



Growing Adeniums in Southern Arizona

Michael Chamberland



Figure 1. A sample of flower variation seen among species and hybrids of adenium.

Adeniums are popular as ornamental container plants. They combine a succulent growth habit and a wide selection of colorful flower forms (Figure 1). The name “desert rose” is often applied to adeniums. The name of the genus *Adenium* can double as a common name which avoids confusion with true roses grown in desert gardens.

What Are Adeniums?

Adeniums are considered to be caudiciform succulent plants. Most species develop thick succulent stems and many produce a large swollen base called a caudex (Figure 2). Not all adeniums form a caudex, but those that do set the image for this

group of plants. Adeniums have no thorns, spines or prickles. The lack of spiny defense is a welcome feature among succulent plants in horticulture. The plants instead rely on their toxic sap as a defense strategy (Mahr, 2013). The leaves of adeniums are not succulent. Leaves can vary among the species, from wide to thin oval shapes, sometimes wavy edged, with a surface glossy to slightly felty. Some have pronounced white veins almost to the point of appearing variegated. Leaves may be evergreen, or may drop during dormancy. But adeniums are not grown as foliage plants. While an immense caudex can draw interest to adeniums, it is the flowers which have brought popularity to these plants in cultivation.



Figure 2. *Adenium arabicum* with the swollen base and trunk of a caudiciform plant.



Figure 3. *Adenium* 'Red Robin,' a double flowered cultivar.

Adenium Flowers And The Desert Rose

Standard adenium flowers have five petals and do not resemble the popular image of a rose flower. They are better compared to wild rose flowers, as wild roses have five simple petals. A mutation in roses created the familiar appearance of cultivated roses having many overlapping petals, known as a “double flower.” The double flower is considered an attractive and desired flower form. Similar double flower mutations have been selected in cultivated plants from many unrelated species. Recently the double flower mutation has been achieved in certain adeniums (Figure 3). Now we can have a “desert rose” flower which better resembles a cultivated rose. These double flowered adeniums are still undergoing development in horticulture and their flowers do not approach the size and quality of rose flowers.

Adenium Species

Adeniums are plants in the Apocynaceae (Dogbane Family). At least eight species of *Adenium* occur across southern Africa and greater Arabia, with a complex in East Africa through the Sahel being one variable species or several sibling species (Dimmitt, pers. com.). Egli (2002) presents *Adenium* as a single

variable species, *A. obesum*, with six interfertile subspecies. The delineation of *Adenium* species and proper naming within the genus is under debate. Hybrids between *Adenium* species have enhanced the variety in cultivated specimens, but the difficulties in species definition within *Adenium* do not appear to come from rampant natural hybridization. Cultivated specimens of many of the true (unhybridized) species are available from cactus and succulent specialty nurseries in the Southwest. The true species can appeal to succulent hobbyists and *Adenium* specialists who are interested in the natural form of species.

Wild adeniums are widely scattered throughout the arid regions of Africa and the southern Arabian Peninsula where they grow in a warm dry tropical climate. They have limited tolerance of cold or freezing. Their succulent form is an adaptation to extended seasonal drought, during which they may go dormant and drop leaves.

The various adenium species differ in growth characteristics and horticultural needs, which are described in the book *Adenium: Sculptural Elegance, Floral Extravagance* (Dimmitt et al. 2009). Most of the adeniums available from non-specialist nurseries will be *Adenium obesum* or hybrids with this species.

Most horticultural recommendations for growing adeniums address *A. obesum* and its hybrids. This is the best starting point for understanding adenium care, which may be modified for some of the different characteristics of other species.

Hybrid Adeniums

Adenium obesum is the most widely cultivated adenium species, and the most used in hybridization. The ornamental strongpoints of *A. obesum* are ease of cultivation, fast growth rate, attractive glossy leaves which may be evergreen, and large attractive flowers which can be produced in massed blooms over a long blooming season. Unfavorable attributes of *A. obesum* are its cold sensitivity, weak floppy branches and inconsistent caudex formation (Dimmitt, pers. com.). *Adenium obesum* has a wide natural range across central Africa, in which it displays a good deal of variation in flower and vegetative characteristics. The variation in the species constitutes a wide gene pool for selection of improved characters (Dimmitt et al. 2009) but this calls into question whether the species should be divided up into separate species with new names. Questions about the proper original naming of *A. obesum* mean that this most popular of *Adenium* species might be subject to a name change in the future (Dimmitt et al. 2009). The genetic variation within *A. obesum* is considerable, and many selections have been made within the species. Hybrids made between *A. obesum* and other *Adenium* species provide additional genes to the hybridizer's pallet. Crosses between *A. obesum* and *A. swazicum* are among the most popular. *Adenium arabicum* is known for making a massive swollen caudex, but its flowers are unremarkable. This species has not been much used in hybridization, but it is recently becoming a focus of breeding efforts (Dimmitt, pers. com.).

The History Of Hybrid Adeniums

Most ornamental plants have a long history of cultivation. Adeniums are comparatively new, with the first development of improved selections and hybrids in the 1980s and 1990s (Dimmitt et al. 2009). The wide variety of adeniums on the market are the result of conventional breeding and selection. They are not the product of laboratory techniques which manipulate, edit, or import genes from unrelated organisms. Therefore they are not genetically modified organisms (GMOs) as these techniques have been too expensive to employ much beyond commercially significant crop plants. Nonetheless the advancement of genetic techniques may bring these technologies to popular ornamental plants in the future.

Much of the early effort to breed and select adenium hybrids was pioneered by horticulturists in Tucson, Arizona (Dimmitt et al. 2009). Much of the recent progress in developing new hybrid adenium cultivars has progressed in Southeast Asia, chiefly Taiwan, and has further enhanced the flower variety and mass-production of adeniums. Unlike many succulent plant genera, adeniums are not CITES listed plants, and there is less restriction on international trade.

Adenium cultivars produced in Tucson will have been selected to perform well in Tucson's climate. While these plants are still not adapted to the Arizona climate without winter protection, they may be better cultivars for Arizona growers than plants coming out of Southeast Asia or greenhouse cultivation as such plants may never have had a brush with cold. Regions of Arizona warmer than Tucson (Phoenix, Yuma) are equally or better suited for outdoor adenium cultivation through much of the year.

The overwhelming emphasis in the development of cultivated adenium varieties has gone toward improving flower appearance and presentation. An incredible variety of flower forms has been produced. Bi-colored and tri-colored flowers, with stripes or zonation of colors, many color shades involving reds, pinks, whites, and touches of yellow have been developed. Selection has increased intensity of color, flower size, numbers of flowers, and length of the flowering season. Variation in flower shape, petal form, and double flowers add even more variety. The number of named adenium cultivars is far beyond the scope of listing them here, and many more continue to be developed.

Improved ornamental adeniums are made by selecting two parent plants with desirable characteristics (these may be members of the same *Adenium* species, different *Adenium* species, or existing *Adenium* hybrids). Not all species of *Adenium* are interfertile, and some species have never been employed in producing improved cultivars (Dimmitt et al. 2009). When an outstanding plant is produced in cultivation, it is selected as a parent for further breeding or for release as a cultivar. Plants without standout characteristics are typically destroyed. However sometimes these plants find their way into the marketplace and add to the various unnamed adenium hybrids present in cultivation. Some less attractive plants can find utility as grafting stock.

Understanding Cultivar Names

A cultivar is a cultivated variety. A plant named as a cultivar may have originated from hybridization, random mutation, or selection from the natural variation in a species. Cultivar names are applied to new notable cultivated plants which are being distributed in numbers, usually through commercial sales. New cultivar names are not given to individual plants or small sets of plants that will not be propagated or circulated. Cultivar names should be published in the horticultural literature with a description of the characteristics of the cultivar. Many undescribed and unregistered cultivar names are in circulation and this promotes confusion. It can be difficult or impossible to assign an unlabeled cultivated Adenium to a species, hybrid cross or cultivar name. For most home gardeners the lack of cultivar identification is of no more concern than a lack of pedigree for their pets.

Adenium 'Crimson Star' is an adenium cultivar. The cultivar name (cultivar epithet) should be capitalized, not italicized, and is indicated by single quotation marks (not double quotation

marks). In this case the cultivar name follows the name of the genus *Adenium* without a species indicated, because this cultivar is a hybrid between different species and does not represent a particular species. *Adenium* 'Crimson Star' is a clone of an outstanding hybrid of *Adenium obesum* crossed with *Adenium swazicum*. Although this plant is an interspecific hybrid, the letter x or multiplication symbol × should not be used in front of the cultivar epithet. Interspecific crosses between species may be indicated with a hybrid formula, such as *Adenium obesum* × *A. swazicum*. This may be used to describe the parentage of a plant when no cultivar name is being applied.

Cultivar names are not trade names and should not include or be followed by trademark symbols, ™ or ®. Neither a cultivar name nor a trade name means the plant is patented. Few adeniums are patented plant materials (Dimmitt, pers. com.). Patented plants are sold with a plant patent number indicated on the label. Unauthorized propagation of a patented plant is prohibited.

Adenium Cultivation In Southern Arizona

Adeniums are excellent plants to grow in warm parts of southern Arizona. Adeniums thrive and grow in heat, so Arizonans have an advantage with their cultivation. Adeniums can be regarded as easy to grow, especially in southern Arizona, so long as their particular needs are met. This is not difficult, but it differs from the treatment for most other plants, even other succulents.

In all parts of Arizona, adeniums should be grown in containers so the plants may be moved seasonally. Adeniums will not thrive as year-round houseplants. Indoors they are unlikely to receive the hot temperatures over 80°F, nor the intense sunlight they require to enter their active growing period. The plants will do best if placed outdoors through the warm months of the year, where they can thrive in the Arizona summer heat and intense light. The plants should be brought indoors or moved to a sheltered covered location for their winter dormant period.

Temperature Preferences

Adeniums are tropical plants which thrive and grow in heat. Summer heat in southern Arizona suits them, though they may slow their growth during the hottest weather. When nighttime temperatures stay above 60°F in spring, adeniums will begin growth, and this is a good indicator temperature for moving plants outdoors (Dimmitt, 2013). The active growth period runs from April to October in warm desert areas (Desert Botanical Garden, 2021).

Adeniums have very little tolerance of temperatures below freezing. The most popular species, *A. obesum*, is especially sensitive to cold and may show cold damage at temperatures below 50°F (Dimmitt et al. 2009). Other species and some cultivars are less sensitive, but no adenium can be expected to be reliably hardy in Arizona winters. Even in the warmest

regions of Arizona it is risky and not recommended to leave these tropical plants outdoors and exposed in winter weather. Freezing temperatures will kill adenium stem tips first, and greater exposure will kill entire plants. Root rot is a danger for adeniums in cold wet soil.

Light

Adeniums can withstand a great deal of sun. A bit of light shade during the hottest season is appreciated. Adeniums should not be overly shaded during the growing season, or growth and flowering will be poor (Mahr, 2013). In their dormant period adeniums will cease growth and it is safe to place them in a darker location. They can sunburn if moved without a transition from a dark, shaded location into bright sunlight (Desert Botanical Garden, 2021).

Watering

Adeniums enjoy frequent watering while in peak summer growth, which usually begins in May (Dimmitt, 2013). The plants are cultivated in fast draining soil media, and should receive a thorough watering that drains quickly from drain holes in the container. During hot weather in the growing season, plants in pots smaller than 10 inches may be watered 3-4 times a week. Plants in larger pots will retain more water and should be watered twice a week (Desert Botanical Garden, 2021). Watering needs can vary depending on the soil medium and how much of the pot is filled with roots.

In contrast, adeniums in the winter dormant state should be kept dry and without water, even if they flower at this time. This is particularly necessary for plants kept in cooler conditions and in poorly lit storage locations. Some light watering, dampening the upper inch or two of soil media, may be applied to young plants or plants kept in warm sunny locations, but only if significant shriveling is noticed. Leaf drop is normal for many adeniums during winter dormancy, but some plants are inclined to keep their leaves.

Watering and fertilizing may continue until night temperatures drop below 50°F (Dimmitt, pers. com.). After this point water should be held off and plants moved indoors or to a sheltered location.

In the spring, adeniums must be "woken up" from dormancy. Let the rising temperatures stimulate growth and avoid watering until nighttime temperatures stay above 50°F. Water sparingly when nights are above 50°F and if the plants begin to grow new leaves (Dimmitt, pers. com.). Gradually introduce them to water, giving water selectively during spring warm spells and avoid watering during cool spells (Dimmitt, 2013).

Fertilizer

Fertilizing adeniums can stimulate growth and flowering. Encouraging growth is not always desired if the grower wants to maintain a plant at a moderate size. A fertilizer low in

nitrogen, moderate in phosphorous, and highest in potassium is ideal. Apply fertilizer at quarter to half the strength indicated on the fertilizer package. Fertilizer may be applied with each watering during the growing season, for maximum effect (Dimmitt et al. 2009) or less often, to moderate growth.

Pots, Planting And Soil Media

Adeniums should be cultivated in pots or other containers, and not planted into the ground in Arizona. Container-grown plants can be moved seasonally. Planting media customized for adeniums will drain moisture better than soil in the ground.

Adeniums should be planted in a soil medium providing excellent drainage. Every grower seems to have a preferred mix, based on materials they have available. Media composed of coarse pumice as a major ingredient is popular. Coarse coconut coir (chips and fiber grade), sand, gravel, and perlite are often employed. Adeniums do not have particular requirements for their soil medium, except that it be well-drained. Bagged potting soil intended for houseplants, even if labelled as a cactus mix, is typically too rich in organic matter to be the sole or main ingredient in adenium soil media. Adeniums will grow well in highly organic media for a couple years, but will suffer as the organic media begins to oxidize a few years later. The preferred media should be mostly inorganic (Dimmitt, pers. com.).

When purchasing a new plant, inspect the growing media it is in. Adeniums may have been produced in nurseries in other climates or in greenhouse environments. It is wise to repot the plants, removing all the media from around the roots and replanting into a medium with known characteristics.

Repotting of adeniums should be done during the warm growing season, the earlier the better. Do not repot adeniums during the fall or winter. If the roots have not been significantly damaged in the process, the repotted plant may be watered immediately following repotting (Dimmitt, pers. com.).

Many growers will repot adeniums at a higher level above the soil than they previously grew at. This practice of elevating the plant is usually done to expose more of the caudex or swollen upper roots, considered an attractive aspect of the plants. It may also aid in protecting these parts from rot. Elevating the plant should not be overdone. It should be a gradual process with each repotting.

Containers for adeniums must have drain holes in the bottom, preferably several. The plants should be maintained so drainage from the pot is not blocked, which can happen when pots are placed on a hard surface. The pot can be elevated to keep an air gap between the bottom of the pot and the surface it is standing on. Pot-elevators or “feet” are available for this purpose. An air gap also discourages roots from growing out the bottom of the pot. Do not place the pot on a saucer which would hold a layer of water.

Glazed pots, plastic pots and other containers may be used. Terra cotta or clay pots are ideal for adenium cultivation

because their porous sides help the soil to dry. The watering schedule and/or potting media should be adjusted for plants in containers depending on the size of the pot and the porosity of the pot. The growing media will retain more moisture in large pots than in small ones, so a finer-textured medium should be used with small pots, and a coarser medium used in large pots. Pumice and coir are lightweight materials when dry. The weight of growing media, plus the pot, should be heavy enough to keep the potted plant from blowing over, but also light enough to facilitate the seasonal moving of the plant.

Adeniums tend to be fast growers compared to other succulents, and they need repotting more frequently. Adeniums tolerate being pot-bound in small pots (Desert Botanical Garden, 2021) and this can be an effective way to maintain them at a manageable size. The caudex or roots can break a pot in the effort to grow. When growing an adenium in a valuable decorative pot, care should be observed to repot the plant before it fills the pot. Do not use pots which narrow near the top or it may not be possible to get the plant out. Avoid planting an adenium in an oversized pot with a large volume of soil, a practice called “overpotting” as the excess media will retain moisture for a longer time. Instead, repot adeniums into a slightly large pot than the one it came out of (Mahr, 2013).

Pruning

Many adeniums have the potential to grow taller than a person, resembling small fat trees (Mahr, 2013). Because adeniums must be moved seasonally, there is reason to keep their size under control. Adeniums can be pruned aggressively to reduce size or to shape the branching structure, as some have poor form with floppy branches. If the adenium is grafted, take care not to cut the stems off below the graft. Spring is a good time to prune or groom plants to improve appearance (Dimmitt, 2013). Late season pruning results in short branches that tend to grow weakly the following season (Dimmitt, pers. com.). Pruned stem pieces have the potential to be rooted as cuttings.

Although adeniums are often compared to bonsai, there are important differences between adenium care as described here, and traditional approaches to bonsai. Bonsai techniques are used to force dwarfed growth from tree species which would naturally grow to large sizes. Adeniums grow naturally into a plant which happens to look like a small tree.

Flowering

Spring is the peak bloom time for most adeniums. A few will bloom in winter, while others peak in fall. Some cultivars have been bred for nearly year-round blooming if a warm bright environment is maintained. Do not mistake a winter-blooming adenium as one needing water. Keep these plants dry until the growing season starts in late spring. Certain adeniums can bloom while less than a year old (Dimmitt, pers. com.). Selective breeding has produced miniature adeniums capable of blooming when quite small.

Vegetative Propagation

Vegetative propagation, such as propagation by cuttings, is the only way to propagate a cultivar that will be true to its name (Mahr, 2013). The genetics of the new plants will be the same as the parent – they are clones. If the parent plant has a well-developed caudex, a plant grown as a cutting from it will also develop a caudex in several years (Dimmitt, pers. com.).

Adeniums may be propagated by cuttings made from leafy young branches or from longer older branches. Both techniques work best if attempted early in the growing season. Leafy cuttings, made on “soft tissue” should not be allowed to dry out or “callus over” as is standard practice for most succulent stem cuttings. Instead, the freshly cut stem end should be dipped into rooting hormone, then inserted into a very well-draining soil medium. Keep this rooting environment moist, very warm, and moderately illuminated. An enclosed rooting chamber in the manner of a terrarium may be used. More mature stems which have lost their lower leaves can be rooted in much the same way as leafy stem cuttings. This technique does not require as much moisture and humidity (Dimmitt et al. 2009).

Air-layering is a useful technique for propagating adeniums, though it is under-used (Dimmitt et al. 2009). The technique can be useful on larger diameter branches. A notch is made in the branch, and rooting hormone is applied to the notch. The notched area is bundled with moist sphagnum or coir, then securely wrapped with clear plastic wrap. The plastic wrap is then covered with aluminum foil to shield the region from sunlight and discourage algae growth. The sphagnum or coir must be kept moist and examined for root growth. When a

root system is observed through the plastic wrap, the layered stem may be severed from the main plant just below the rooted region. The moss or coir should be removed. The stem may then be treated like a rooted cutting.

Another mode of propagation for adeniums is tissue culture, also known as micropropagation or meristem culture (Rowley, 1999). Small clusters of meristem cells are grown under laboratory conditions, and later separated out to grow as genetically-identical plantlets. The technique has not been widely used with adeniums (Dimmitt et al. 2009).

Propagation by Seeds

Adeniums generally do not self-pollinate. Two different clones are usually required to exchange pollen and produce seed (Mahr, 2013). Different species may be crossed, but not all species will interbreed (Dimmitt et al. 2009). The flowers have a complex structure and may be tricky to pollinate by hand (Mahr, 2013) however plants grown outdoors may be pollinated successfully by local pollinators. Flower structure and pollination are described in detail by Rowley (1999). Successful pollination is followed by the production of a pair of long cigar-shaped seed capsules called “horns.” These will split open and release cylindrical seeds with fuzzy hairs at each end (Figure 4). Seeds may blow away outdoors. The horns can be loosely wrapped in a mesh bag before they open, to capture the seeds when released.

Plant adenium seeds under warm conditions corresponding to peak adenium growing season. Fresh seeds should germinate in moist soil in a matter of days. Seedlings must be



Figure 4. A small adenium with large seed horns (left), releasing seeds (right).



Figure 5. Adenium seedlings growing in a soil medium containing pumice and coir.



Figure 6. Grafted adeniums with visible graft unions.

kept moist but not saturated during their early weeks (Dimmitt et al. 2009). The seedlings are large and faster growing than most succulents (Figure 5). It is beneficial to water and fertilize seedlings to maximize growth, as small seedlings are more delicate than adult plants. During their first winter, seedlings prefer ideal conditions of light, warmth, and sparingly applied water if needed to avoid shriveling.

Adenium cultivars will not breed true. The seedlings will not duplicate the genetics of either parent. Any seedlings resulting from the cross should not be assigned the cultivar name of either parent.

Grafting Adeniums

Grafting is a common horticultural practice where stems of one plant, called the scion (usually with desirable characteristics) is surgically united with a rooted plant which serves as the rootstock (Figure 6). The rootstock is usually a less desirable plant, but one with strong roots, or in the case of adeniums, possibly a plant producing a large caudex. In this way, an adenium cultivar with attractive flowers but poor caudex development may be grafted to a caudex-forming rootstock. In time the graft union will no longer be conspicuous as the stems enlarge.

Grafting adeniums is not always done to provide plants with a caudex. The technique may be used as a form of propagation, allowing a desirable cultivar to be increased by grafting small branches, which establish and grow faster than they would if propagated as cuttings.

A grafted plant unites the tissues of two different plants, but it is not a hybrid, which would combine the genetics of different plants. The name given to a grafted plant is the name of the scion, the desirable plant stem that is grafted on the rootstock.



Figure 7. Root mealybugs appear as ashy-white deposits on adenium roots, soil medium and the inside of pots.

Pests And Problems

Adeniums are rarely bothered by pests when grown outdoors. Spider mites, aphids and mealybugs may occur on the leaves and stems, but they can be dislodged with water sprayed from a hose (Desert Botanical Garden, 2021). These insects cannot prosper on plants which go dormant and drop leaves in winter. Inspect roots for the powdery white signs of root mealybugs (Figure 7). If found, remove all soil from the

roots and spray them with rubbing alcohol. If possible, leave the plant unpotted for a number of days for repeat treatments before potting up again. Discard the old soil media and clean the pot if it is to be reused.

Rot disease is a significant problem for adeniums which are not properly cared for. Frozen or cold-stressed plants may rot. Root rot can set in if plants are watered during dormancy, or watered too early in spring. Adeniums should be protected from cold, wet soil. This is an important reason for moving the plants indoors or under cover in winter. Rotted areas should be cut away as soon as they are noticed. The remaining tissue must be kept dry. If enough of the plant is uninfected, adeniums may recover after the loss of a large portion of roots and caudex.

Viruses accompany some adeniums in cultivation. The infection is seen as mottled coloring on leaves and broken coloration on flowers, sometimes with deformation. Viruses may be spread from plant to plant by unsanitary pruning tools. Infected plants must be destroyed (Dimmitt et al. 2009).

Adenium Toxicity

Adeniums are related to oleander. Like oleander, adeniums are toxic (Mahr, 2013). Adeniums are extremely bitter, and this makes them so unappealing a meal that few people or animals are likely to eat enough to be seriously poisoned. Even goats are said to avoid eating them (Mahr, 2013). However, some animals will browse on adeniums in habitat, and rodents may gnaw on adeniums in cultivation (Dimmitt, pers. com.). No human deaths due to adenium toxicity are known (Dimmitt, pers. com.). Take care when handling adeniums. Wash off any sap and be especially careful to keep sap away from eyes (Mahr, 2013).

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THE UNIVERSITY OF ARIZONA
Cooperative Extension

AUTHOR

MICHAEL CHAMBERLAND
*Assistant Agent in Urban Horticulture, Maricopa County
Cooperative Extension*

CONTACT

MICHAEL CHAMBERLAND
mchamb@email.arizona.edu

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