

## Propagation of Cactus and Agave Made Easy<sup>®</sup>

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### INTRODUCTION

This paper is designed for plant enthusiasts who wish to propagate their agaves and cacti through vegetative means. Although there are many methods used by commercial growers who mass produce these plants including in-vitro propagation, grafting, cuttings and seed, this paper will focus on low-tech, easy-to-follow protocols utilizing cuttings of cacti, vegetative divisions, and bulbils of agaves.

### CACTUS PROPAGATION

**Cuttings.** Many genera of cacti, e.g., *Opuntia* sp. (prickly pear), *Cereus peruvianus* (see *C. repandus* or *C. hildmannianus*) (Peruvian apple cactus), and *Cereus repandus* (hedge cactus, apple cactus) are easily grown from cuttings if taken at the appropriate time of year and root in as little as 28 days. Species such as *Stenocereus thurberi* (organ pipe cactus) will take 2 to 3 months to root. As a general rule, most commonly grown columnar cacti root in 4–6 weeks.

Only the highest quality propagation material should be selected. All cutting material should be well-hydrated and free of disease, blemishes, and insects. Periods of rapid growth (spring through summer) are the best times to propagate these plants.

The first step in propagation of a columnar cactus is to remove the cutting from the stock plant. Since the cut area will be unsightly after the cutting removal, taking the cutting from the back of the plants will help in maintaining the aesthetic value of the stock plant. Make all cuts at a 45° angle. As the cut area of the stock plant dries, a cupping of the vascular bundle may occur. Unless cut on an angle, the stem will collect water during irrigation or rain and cause unnecessary decay. To avoid pathogens entering the cut portion of the cutting, it is mandatory that they be air-dried until a callus forms over the cut area. Callusing may take from 5 days to several weeks depending on relative humidity and temperature. The cutting should be stored in a very bright area and placed upright. Compartmentalized boxes in which wine is shipped work well for this purpose.

Cutting length can vary from several inches (cm) to several feet (m) depending on the species, the propagator, and the availability of cutting material. Prior to callusing, the base of the cuttings should be carefully squared off. This minimizes the area exposed to the rooting medium and lessens the area that may potentially be invaded by a pathogen. The cutting may be dusted with powdered sulfur prior to sticking as added insurance against disease. Talc formulations of rooting compounds which are available at most garden centers are optional.

Another method used by some propagators is to place the sulfur-dusted cutting upright in a bright area for about 3 to 4 weeks. During this time, species such as *Echinopsis pachanoi* (syn. *Trichocereus pachanoi*) (San Pedro cactus) and others will form adventitious roots on the cut portion of the cutting and then can be stuck

directly into growing medium. If kept in a too-dark location during this period, the cutting may elongate and become thin.

Globe-shaped cacti such as *Echinopsis* spp. will often have pre-formed adventitious roots present while still attached to the mother plant. These can be removed by either cutting them off with a sharp, clean knife or gently twisting the small globes. As with columnar cactus cuttings, these must be dried to allow a callus to form prior to sticking.

**Grafting.** Many cactus species can be grafted. The reasons for grafting are to produce elite clones that do not grow well on their own roots, produce novelty cactus such as *Gymnocalycium/Hylocereus* grafts, hasten seed production, and to allow exotic species to grow under harsher conditions than they would normally survive.

A flat graft is commonly used and is easy to successfully accomplish. The scion and stock need to be from the same family. The rootstock should be plump and actively growing, and all cutting tools need to be clean and razor-sharp. Very rapidly growing species and species that offset prolifically should not be used as rootstock as they will soon outgrow and overtake the scion. Carefully cut the top off the rootstock several inches below the top. The length above the soil line of the rootstock should be approximately 4.5 in. (9 cm) long and 1–1.5 in. (30–35 mm) in diameter. This piece can be rooted and used again as a new rootstock. The sides of the stock should be beveled to prevent accumulation of water and subsequent rot. Then remove the scion from the desired species taking care not to touch or contaminate the scion or rootstock. Crested scions should be trimmed so they are fan-shaped which will prevent the scion from rapidly growing over the graft union. The side pieces are discarded. Carefully place the scion on the rootstock and align the vascular cambium of both pieces. They do not have to perfectly align and will take even if only a portion of the cambium rings are in contact. Press the scion slightly onto the stock to remove air bubbles and water. Secure the stock and scion using a rubber band. Protect the graft from extreme dry temperatures, drafts, and very still humid locations. Keep the plants in an area that is in the 75–85 °F (24–30 °C) range, with 85% relative humidity, and receives 5000–8000 f-c of light. Remove the rubber band after 5–10 days.

Another technique is the wedge graft which is used commonly with grafts of *Epiphyllum* and *Schlumbergera* and other thin-stemmed species. Remove the top 2 in. of the stock and make cuts down the sides forming a very tight wedge. Slip the scion into the wedge in the stock and secure the graft with a clean cactus spine and then use a plastic clothespin to put pressure on the incision. Protect from extreme conditions as you would with a flat graft. The graft should be done within 7–10 days and the clothespin can be removed.

## AGAVE PROPAGATION

Agaves are easily propagated from divisions or “pups,” and bulbils. Bulbils are miniature plants that form on the inflorescence and are genetically identical to the parent plant. For ease of handling, stock plants should be grown in containers or in a loose soil making removal of the plants and offsets easier. Large species such as *Agave weberi*, *A. americana*, *A. americana* ‘Mediopicta’, and *A. parryi* are typically grown in the ground while smaller species such as *A. victoriae-reginae* are grown in containers. In the ground plants will be limited to harvesting the offsets that

grow near the parent plant. Containerized plants are easier to handle and are of smaller size.

With the popularity of tissue culture propagation, many species that produce very few offsets or in many cases no offsets can be mass produced from limited parent material. Species that are exceptional examples of the species (elite clones) are also prime candidates for tissue culture propagation.

Species that produce bulbils are the easiest to propagate. They will typically have adventitious roots that grow rapidly when transplanted to soil. Species that produce bulbils include *A. vilmoriniana*, *A. ocahui*, and *A. murpheyi*. Not all species of agaves produce offsets and many are solitary plants that are only grown from seed and/or tissue culture because the parent plant typically dies after blooming.

Offsets are easy to propagate. Remove the plant from the pot or container. Break up the root ball to separate the offsets. Then trim off all but  $\frac{1}{4}$  in. (6 mm) of the roots. This will make sticking the offsets in the rooting medium easier and the plant will grow a new set of roots from the base of the offset.

Air-dry the offsets in the shade for several days so the cut portions of the offset can callus over. No sulfur or rooting compounds are needed for success.

After potting up the plants in small containers place the plants in an area that receives dappled sunlight and water sparingly. Allow the plants to go dry between watering. Ideal temperatures for rooting are 80–85 °F (27–29 °C) with a nighttime low in the mid to high 60s (15–21 °C). After 20–30 days the offsets will be rooted and a fertilizer program can begin using half-strength 20N-20P-20K soluble fertilizer weekly.

The requisite propagation mix for all cactus and agave is one that is rapidly draining, clean, and retains some water and nutrients. Mixes typically contain pumice (volcanic gravel), sphagnum peat moss, and well-rooted compost (2 : 1 : 1, by vol.). Where pumice is not available coarse perlite is an acceptable substitute and all sphagnum peat may be substituted for the compost. There is no one “best” propagation and growing mix but all have one quality in common which is good drainage.

The purpose of sharing this information that was gleaned from many sources is to help those who do not have access to a greenhouse or high-tech equipment to grow many commonly sought after species of agave and cactus at a low cost and a high degree of success.

### ADDITIONAL READING

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