few books that aren’t in my collection that I bet would at least cover information about preparing an area outside meant to grow winter-hardy plants year-round.

I have a few winter-hardy succulents elsewhere in my yard planted in the ground, but I have always used my raised bed, specifically, to grow many of my plants more rapidly. You can certainly find biology, botany and horticulture articles that discuss how differences in pot or container size, including raised beds, affects plant growth. Most of these articles seem to be discussing food crops and yield variations related to container size. There are data in these articles that we can broadly apply to any plants, including succulents. One article (Poorter et al. 2012) reported that the doubling of container size increased biomass production by 43%, possibly due to an increase in net photosynthesis. This same article mentioned that a smaller size container decreases the total nutrient content which results in lower levels of nitrogen and phosphorus equating to a decrease in photosynthesis. One article referenced here considered implications of container pot size influencing plant growth for other reasons. This article was specifically addressing the health and viability of vegetable and floral crops being transplanted from and to various size pots.

Some of this information can also be applied to succulents and the size of the pots we use and how a raised bed, even temporarily, might diminish or eliminate the negative effects. Several of the aspects that were included in this article (NeSmith and Duval 1998) discussed reduced rooting volume, a decrease in shoot growth, reduced leaf growth and plant development. Also, small pots have more surface area relative to their volume which increased soil and root temperatures. With the volume of even a small, raised bed, water, root temperature and nutrient availability is much more stable.

One book in my collection does address the benefits of a raised bed specific to succu-
lents and that is *Pachyforms: A Guide to Growing Pachycaul and Caudiciform Plants* by Philippe de Vosjoli. He later published *Pachyforms 2: Bonsai Succulents* along with Rudy Lime. Philippe is probably better known as a best-selling author of over twenty titles on reptile care and vivarium designs. I would argue that the succulent hobby scored big when he delved into our hobby with two publications, and you should definitely add his books to your personal library wishlist!

Vosjoli (2004) discusses an important broad consideration: that the succulent hobbyist should distinguish between the two ways to grow our plants. “The pachyform hobby involves two distinct approaches to growing plants with the purpose of achieving different goals. One set of conditions aims to obtain rapid growth, the other in inhibiting the growth rate for the purpose of display.” We see grand, old, mature specimen plants in person and in pictures of cacti and succulent shows and we want THAT plant, or a plant that looks like THAT one. Although on the sales tables you will often see a wide variety of specimen plants, the majority of plants there are seedlings or immature. These plants are certainly more affordable, but they aren’t the same as those huge specimens out on the show tables. Quickly doing even basic math shows that to start or quickly amass a collection entirely made up of large specimen plants will require you to either win the lottery or be independently wealthy.

Most of us buy large plants when available and we have the funds, or we buy small, cross our fingers, and begin the slow progression with hopes that those plants will one day turn into one of those wizened specimens. In his book, Vosjoli (2004) mentions that the fastest growth can be obtained using large planters or beds. He discusses several factors in his book to get our affordable small plants to the size we want them as quickly as possible. Then how, precisely, to shift gears and alter our growing technique when our plants reach the size we want them to be and how to maintain them at that size for display.

In hindsight, I am thankful that when I considered building my first raised bed, I didn’t start off with a literature search for research that would convince me to build one because I fear I might not have built one. With little effort, you can likely find more articles about raised beds than I did for this article. You might find many research articles that even specifically address succulents in raised beds. If you do, please consider writing an article for your local cacti and succulent society. If you really want to benefit our hobby and these plants even more, you should consider investigating the possibility of applying for the research grant program available through the Cactus and Succulent Society of America. At the very least, I would encourage you to build a raised bed, experiment, take good notes and lots of photographs and see the results you get. I bet you won’t be disappointed!

In part 2 of this article, I will describe in detail how I built my raised bed and will include a materials list for you to build your very own raised bed.

References


CSSA CALENDAR OF EVENTS 2023

Full details and updates at
CSSA Calendar
http://cactusandsucculentsociety.org/calendar_of_events.html

The Haworthia Society
The International Society for the study of Haworthias, Gasterias, Aloes, Bulbinas and other related South African plants

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Crassula picturata, native to South Africa. Needs excellent drainage, but not difficult to grow. Remains a small plant. Grown and photographed by Mark Raduziner, Mission, KS

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