KAKTOS KOMMENTS

A bimonthly publication of the Houston Cactus and Succulent Society
to promote the study of cacti and other succulents

Volume 63 Number 4 **July-August 2026**

Special Conservation Edition

Federally endangered
Astrophytum asterias in habitat
by Gierayl Clepper

Houston Cactus and Succulent Society
Founded in 1963
Affiliated with the Cactus & Succulent Society of America

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Calendar

July 9th, 2026	7:00pm Board Meeting via Zoom
July 22nd, 2026	7:00 pm Membership Meeting, Metropolitan Multi-Service Center Anniversary Potluck Dinner
August 26th, 2026	7:00 pm Membership Meeting, Metropolitan Multi-Service Center Program: TBD
September 1st, 2026	Deadline to submit articles for the KK

Membership — Sara Ortiz

On May 27, 2026, twenty-five members and three guests attended our membership meeting at the Metropolitan Multi-Service Center. John Weistroffer presented "Cryptic Morphology of Desert Plants – a Slideshow of Camouflage and Mimicry," an engaging program exploring the fascinating ways desert plants use camouflage and mimicry to survive in their natural environments. For May, Carson Einkauf presented the Cactus of the Month, *Opuntia macrorhiza*.

On June 24, 2026, thirty-eight members and one guest attended our membership meeting at the Metropolitan Multi-Service Center. Gierayl Clepper, known as "Madam Cacti," presented "*Astrophytum* and Its Hybrids," a fascinating program that generated great enthusiasm and interest among attendees. She shared her extensive knowledge and passion for *Astrophytum*, highlighting the remarkable diversity, unique characteristics, and beauty of these plants and their hybrids. The experience continued the following weekend, when Madam Cacti generously welcomed members for a tour of her greenhouse, giving them the opportunity to see her impressive collection firsthand and continue learning in a more personal setting. For June, Omar Herrera presented the Cactus of the Month, *Pereskia grandifolia* (Rose Cactus), and David VanLangen introduced the Succulent of the Month, *Bursera microphylla*.

CSSA News — Liliana Cracraft

This is a reminder that since our Club is an affiliate member of CSSA, our members are eligible for their Supporter Membership. It is regularly $20 per year, but you can get it now for only $10!

As a supporter member of CSSA, you'll receive:

- To The Point digital PDF e-newsletter (quarterly)
- Notifications of CSSA monthly webinars
- **Access to purchase seeds from the CSSA Seed Depot https://shop.cactusandsucculentsociety.org/collections/seed-depot**
- Eligibility to participate in all CSSA Photo Contests.
- Free admission to the Huntington Botanical Garden during CSSA Annual Show and Sale.
- A meaningful way to support CSSA's mission in conservation, research, & education

To join, please Use This Direct Discount Link:

https://app.joinit.com/o/cactusandsucculentsociety/viDRLZXRuWmiEp7YS/?discount=Houston-Affiliate-Partner-Discount

If you have any questions, please reach out to Liliana: opuntia77@yahoo.com

July Cactus of the Month — Pat Hudnall

Rhipsalis cereuscula

Common Names:

Coral cactus, Rice cactus, Mistletoe cactus

Habitat/ Distribution:

Rhipsalis cereuscula is an epiphytic cactus from tropical areas of South and Central America. Instead of growing upright in the ground like most cacti, it is found growing as a hanging plant in trees or draping over rocks.

Description:

There are over 30 species of *Rhipsalis*. Like many cacti, identification can be tricky if the plant comes to you unlabeled. Photos of the two from my garden, shown above and below, are my best guess'. They were unlabeled when I obtained them. Because the plants drape from trees its stems hang more like tendrils than upright stems. The stems may hang down up to three feet. The spines are very tiny making them hardly visible.

Cultivation/Growth:

Like most of our cacti this species will not tolerate freezing temperatures and is only hardy to 45°F (7°C). However, being from tropical regions, these cacti otherwise tend to thrive in Houston's warm, humid climate. The plant shown above is growing in direct sun from morning till midday. I protect it when temperatures are projected to fall below 50F. I've found my *Rhipsalis'* tend to do better when provided with

regular water, and I have started to fertilize them with cactus and succulent food to improve their growth. In researching this cactus, I found that *Rhipsalis* prefer rainwater rather than hard tap water.

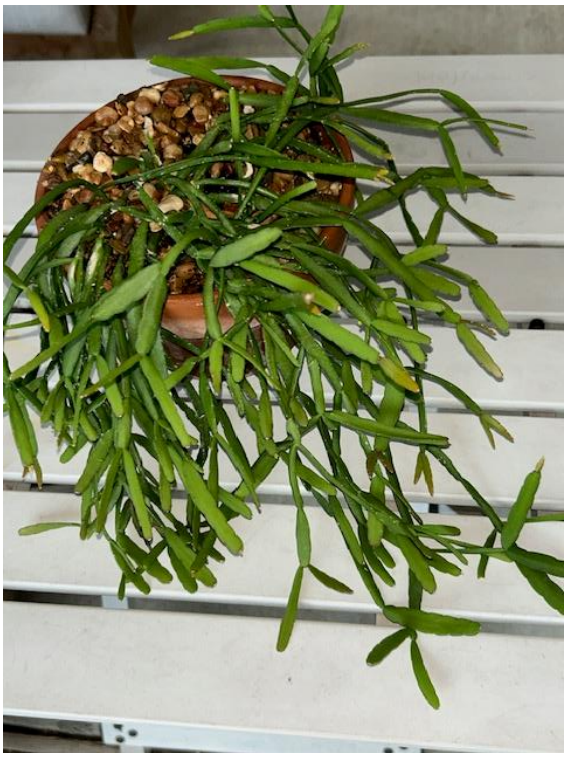
Rhipsalis are likely to grow longer stems and hold a darker green color if grown in partial sun to bright shade. Because these cacti are an epiphytic plant they benefit from being planted in well-draining soil. As the plant matures it will begin to produce very small, white flowers along the stems which, when pollinated, should develop into small green, then white berries.

Availability:

I obtained the plant below from Another Place in Time Nursery on 11th Street in Houston. I don't recall the source of the plant shown at the top.

References:

- Tower Landscape and Design.
- LuEsther T. Mertz Library Plant & Research Guides



Rhipsalis ewaldiana(?) Pat Hudnall

Rhipsalis trigona(?) Patricia Rivas, Uruguay

July Succulent of the Month — Katerine Millsap

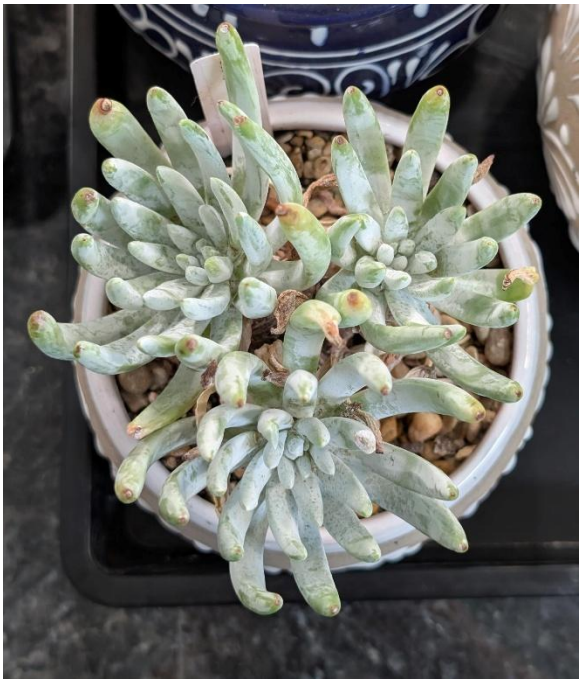
The White-Flower Liveforever: *Dudleya albiflora*

Common Name

White-flower Liveforever

Scientific Synonyms

Dudleya moranii, Cotyledon albiflora, & Echeveria albiflora



Introduction

Within the diverse and fascinating genus *Dudleya*, few species capture the delicate elegance of the succulent flora of the Baja California Peninsula quite like *Dudleya albiflora*. Commonly known as the "white-flower liveforever," this perennial succulent belongs to the *Crassulaceae* family, a group renowned for its remarkable adaptations to arid environments. As a member of the *Dudleya* genus—often colloquially called "Liveforever" due to their remarkable longevity—this species is a marvel of botanical resilience. Under ideal conditions, these succulents can endure for decades, some even approaching a century of life.

Description

Dudleya albiflora is a winter growing succulent that is characterized by its glaucous, rosette-forming habit. The rosettes are relatively modest in size, often reaching a diameter of approximately 2.4 inches (6 cm). However, through the production of offsets, individual specimens can coalesce into expansive, sprawling clumps that may exceed 28 inches (70 cm) in total diameter.

The leaves are slender and cylindrical, covered in a dense layer of epicuticular wax known as farina, which serves to reflect high-intensity UV radiation. Under conditions of high light stress, the foliage may exhibit anthocyanin production, resulting in a reddish pigmentation. True to its specific epithet "albiflora," the species produces prominent white flowers. These blossoms are central to its identification and provide a stark, beautiful contrast against the fleshy, often tinted foliage.

Habitat & Ecology

Dudleya albiflora is endemic to the coastal regions of the Baja California peninsula and associated islands, such as Cedros and Natividad. Its preferred niche consists of lithophytic habitats, specifically steep, rocky inclines and maritime cliffs. It is an endemic species, found primarily within the coastal regions and specialized micro-climates of this territory.

Members of this genus typically thrive in well-draining, rocky, or sandy substrates. The plant's ability to store water in its fleshy leaves allows it to endure the seasonal fluctuations in moisture characteristic of the region. During the summer drought, *D. albiflora* undergoes a period of dormancy, a survival mechanism involving the resorption of nutrients and water from older leaf tissue. These desiccated leaves persist on the stem, providing thermal insulation and protection against transpiration. Notably, the species is highly sensitive to fungal pathogens; improper drainage or moisture retention during the dormant season often results in crown rot.

My Experience

Cultivating *Dudleya albiflora* in the humid subtropical climate of Houston, Texas, is challenging, as the species' evolutionary adaptations are optimized for the arid and semi-arid microclimates of the Baja California Peninsula. The primary obstacle lies in Houston's characteristic high humidity and heavy seasonal rainfall, which create an atmospheric environment highly conducive to fungal pathogens and crown rot. To mitigate these risks, I strictly manage moisture through the use of containers and an exceptionally well-draining, substrate (80 - 90% inorganics) composed of coarse sand, crushed granite, perlite, and cacti/succulent potting mix to ensure rapid desiccation after watering. In addition, this succulent is placed within my indoor greenhouse to protect it from excess rainfall and heat during the summer months. During that time, it's provided with light via grow lights and fans to ensure vigorous airflow to prevent stagnant, moist conditions that can lead to fatal rot.

Conservation & Threats

Like many members of the *Dudleya* genus, *Dudleya albiflora* faces the indirect but significant pressures common to succulent endemics. The genus *Dudleya* is noted for its vulnerability to habitat fragmentation caused by land development and the increasing frequency of anthropogenic disturbances.

Furthermore, "poaching"—the illegal collection of rare succulents for the horticultural trade—is a pervasive threat to many specialized *Dudleya* species. Because many of these plants occupy narrow, niche habitats, even localized disturbances can have profound impacts on population stability. While specific legislative protections for *Dudleya* may vary by specific locality, its reliance on stable, undisturbed coastal ecosystems makes it a species of significant conservation interest.

Conclusion

Dudleya albiflora is more than just a beautiful succulent; it is a biological indicator of the health of the Baja California coastal ecosystems. Its specialized morphology and endemic distribution make it a subject of great importance for botanists studying plant evolution and arid-land ecology. Preserving the delicate habitats that support this "white-flower liveforever" is essential for maintaining the rich biodiversity of the North American succulent flora.

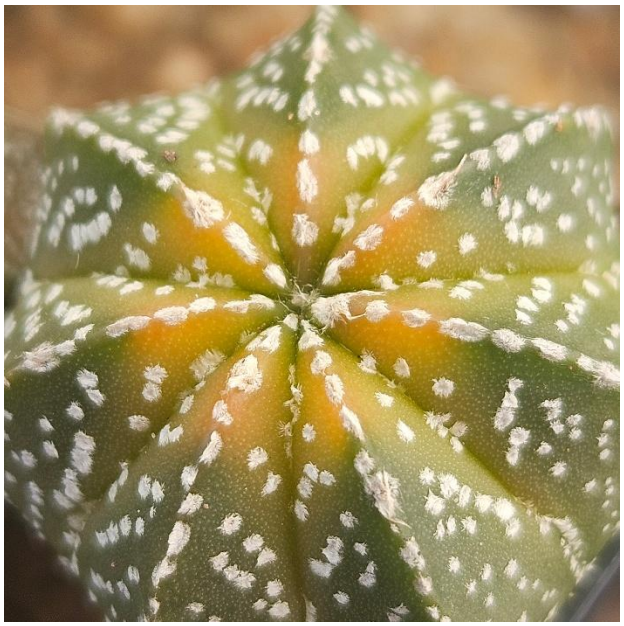
References:

- https://en.wikipedia.org/wiki/Dudleya_albiflora
- https://en.wikipedia.org/wiki/Dudleya
- https://www.crassulaceae.com/botanik/pflanzen/scans/gnr1510/1510-10.pdf

- https://www.researchgate.net/publication/369662364_THREE_NEW_DUDLEYA_TAXA_CRASSULACEAE_FROM_COASTAL_NORTHWESTERN_BAJA_CALIFORNIA_MEXICO
- https://pacifichorticulture.org/articles/dudleya-silver-wonders/
- https://www.consultaplantas.com/index.php/en/plants-from-d-to-l/3612-dudleya-albiflora-or-white-flower-liveforever-care-and-growing
- https://worldofsucculents.com/dudleya-albiflora-live-forever/
- https://www.cnps.org/conservation/dudleya-protection

August Cactus of the Month — John Weistroffer

Astrophytum Myriostigma* cv. *'Koh-yo'



Most cactus growers are familiar with *Astrophytum myriostigma* - also called the Bishop's Cap - native to the limestone hills of the Chihuahuan Desert in central and northern Mexico. It's a spineless species whose body shape, geometrical ribs, and white flecking create a nearly perfect camouflage in its native limestone environment. It is an easy species to grow, as well as to flower, and collect seed.

There are some very interesting and beautiful cultivars of this species; but one of my favorite is known as "Koh-yo". This name translates literally to "changing leaves" in Japanese. This cultivar possesses a genetic trait that causes seasonal changes in the production of chlorophyll and accessory photosynthetic pigments - producing shades of yellow, orange, and red in the skin of the plant. Koh-yo plants are not variegated. Unlike variegation, Koh-yo plants retain the capacity to produce chlorophyll throughout their tissues, and the color changes are only temporary and depend on environmental and seasonal conditions. Koh-yo plants may be nudum (lacking the characteristic white trichomes) or flecked, with each form showcasing the shifting colors in its own unique way.

The exact genetic mechanism responsible for the Koh-yo phenotype is not fully understood, but the changing colors are the result of seasonal shifts in relative pigment concentrations rather than the absence of capacity to produce chlorophyll as seen in variegated plants. Typically, during cooler temperatures, chlorophyll levels are reduced enough to allow yellow and orange betaxanthins and red betacyanin pigments to become more visible. As temperatures warm, stress decreases, and growth resumes chlorophyll production increases, the stems gradually return to their normal green color.

Koh-yo plants are grown under the same conditions as standard *Astrophytum myriostigma*. They perform best in a very well-drained, mineral-based soil especially with the addition of limestone, reflecting the alkaline soils of their native habitat. Water regularly during the growing season and keep plants dry during winter dormancy, if maintained in cool conditions. As with any nudum *Astrophytum,* specimens lacking the protective white trichomes are somewhat more susceptible to sunburn and may benefit from some protection during Houston's intense afternoon summer sun.

August Succulent of the month — Lauren Morris

Crassula perfoliata* var *minor

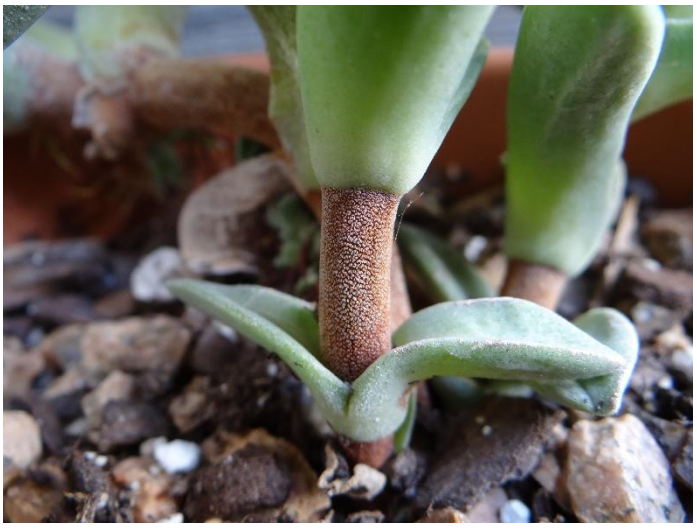
Crassula perfoliata var *minor* originates from the Eastern Cape in South Africa. It was initially named by Carl Linnaeus in 1753 and its variety was named by Adrian Haworth in 1821.

The *Crassula perfoliata* var *minor* plant has smooth, grey-green, overlapping curved leaves that give it it's common name of propeller plant or airplane plant. These succulents can grow tall, but are usually less than 23 inches. They produce clusters of tall, bright-red, flowers. My plant has not flowered yet. One publication mentioned that it should flower in its 4th year. Like many succulents, they should be protected from freezing temperatures and frost. They can tolerate full to partial sun. I keep mine indoors in a south-facing window that receives full sun.

Although not normally encountered in habitat, when they are, it's often in rocky outcroppings in dry river valleys. They grow solitary or in small clusters and are widely available in cultivation. I obtained my plant online as part of a succulent growing kit for beginners. This succulent is very beginner friendly. It can be propagated through offshoots and leaf cuttings. This is one of the few succulents that I've had success with both propagation methods. To mimic their natural habitat, they should be planted within a gritty soil mix. I typically don't water mine until I notice their leaves starting to wrinkle.

References:

- van Jaarsveld, E. (2008, November). *Crassula perfoliata var. minor*. SANBI - PlantZAfrica. https://pza.sanbi.org/crassula-perfoliata-var-minor
- *Crassula falcata*. *www.llifle.com* 14 Nov. 2005. 10 Jul 2026, https://llifle.com/Encyclopedia/SUCCULENTS/Family/Crassulaceae/11183/Crassula_perfoliata_var._falcata



The Black Lace Rescue Project by Ron Andring Sr., in Collaboration with the San Antonio Cactus & Xerophyte Society Legacy Project

The following article is made up of portions of a larger article regarding the Black Lace Cactus Rescue project happening in Texas. Thank you to Ann Black and the San Antonio Cactus & Xerophyte Society for allowing us to reprint with permission from their newsletter. If you would like to read the full article head to the following link: **https://files.constantcontact.com/814e4a46801/9a9cf28f-962d-4b39-926b-fa7670b8327a.pdf?rdr=true**

The Black Lace Rescue Project

Echinocereus reichenbachii subsp. albertii, commonly known as Black Lace Cactus, a Texas native, was listed as endangered under the Endangered Species Act (ESA) in 1979. Once numbering over 140,000 individuals spread across six populations in three coastal Texas counties, its original numbers had plummeted to under a thousand by the early 2000's. Its native habitat has been rapidly giving way to agriculture and grazing. Fortunately, in 2014 previously unknown populations of *E. reichenbachii ssp. albertii* were discovered spread across 43,000 acres of rangeland being mined for lignite coal by SMEC (San Miguel Electric Cooperative, Inc.).

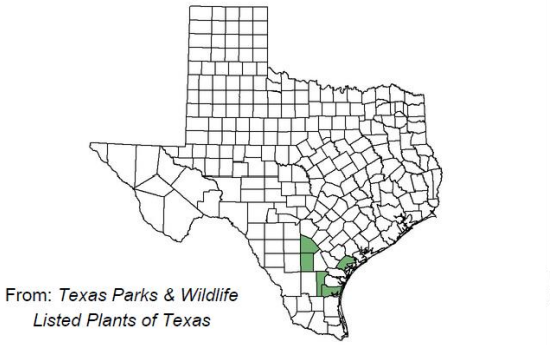
Through an innovative partnership between the San Miguel Electric Cooperative, Inc. (SMEC), the San Antonio Botanical Garden (SABG) and the San Antonio Cactus and Xerophyte Society (SACXS), a comprehensive program has begun to rescue populations of Black Lace Cactus threatened by destruction from surface mining In Atascosa County.

To date about 120 distinct populations have been mapped by ecologists for SMEC by consultant Blackland Environmental Inc. (BLE) for rescue. The intent of the partnership has been to field collect plants threatened by mine expansion, to house them at the SABG, and to produce enough seed to propagate additional plants for eventual return to the mining site once land reclamation is complete.

An Endangered Species is Recognized

First classified in 1969 by Benson as *E. rechenbachii var. albertii* from specimens provided by amateur naturalist Dr. Richard Albert, it was only known to exist in two populations each in Jim Wells, Kleberg and Refugio counties. Its habitat lay along watercourses that occasionally flood, on saline sandy silty soils, in breaks in the mesquite and thornbush. By the time of its listing by the US Fish and Wildlife Service (USFWS) as endangered in 1979, three of the six populations had either been severely damaged or destroyed by plowing to improve agriculture and livestock grazing. Because conservation of plants under the ESA requires landowner cooperation, the remaining populations have continued to decline significantly due to lack of cooperation from the landowners as none have entered into cooperative conservation management agreements with the USFWS.

Distribution Map of Black Lace Cactus in Texas



From: *Texas Parks & Wildlife*
Listed Plants of Texas

SACXS Legacy Project Answers the Call

SABG personnel went out to the mining site and collected 2,444 black lace cacti. Lacking sufficient staff resources to pot and care for the rescued plants, Michael Eason contacted SABG Gardener Alyssa Danna, who is also an active member of SACXS, for assistance. Alyssa met with the Legacy Project Committee to organize SACXS volunteers to assist in the effort to rescue the endangered Black Lace Cactus. As a result, SACXS volunteers gathered at the end of January 2026 to pot these rescued plants in nursery flats. A custom soil consisting of three parts small limestone gravel, one part calcinated clay, one-part corse sand, one-part pumice, one-part ProMIx Mychorrhizae, and the remnants of the native soil that was cleaned from the plant roots was used. Given the wide range of plant sizes, planting densities in the trays varied widely. Trays were planted by site number, with each tray being marked by site and tray number, and the number of plants it contained. The completed trays were moved to a fenced outdoor area for monitoring and care. On February 11th SACXS volunteers again joined SABG staff and ecologists from SMEC to collect an additional 945 cacti from three threatened populations. The same protocols were followed as before.

The Rescue Plan Going Forward

These cacti tend to bloom in flourishes of several hundred at a time. As many as three hundred blooms have been observed in a single day. Unfortunately, some of these flourishes occurred during heavy spring rains, so many of the flowers were only partially pollinated, if at all. Natural pollination by bees was observed and supplemented with hand pollination to increase seed production. Plants, from all but one site, have produced significant amounts of seed which was collected, cleaned, and segregated by site number for propagation of additional plants. Excess seed will be sent to a seed bank for future propagation. With sufficient seed collected, the next step will be propagating the approximately 7,000 additional plants for replanting back to the original sites once land reclamation is complete. Seed will be propagated by site number, and the plants segregated by site as well. The current plan is to transfer the rescued cactus to the holding facility in the spring of 2027 where they will be individually potted in biodegradable pots. The propagated plants will be transferred once they reach a sustainable size. This effort will require additional volunteer assistance from SACXS in the coming months and years.

The Vanishing Star: Poaching and the Decline of *Astrophytum asterias* in Texas by Omar Herrera

Introduction

Cacti are integral to the ecosystems of arid and semi-arid regions of Texas, where they provide food, shelter, and soil stabilization for wildlife and microbiota (Texas parks and wildlife). Cacti act as a source of food to wildlife, as well as to humans. Often, they are eaten in the form of the fleshy stem, or their fruit. In Texas, the Prickly Pear Cactus (*Opuntia basilaris* P. Mill.) produces fruits that are sweet and eaten by many (USDA Natural Resources Conservation Service). In addition to fruit production, cacti are also valued for their edible fleshy stems, commonly referred to as nopales in various Latin American cultures. These stems are consumed as a dietary staple by humans and are also ingested raw by livestock and other animals (National Center for Biotechnology Information).

Cacti serve as vital ecological resources, providing shelter for various animal species. For example, the cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*) commonly nests in the cavities of Saguaro cacti (*Carnegiea gigantea*), where the thick, spiny exterior offers protection against predators and extreme temperatures (U.S. Fish & Wildlife Service; Phoenix Zoo, n.d.). These owls use the cacti not only as shelter, but also as sites for nesting and rearing their young. Cacti also play a vital role in ecosystem stability, primarily through their extensive root systems, which enhance soil stabilization in arid regions (Le

Houérou, 1994). These roots are adapted to spread widely rather than penetrate deeply, allowing cacti to efficiently absorb water while simultaneously anchoring the surrounding soil. This wide-reaching network prevents soil erosion by compacting and stabilizing soil particles around the root zone. In the Mediterranean Basin, cacti have been documented to alter soil structure through their expansive roots, which help restore degraded soils by rearranging and consolidating soil particles (Le Houérou, 1994). This natural soil modification not only prevents further degradation but also supports ecosystem recovery in regions affected by erosion and soil loss. As with everything that has been discussed before, cacti are some of the most important plants in their own ecosystems, as well being key components for the desert environments that they are typically grown in. Among them, *Astrophytum asterias*, commonly known as the star cactus, stands out due to its distinctive appearance and ecological importance. However, its survival is now threatened primarily by illegal trade and habitat loss. This paper explores the reasons behind the star cactus's dwindling numbers, the consequences of its decline, and potential conservation strategies that may help preserve this unique species.

The star cactus (*Astrophytum asterias*), also known as the sea urchin cactus, sand dollar cactus, or star peyote, is a rare and endangered species native to the Lower Rio Grande Valley of Texas and parts of northeastern Mexico (Beacham, 1993; Texas Parks and Wildlife Department). Once abundant, its natural range has significantly diminished due to multiple environmental pressures. Characterized by its distinctive star-like shape and small yellow flowers, the star cactus is now the focus of conservation efforts due to severe population declines. Primary threats include habitat loss, climate change, and poaching for the illegal cactus trade (Beacham, 1993). Habitat destruction has been exacerbated by overgrazing, frequent fires, and agricultural expansion, which have converted native habitats into pasture dominated by invasive species such as buffelgrass. As a result, the star cactus is forced to compete for limited resources with other, more resilient plant species (Beacham, 1993). The star cactus is seen as an ornamental plant, which means that it serves the purpose of being viewed for its beauty, shape, or the space that it takes up. This, alongside other plants, has caused a huge number of them to be removed from their native grounds. As succulent plants have surged in popularity worldwide, so too has the demand for unique and rare specimens, putting intense pressure on small wild populations of this species.

This prospective paper seeks to thoroughly examine the ecological, reproductive, and conservation aspects of *A. asterias*, drawing from recent scientific literature and case studies in Mexico and the United States. It analyzes the factors contributing to its vulnerability, the ecological processes it relies on, the observed population dynamics, and the management strategies that have been tested to date. Ultimately, the goal is to contribute to a comprehensive understanding of this species as part of the Tamaulipan thornscrub biome and as a priority object in binational conservation agendas.

Ecological Role and Habitat

The star cactus resides primarily in the Tamaulipan thornscrub ecosystem, a unique ecological region that spans southern Texas and northeastern Mexico (Center for Plant Conservation). Located in Tamaulipas and Nuevo León of Mexico, and the Starr and Hidalgo counties in Texas, these particular species of cactus have evolved the unique characteristics to survive in this type of environment (Beacham 1993). This cacti species grows in a semi-arid habitat, among scattered shrubs such as *Acacia farnesiana, Prosopis glandulosa*, and *Ziziphus obtusifolia*, which provide some indirect protection against predators and extreme temperatures, while still allowing essential sunlight for photosynthesis (Beacham 1993). This habitat has soils that are comprised of sandy-loam or gravelly soils derived from caliche, limestone, or other sedimentary substrates, which is ideal for the star cactus (Texas Parks and Wildlife Department). With roots that grow horizontal to ensure that the cactus is optimizing the most it can for the rain, this habitat is crucial for the star cactus. The cactus's shallow root system also helps stabilize fragile soils and supports microbial communities vital to desert ecosystems. (Martorell 2015). It also is usually camouflaged among the ground due to debris, which still allows the cactus to avoid potential predators and avoid harsh parts of the sun but still getting the required sunlight that is needed for this species to thrive in (*U.S. Fish and Wildlife Service*). These microhabitats are crucial for the cactus's survival, as they

offer optimal sunlight exposure, reduced competition with larger plants, give protection to some degree, and allow their roots to grow horizontal to get any nutrients that they may need (*U.S. Fish and Wildlife Service*).

Ecologically, the star cactus plays a niche but important role in its environment. Its flowers attract native bees and other pollinators, contributing to the reproductive cycles of both the cactus and other local flora (Blair & Williamson, 2008). The star cactus has bright, yellow flowers that bloom during late spring and early summer, most often before other species (Blair & Williamson, 2008). Due to this, native insects, such as bees and butterflies, swarm the cactus whenever the flowers are in season as it serves as a critical food source during a period when nectar is otherwise scarce (Blair & Williamson, 2008). Since the cactus is a semi-arid area, being able to produce these flowers is crucial for not only the pollinators, but the cactus themselves (Blair & Williamson, 2008). The pollinators gather food from the nectar and pollinate the cactus, creating a beneficial relationship between the two species (Blair & Williamson, 2008).

Besides the relationship that it has created with pollinators, the star cactus also could contribute to microhabitat formation. In microhabitat formation, the star cactus itself forms a type of space for the other inhabitants of the region (University of Arizona Campus Arboretum). Sometimes, by collecting dew in the morning, it could accumulate organic matter and retain moisture in the surrounding substrate, facilitating the germination of other species. (University of Arizona Campus Arboretum). Even with its size, it would be able to aid in hiding some species from others or to escape the heat (University of Arizona Campus Arboretum). With these characteristics, the star cactus to be known as an indicator species for its environment (U.S. Fish and Wildlife Service). This means that the cactus itself is used to determine the overall health of that area. Lastly, the star cactus is known for having a unique and genetic diversity for the environment that it lives in, allowing for a genetic uniqueness for that habitat. The biology of *A. asterias* also demonstrates notable resilience in terms of water consumption, employing crassulacean acid metabolism (CAM) to minimize water loss during photosynthesis, reinforcing its role as an organism adapted to extreme conditions. This is what makes the star cactus to be ideal for this area (Texas Parks and Wildlife Department).

Unfortunately, the Tamaulipan thornscrub has become one of the most imperiled ecosystems in North America, with more than 95% of its original extent in Texas already converted for agriculture, urban development, or ranching (Beacham 1993). The progressive loss of habitat due to these factors and the introduction of exotic plant species has had a devastating impact on wild populations (Beacham 1993). Restoration studies have shown that livestock exclusion allows for the gradual recovery of native herbaceous strata and improves conditions for the recolonization of species like *A. asterias*, although these processes are slow and require ongoing management and long-term monitoring (Martorell 2015). Additionally, the development of infrastructure such as roads, power lines, and irrigation systems further fragments its habitat, disrupting gene flow between subpopulations, which causes a significant challenge for in situ-conservation strategies. Due to this, the star cactus has had little chance of continuing to grow in this area as it has in the past. As this ecosystem disappears, so does the specific microhabitat required by *Astrophytum asterias*, making habitat loss one of the most immediate threats to its survival (Beacham 1993).

Historical Range and Population Trends

Historically, *Astrophytum asterias* were found throughout a wider band of the Lower Rio Grande Valley in Texas and across the states of Tamaulipas and Nuevo León in northeastern Mexico (Terry 2007). In the United States, its range extended across Starr, Hidalgo, and Cameron counties (Terry 2007). However, over the past century, this range has drastically diminished due to a combination of habitat destruction, land conversion, and human disturbance (Beacham 1993). Today, only a handful of naturally occurring populations remain in Texas, most of them located on private lands with limited formal protection (U.S. Fish and Wildlife Service, 2003). Population data reflect this troubling trend. A 2003 report by the U.S. Fish and Wildlife Service estimated that only a few thousand individual plants remained in the wild in the United States (U.S. Fish and Wildlife Service, 2003). Surveys conducted since then suggest that some populations

may be stabilizing due to conservation efforts, but others continue to decline (NatureServe Explorer). In Mexico, populations are slightly more robust due to greater habitat availability, but even there, poaching and overgrazing have taken a toll (Terry 2007).

Intensifying the issue is the species' low reproductive rate and specific habitat needs. *Astrophytum asterias* exhibit a highly specialized reproductive strategy that significantly contributes to its ecological vulnerability (Strong & Williamson, 2007). This species is strictly outcrossing, meaning it relies entirely on cross-pollination for seed production due to self-incompatibility mechanisms that prevent self-fertilization and promote genetic diversity (Strong & Williamson, 2007). Pollination in *A. asterias* is primarily carried out by native solitary bees, particularly *Diadasia rinconis*, which has been identified as the most effective pollinator in field studies (Blair & Williamson, 2008). These bees exhibit a high degree of floral constancy and can travel between scattered individuals, which is especially vital in fragmented landscapes where plant density is low, and pollinator efficiency becomes critical for reproductive success (Blair & Williamson, 2008). However, the mutualism between *A. asterias* and its pollinators is threatened by both habitat fragmentation and agricultural pesticide use, which reduces the availability of foraging resources and nesting sites for these insects (Blair & Williamson, 2008). As pollinator populations decline, so does the reproductive viability of *A. asterias*, creating a feedback loop that intensifies its risk of local extinction (Blair & Williamson, 2008). The star cactus takes several years to reach maturity, and its seeds are slow to germinate and establish, with each reproductive event yielding a relatively small number of viable seeds, and the germination success in natural conditions is notoriously low, especially in disturbed or degraded habitats (Strong & Williamson, 2007). Additionally, reproductive success is inherently limited by the species' low seed success rate and slow life cycle (Terry 2007). Seeds typically require specific temperature and moisture conditions to germinate, and under greenhouse settings, it can take several days for germination to occur (Terry 2007). Once established, seedlings grow slowly and often need multiple years to reach reproductive maturity (Terry 2007). This extended juvenile phase makes populations particularly vulnerable to environmental events such as drought, grazing, or invasive plant encroachment (Terry 2007). Studies have also documented high seedling mortality rates, even under controlled conditions, due to dehydration, herbivory by insects and small mammals, and competition from non-native grasses like *Cenchrus ciliaris* (Terry 2007). These ecological pressures, combined with the species' inherent reproductive limitations, significantly hinder the potential for natural population recovery (Terry 2007). Fragmented populations are often too small or isolated to support adequate pollination, reducing genetic diversity and making recovery more difficult (Terry 2007). Without coordinated conservation strategies, these shrinking populations face the risk of local extinction, one fragment at a time.

The Problem: Illegal Trade, Poaching and the Global Cactus Trade

Poaching is one of the most significant drivers of the decline of *Astrophytum asterias*, particularly due to its high desirability among collectors and succulent enthusiasts. Despite protections under the Endangered Species Act and its listing on Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), illegal trade continues (CITES 2024). Illegal trade involves the unauthorized removal of cacti from their native habitats for sale, where they are acquired by individuals for various purposes (CITES 2024). Some of these purposes are ornamental reasons, meaning that the person who is trying to keep this plant only values it for aesthetic purposes and how it looks. This could be used as a way to promote their status in some cases in which they show off what they have acquired. Other times plants are taken for medicinal use in which some people believe that there could be potential healing properties within the plant that they can utilize for their own benefit and health (Margulies 2023). Collectors often prize the star for its symmetry and rarity, fueling a rise in the black market for these cacti (Margulies 2023).

Poachers often use online marketplaces and social media to facilitate illegal sales, masking the origin of the plants and making enforcement difficult (Goettsch 2015). Online marketplaces and social media platforms have facilitated a surge in illicit cactus trading (Goettsch 2015). Sellers frequently disguise the

origin of plants, and enforcement agencies face difficulties in tracking and prosecuting offenses due to the anonymity of digital transactions (Goettsch 2015). In many cases, wild plants are mislabeled as nursery-grown, circumventing legal protections and rendering tracking systems ineffective (Goettsch 2015). Economic desperation in rural areas is also a contributing factor: poachers often offer monetary incentives to local inhabitants in exchange for locating and extracting wild cacti, creating an informal supply chain that is difficult to regulate (Goettsch 2015). A 2021 report from the Center for Biological Diversity found that cactus trafficking has increased sharply, with species like *A. asterias* particularly vulnerable due to their limited geographic range (Center for Biological Diversity 2021). In some cases, entire populations have been eradicated from wild sites to meet collector demand (Center for Biological Diversity 2021). This illegal trade has escalated dramatically during periods of global economic instability and was particularly exacerbated during the COVID-19 pandemic, when demand for ornamental succulents surged (Financial Times 2025). This trend has led to increased poaching of rare species, including cacti, as collectors seek unique specimens (Financial Times 2025). Illegal trade is often organized by international criminal networks, and many species are critically endangered or extinct in the wild (Financial Times 2025). Efforts to combat this illegal trade include monitoring online platforms for illicit plant sales and increasing public awareness about the ecological impacts of removing plants from their natural habitats (Financial Times 2025). However, enforcement remains challenging due to the anonymity provided by online transactions and the rapid spread of trends on social media (Global Initiative).

The cactus's popularity in Asia, particularly in countries like Japan and South Korea, where it is valued in the art of bonsai and ornamental gardening, has further incentivized illegal harvesting (Margulies 2023). Even reputable sellers may unknowingly traffic plants grown from poached seed, highlighting the need for stringent documentation and traceability protocols (Margulies 2023). The continued removal of wild specimens undermines conservation work and increases the risk of local extinction, especially when populations are already small and fragmented (Margulies 2023). The cumulative impact of illegal harvesting is not merely a reduction in population size, but a destabilization of entire microhabitats (Margulies 2023). The removal of mature specimens—especially those capable of reproduction—disrupts the demographic structure and pollination dynamics of remaining populations (Margulies 2023). In small populations, such losses can lead to local extirpation, as reproductive failure and genetic bottlenecks render recovery virtually impossible without human intervention (Margulies 2023). Additionally, poaching often damages the fragile substrate in which the cactus grows, leading to increased erosion, loss of seed banks, and degradation of surrounding vegetation, which collectively reduce habitat quality and resilience. (Margulies 2023).

The star cactus's rarity and aesthetic appeal have made it a prized possession for international cactus collectors. Often mistaken for *Lophophora williamsii* (peyote), another native cactus used in religious rituals, *Astrophytum asterias* is vulnerable to misidentification and unintentional harvesting (Martin 2007). Residents, often economically marginalized, are sometimes drawn into poaching to make ends meet (Martin 2007). This human dimension highlights the socio-economic roots of the illegal cactus trade and the difficulty in enforcing protections, especially in cross-border contexts like the Chihuahuan Desert (Martin 2007).

Consequences of Decline

The loss of *Astrophytum asterias* can have an effect on entire ecosystems. This cactus plays a role in maintaining microhabitats for insects and small animals and contributes to the fragile ecological balance of desert environments (Terry 2007). Its decline can reduce pollinator populations, compromise biodiversity, and weaken soil structure, thereby accelerating desertification and land degradation (Blair & Williamson, 2008). The star cactus is a valuable member of its ecosystem, being a rare member in the semi-arid area (Beacham 1993). This complete loss of this cactus in its ecosystem will cause issues with other species that inhabit this location as it does bring niche characteristics to other organisms that inhabit the semi-arid area (Blair & Williamson, 2008). As mentioned before, the cactus provides lots of food for pollinators that do not have many options in the kind of environment that they inhabit (Beacham 1993).

With their early blooms, it is necessary to feed the pollinators that rely on them (Blair & Williamson, 2008). Without them, they also are not able to germinate their seeds since pollinators are needed to help the species be able to reproduce (Blair & Williamson, 2008). As the area has decreased with the species needing specific requirements that are needed in the environment (Blair & Williamson, 2008). As an indicator species, the star cactus shows the health being diminished from the habitat, along with the area being cultivated into pastures, shows that the area is not thriving as it once was (Blair & Williamson, 2008). Further, the star cactus shares a superficial resemblance to peyote (*Lophophora williamsii*), a small, spineless cactus with which it is often confused (Terry 2007). Both species exhibit similar sizes and rigid, rounded forms (Terry 2007). However, they can be distinguished by their floral characteristics: the star cactus produces yellow flowers, while peyote is known for its white blooms (Terry 2007). Peyote is highly sought after due to its psychoactive properties, making it a target for illegal collection (Terry 2007). Beyond its cultural and medicinal use, its rarity has also made it a prized possession for collectors (Terry 2007). This high demand has driven poaching, not only in international markets but also among local communities seeking economic gain (Terry 2007). For some individuals, poaching represents a means of financial survival, despite its detrimental impact on native populations of these vulnerable cactus species (Terry 2007).

Conservation Strategies and Policy Responses

In response to these threats, numerous conservation measures have been implemented at both national and international levels. In the United States, *Astrophytum asterias* was listed as endangered under the Endangered Species Act in 1993, affording it legal protection and mandating the development of recovery plans (Beacham 1993, Texas Parks and Wildlife Department). Habitat conservation has been a major focus of these efforts, with organizations such as The Nature Conservancy working to purchase and protect the rights of these species to ensure that their survival in the wild will continue to live and grow on (Texas Parks and Wildlife Department). The U.S. Fish and Wildlife Service (USFWS) also has developed a Recovery Plan, focusing on several key strategies to continue to ensure that the star cactus population is being protected: protecting existing populations, conducting surveys for additional populations, engaging in public outreach, collaborating with private landowners for voluntary conservation agreements, and lastly, exploring reintroduction efforts within its historical range (U.S. Fish and Wildlife Service). Alongside this, their goal is to work alongside the Mexican government to formalize conservation methods to continue to fill in the information on the species (U.S. Fish and Wildlife Service, *Recovery Plan*).

On the international level, *A. asterias* is listed in Appendix I of CITES, which prohibits international trade of wild-collected specimens without permits (CITES 2024). Mexico has enacted similar protections under its environmental laws and supports ex-situ conservation programs that cultivate plants for reintroduction (Martorell 2015). The Cactus and Succulent Society of America, along with botanical gardens, has also contributed to awareness campaigns and funding for research. With the aid to ensure that the cactus continues to grow in its native area, they allow certain species to be cultivated in efforts to allow them to continue to grow and be established once they sprout to be reintroduced back into their native environment (U.S. Fish and Wildlife Service, "Import Wild-Collected Appendix I Plants").

Despite these efforts, enforcement challenges and limited funding continue to hinder conservation progress. Habitat conservation often relies on voluntary participation by private landowners, many of whom lack incentives or awareness of the species' plight (U.S. Fish and Wildlife Service, 2003). Without adequate incentives or awareness, many landowners may not engage in conservation activities, leaving these areas vulnerable to habitat degradation and illegal collection (U.S. Fish and Wildlife Service, 2003). Greater coordination among stakeholders, increased funding for monitoring, and stricter regulation of online trade are all necessary to ensure the star cactus does not vanish completely (Defenders of Wildlife 2006).

Efforts to conserve *Astrophytum asterias* include legal protections, habitat restoration, and ex-situ cultivation (U.S. Fish and Wildlife Service, Recovery Plan). Some botanical gardens and nurseries propagate the star cactus for legal trade, aiming to reduce pressure on wild populations (Ermakova 2002).

However, illegal markets continue to thrive due to lax enforcement and persistent demand (Sajeva 2016). Education and outreach are critical. Many poachers and buyers are unaware of the ecological consequences of their actions (U.S. Fish and Wildlife Service, 5-Year Review 2013). Raising awareness, especially among tourists and collectors, could significantly reduce demand. Moreover, improving enforcement mechanisms and cross-border cooperation are essential to stopping the illegal flow of wild specimens (U.S. Fish and Wildlife Service, "Catching Cactus Crooks" 2024).

Figure 1. Artificially Cultivated *Astrophytum asterias* Garden Display. A cultivated collection of ornamental *Astrophytum* cacti displayed in individual containers under natural window light. The foreground highlights a hand-held specimen, likely *Astrophytum ornatum*, with prominent ribbed morphology, white trichome patterns, and long black spines. The background showcases an array of related cacti in organized rows, indicative of an ex-situ propagation environment. Such setups illustrate sustainable horticultural practices that alleviate pressure on wild populations by providing legally grown alternatives for collectors and enthusiasts. This figure exemplifies ornamental use within conservation-compatible cultivation systems.

Ethical, Cultural, and Scientific Significance

Beyond its ecological role and botanical rarity, *Astrophytum asterias* holds important ethical, cultural, and scientific value, dimensions that further underscore the need for its protection. The ethical imperative to conserve the star cactus stems from broader considerations of biodiversity stewardship. As one of the most endangered cacti in North America, *A. asterias* represents not just a single species at risk, but also a symbol of the global biodiversity crisis (Lundell and Worthington 2003).

From a cultural perspective, cacti, including *A. asterias*, have long held significance in the folklore and spiritual traditions of Indigenous peoples in the Southwest and northern Mexico. While *A. asterias* itself is not known to have widespread ceremonial use like peyote, its visual similarity has led to confusion and, occasionally, inadvertent collection by individuals unfamiliar with the distinction (Ponderosa Cactus 2023). Still, its presence in the landscape has symbolic weight, representing endurance and resilience (Greg App 2023).

Scientifically, *Astrophytum asterias* offers unique opportunities for research in evolutionary biology, plant physiology, and conservation science. Its extreme specialization such as CAM photosynthesis, compact

morphology, and pollination strategy makes it a model for understanding adaptation to arid environments (Mandujano 2008). Conservationists and geneticists also study the species to develop better reintroduction protocols and to explore how limited gene pools impact long-term survival (Terry 2007). The cactus's small population was once thriving and now has suffered a decline in genetic diversity, which poses long-term risks to its resilience and adaptability (Terry 2007). Ultimately, the value of *A. asterias* cannot be measured solely in economic or utilitarian terms. Its presence adds to the beauty and complexity of the ecosystems it inhabits. Losing it would mean more than the disappearance of a plant, it would mean the erasure of a lineage that has survived for thousands of years, and a narrowing of the intricate web of life in which we are all entangled.

Future Directions and Conclusion

The future of the star cactus hangs in the balance. While conservation efforts have made important strides, long-term survival depends on a more integrated and aggressive strategy (U.S. Fish and Wildlife Service, *Recovery Plan*). Future directions must include expanded habitat preservation, stronger international enforcement of anti-poaching laws, and greater public engagement (U.S. Fish and Wildlife Service, *Recovery Plan*). One of the most effective ways to protect the star cactus is through the acquisition or legal protection of private lands where the star cactus is known to grow (Beacham 1993). As an ecological specialist with highly restricted habitat requirements and a low reproductive rate, this species is disproportionately affected by habitat fragmentation, poaching, and environmental degradation (U.S. Fish and Wildlife Service, *Recovery Plan*). Despite its inclusion in legal protection frameworks such as the U.S. Endangered Species Act and CITES Appendix I, conservation outcomes remain inconsistent, largely due to inadequate enforcement, insufficient habitat coverage, and limited public awareness (CITES 2024). The ongoing pressures from agricultural conversion, overgrazing, and illegal trade represent compounding stressors that erode the viability of remaining wild populations and the integrity of their surrounding ecosystems (U.S. Fish and Wildlife Service, *Recovery Plan*). The U.S. Fish and Wildlife Service's Recovery Plan emphasizes the importance of partnerships with private landowners and the establishment of conservation agreements to ensure the survival of the species (U.S. Fish and Wildlife Service, *Recovery Plan*).

In conclusion, the star cactus is more than a botanical curiosity. This species is a symbol of the delicate balance between natural heritage and human impact. Its decline due to poaching and habitat loss represents a broader pattern seen around the world. But with coordinated conservation, strong legal protections, public engagement, and international cooperation, *Astrophytum asterias* can still be saved. The species' inclusion in CITES Appendix I and its status as endangered under U.S. federal law reflect the global recognition of its vulnerability (U.S. Fish and Wildlife Service, *Recovery Plan*). By looking at the different methods that have been done with the cactus and what can be done, it does take into reason that it is possible for the cactus to be saved from any consequences that have occurred to it. With the ability to be propagated, grown, and cultivated, it does seem possible to grow this cactus and introduce it back into its native area. With the native landscape being transformed, however, it could be viable to place the star cactus in another area. A similar area to where it was or find areas that have not be affected by the loss of its natural habitat and make sure that it is undisturbed or changed. Its continued existence would be a testament to the power of science, ethics, and community working together to prevent extinction. Ultimately, *Astrophytum asterias* serves not only as a target for species-level conservation, but also as a symbol of the biodiversity and fragility of the Tamaulipan thornscrub ecosystem. Its preservation offers co-benefits for the myriad other species—plant, animal, fungal, and microbial—that depend on the same shrinking landscape. In this sense, investing in the survival of the star cactus is an investment in the resilience and integrity of entire ecological communities. If current threats are not addressed through comprehensive and cooperative action, *A. asterias* may vanish from the wild, taking with it a unique evolutionary lineage and a living connection to some of North America's most endangered natural habitats.

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CREATING AN ETHICAL CACTUS AND SUCCULENT COLLECTION

Cactus and succulent species are at risk

One third of all cactus species (Cactaceae) are at risk of extinction[1], and so are many succulents and caudiciforms, including *Dudleya*, *Dioscorea*, and *Pachypodium*[2]. Half of threatened cacti are at-risk at least in part due to the horticultural trade[3]. Social media platforms like Facebook and Instagram influence the desire to take old and rare cacti, succulents and their seeds from habitat[3, 4].

Cacti and succulents are central in dry ecosystems

Cacti and succulents store water in their tissues, provide nesting areas and food for wildlife, photosynthesize, store carbon, and even provide a place for insects to lay their eggs until they develop into adults. These plants play an essential role in dryland ecosystems and must be protected.

Building your collection

1 Check the source before you buy
- Use caution when buying online.
- Was it nursery grown, or habitat collected?
- Is it a species at risk?

2 Buy from reputable plant sellers
- Search for an approved grower.
- Ask your cactus and succulent community.
- Ask previous customers.

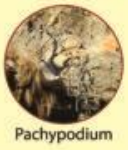
3 Grow your own cacti and succulents
- Plant from seed.
- Propagate from a cutting or leaf.
- Buy and grow young plants from seliers.

4 Educate yourself and spread the word
- Learn more about plant poaching.
- Join a cactus club or online community.
- Join a conservation group.

Plants to be cautious of when purchasing

Slow-growing, rare plants sold online are more likely to be field-collected because their size and habitat characteristics are hard to replicate in a nursery, therefore the time it takes to grow them ethically reduces practical and economic feasibility. If you're looking for rare plants for your collection, ask experts in your plant community for help finding ethical sources, or learn which plants are endangered and/or protected by the Convention on International Trade in Endangered Species (cites.org). Examples include:


Aztekium


Pachypodium


Dudleya

Identifying field-collected vs. greenhouse-grown

Wild plants tend to face harsher growing conditions than greenhouse-grown plants leading to features which can help you identify the source. These characteristics are not always diagnostic, so when in doubt ask a community expert.

Copiapoa cinerea subsp. columna-alba

Poaching impacts on wild populations

Wild populations can be significantly reduced by poaching. For example, in 2015, 3500 *Ariocarpus fissuratus* were stolen, likely from Big Bend National Park[3].

Large-scale harvest of slow-growing wild cacti can decimate habitat populations by removing the mature, reproductive plants. This demonstrates how wild and illegal field collection for the horticultural trade is a significant threat to the survival of cacti and succulents in habitat.

This map highlights regions with high levels of cacti and succulents at-risk including Mexico, Chile, and southern Africa which face poaching impacts[1].

Copiapoa cinerea which are ~30 cm/12 in. tall and take ~100 years to reach this size in habitat. When they are removed from the wild, all that is left are holes in the ground.

Find out more at: www.ethicalcactus.com

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