

## Vegetative Propagation by Stem Cuttings

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**Supplies:** Rose pots, trays, cotton glove liners, nitrile gloves, feather blades, small tub (1-ft in length) of water (to submerge cut end of stem in as you make the cuttings), large tub (1-m in length) of water for perlite trays, ¼ inch diameter stick, pot labels, pencil, dust mask. Healthy plant with no obvious signs of nutrient deficiency (pale or yellowing leaves or reddening petioles) or active pests.

**Soil media for cuttings:** perlite, wet thoroughly with water.

### Procedure:

**1. Prepare perlite pots:** Place 21 green, reusable rose pots into a tray, fill pots with perlite over a trash can outside. Wear a face mask since dry perlite is very dusty. Place the tray of rose pots into the large tub after filling it to a depth of about 1.5 inch (~4 cm) with water, and allow the perlite to soak up through the media until the surface is wet.



### 2. Prepare stem cuttings:

- Put on a cotton liner, and over that, a nitrile glove. Snap a feather blade along its length into two halves, each with one blade edge (consult with others if you do not know what this is). **Feather blades are SHARP - be extremely careful!**
- Single-node cuttings (internodes~ 1.5-2 in. long) are made from vigorously growing shoots (see **Tips** below). Use a pair of sharp scissors to trim away excess lamina of fully-expanded leaves between nodes 8 and 25 from the top. After trimming, the part of the leaf that remains will be in the shape of a triangle about 1-inch wide at the base of the lamina, tapering to a point about 2.5-3 inches out along the midvein.
- Use a pruner to cut off the top 30-40 internodes of the parent plant. Submerge cut end into a 5-gal bucket filled 1/3 full with water, cut the submerged end **below** the water surface with the pruner and move into the head house prep area.
- Remove the shoot tip down to the topmost trimmed leaf. Again, leaves should be in good shape or success will be low; see **Tips**.
- Fill the smaller tub with water for excising and collecting the internode cuttings. Use the feather blade to cut through each internode **just above** the tiny (non-emerged) bud, generally at a 30-40° angle, while the end of the stem that you are cutting is submerged. **Leave cuttings in tub until you are ready to stick them into the perlite. Do one plant at a time!**
- **Optional:** soak cuttings in a fungicide solution for 10-15 min, rinse and place in a water tub until use.



**3. Planting:** With a small stick, ¼ inch in diameter, make a hole diagonally through the perlite all the way to the bottom. Gently push cuttings into the perlite bed so that the remaining part of the leaf blade is pointing up (more vertical than shown in the images here so that the cuttings do not shade each other). Press the perlite firmly around the cuttings and make sure the cuttings are anchored. **Keep cuttings moist during the process by occasionally hand misting.** Insert a plastic label with genotype and date, in pencil, into each and every pot. When the tray is full, place it onto the mist bench. **Automatic mist settings should initially be at 10 sec every 10-12 min.** We have found that misting is not necessary at night, but be sure the cuttings are not in the airflow of any heaters. Mist timers should be set to resume misting at sun-up.



**Clean up the cutting area thoroughly.** Sweep away all perlite from bench and floor, rinse tubs and make sure there is no perlite sitting in the sink. Flush well with water. **Dispose of used blades in the sharps container which is near the bench.** This is very important since blades can be easily missed and if one blade makes it to the garbage or into somebody's fist or shoe, serious injury can result.

**4. Mist bench:** Good rooting is usually evident within ~1 month. Ensure that the area of the bench you are using is receiving good misting. Avoid ends and edges of the benches. Report to the greenhouse manager if it appears that misting is uneven or weak, or not functioning as expected. Check on your cuttings once a day or so to be sure they are wet and the perlite soaked ([randomly lift a few pots to feel the weight](#)). Rooting can be gauged by peeking from the bottom of the tray/pot, or by gently tugging the cutting upward. Cuttings without roots can be pulled easily, while rooted ones will “resist” the motion. This can be tricky if the cuttings develop a callus which might become large enough to make the cutting seem anchored. Don't be afraid to tug pretty firmly. Don't use callused cuttings. Good to not count your chickens until they are hatched. You might assume you will have twenty based on shooting, but then wind up with 10 or 15 that root properly and can be potted.

**5. Acclimation:** Once rooted, and with shoots >5-7 cm in height, move the cuttings to a mist bench that has a reduced misting frequency (**30-sec duration once per hr**) and observe for 3-4 days. If plants are holding up, move the cuttings out of the mist, and onto a dry bench with a shade cloth. Monitor carefully at first. Once out of the mist, fertilize the cuttings by setting the tray into 1.5 inches of Peter's or Jack's 20-20-20 or equivalent (5 g/L from a concentrated stock of your choice) for 1 hour every 2-3 days until potting in soil. Water once per day early in the morning for one week to harden the plants. **Plants that are fully acclimated to ambient\_ greenhouse conditions ([no sign of wilt at the end of the day](#)) should be transplanted to soil pots very soon thereafter.** Rooted cuttings left in the mist chamber for long will begin to rot. Fully acclimated cuttings in perlite pots will dry out and die if potting is delayed.

Soil media for potting: Fafard 3B + Osmocote Plus (15-9-12 NPK+micro's, 8 g/1 gal), well mixed. When transferring to soil, [avoid bare-rooting](#). Keep whatever perlite you can on the roots. Water the soil to flow-through after planting. Plants can go directly from the planting room to the greenhouse, but they should be checked the first couple of days, and any that are wilting should be moved out of direct sun until they have had more time to adjust.

**Cutting success depends greatly on personal care and attention to detail. The tips below are for trouble-shooting. Consult with experienced personnel for advice and guidance.**

**Tip 1.** Use parent plants that are 4-6 tall, and have vigorous growth at the shoot apex.

**Tip 2.** Carefully examine plants for evidence of mites and thrips about 1 week before you plan to make cuttings. If you see pests, mist the plants thoroughly with 65 psi water through a hose mister to blast off pests and their eggs, generally on the undersides of the leaves. If leaves are damaged by the pests, probably should not proceed with that plant. Let the greenhouse manager know that you will segregate those plants for spraying.

**Tip 3.** On your own, fertilize the plants (1-gal pots) with blue fertilizer (Miracle-Gro, one small teaspoon/L water) three or four days before you plan to make your cuttings. Repeat if plants do not look robust. Do not overdo it with the fertilizer or buds will release prematurely on the stem and you will not get cuttings. If the plants have become obviously nutrient deficient, have badly outgrown their containers or have spindly tops, cuttings success will drop precipitously.

**Tip 4.** From the standpoint of the plant, the best time to make cuttings is **early morning** or **late afternoon**. Avoid working in the heat of a hot sunny day. Mist the cuttings frequently while you are working.

**Tip 5.** If the internodes are poorly spaced, <1.5-2" between leaves, a cutting can comprise two internodes, and this would be the way to go rather than hope for shorties to work.



### When to take cuttings

The plants to the left are ready for cuttings. Generally, plants are about 4-5 feet tall when they reach a nice stage of semi-woodiness. The stem diameter should be ~ ½ inch at the base.

The plant on the right is too large; it was allowed to reach 3 meters in height with a stem diameter of >¾ inch.



The plant to the left has lush green stems and buds. The buds are green, and stem is covered with trichomes (white color).

The plant to the right has woody stems and pinkish petioles and buds. The buds are hard and small. Fewer trichomes.

The plant on the left is probably cleaner and less infected with pests.



Old plants can make decent cuttings if they are cut back, fertilized and allowed to regrow with good management to the ideal height of 4-5 feet.

Mites and thrips can reside in soil as larvae and might be more of a problem for regrown plants.



### When to start acclimation



Cuttings should be utilized at this stage. This cutting is well rooted and will survive step-wise hardening.

Mix and match your cuttings so that the entire tray contains similarly developed cuttings when you move to hardening.



The cutting above is still too small for hardening off.

Acclimation should take **7-10 days**. Cuttings fully acclimated to normal greenhouse conditions should be potted ASAP.



These cuttings should have been removed from the mist days ago. The plant on the left is still OK while the plant on the right is beginning to rot and was not that great to start with. The fungus at the leaf tip most likely is Botrytis blight (the same gray fungus that rots strawberries in your refrigerator).