



## Air Layering

by John Farmer, Janine Fujioka, and David Maxwell  
O'ahu Master Gardener Program (Class of 2024)

During a workshop led by Dr. Alberto Ricordi, Assistant Extension Agent, at the Urban Garden Center in Pearl City in March 2024, we practiced the technique of air layering on plumeria (*Plumeria* spp.), native yellow hibiscus or ma'o hau hele (*Hibiscus brackenridgei*), and song of India (*Dracaena reflexa*). Inspired by working with these plants, Janine later wrote a poem that closes with the lines, "Hibiscus closes at night / A song of India opens in the morning." Air layering is a method of asexual propagation recommended for plants that can't be easily propagated by cuttings or grafting. The Chinese began to use this method about 4,000 years ago. Today, it's used to propagate a variety of trees and shrubs, including lychee (*Litchi chinensis*), longan (*Dimocarpus longan*), and Persian lime (*Citrus aurantifolia*). It's also useful for reproducing plants from genera like *Ficus*, *Croton*, *Monstera*, and *Philodendron*. Home gardeners can use the technique to create genetic clones of large plants, as well as to produce roots on the stems of indoor plants that have become leggy.



Air layers on plumeria tree, Urban Garden Center, March 2024. Photo John Farmer.

In air layering, an aerial stem (or branch) of a plant is girdled and wrapped in a rooting medium to initiate adventitious roots. Girdling involves removing layers of bark and wood, including the phloem and vascular cambium but not the xylem, completely around the stem. Girdling keeps the stem's xylem intact so that water and dissolved minerals from the xylem can continue to flow upward to the upper part of the stem. But because girdling severs the phloem, the downward flow of sugars, the phytohormone auxin, and other

compounds is blocked. These compounds accumulate above the girdle, where the ratio of auxin to cytokinin, a complementary phytohormone, increases, signaling the plant to initiate roots.

Air layering is a straightforward, low-cost procedure. So if you have a favorite philodendron or similar plant that's become leggy, or a plant you'd like to clone, air layer it. Also try air layering fruit trees: the new tree's juvenile period (the time required for it to reach its fruit-bearing stage) is shorter than with seeding. For example, a lychee tree propagated by seed has a juvenile period of 10–12 years, while one propagated by air layering may bear fruit in 3–5. But as always, research your plant first to confirm that air layering is an effective method of propagation for that species. As Dr. Ricordi has observed, "some plants form calluses and adventitious roots easier than others, and that's in response to each plant's biochemical, morphological, and physiological characteristics." Growers air layering multiple plants often use air-layering devices, of which there are many—including a system developed by Professor Joe DeFrank and his colleagues at CTAHR a few years ago that can be used with stems of widely ranging diameters. The instructions that follow, however, are intended primarily for home gardeners using materials they already have.



Air layer on native yellow hibiscus (ma'o hau hele) shrub, Urban Garden Center, March 2024. Photo John Farmer.

## Air Layering in 9 Steps

### Materials:

#### FOR AIR LAYERING:

Sharp knife or clippers  
Rooting hormone  
Paintbrush  
Sphagnum moss, peatmoss, or potting soil  
Plastic wrap  
Twist ties or tape (floral tape works well)  
Aluminum foil  
Felt-tip permanent pen for labeling

#### FOR REPOTTING:

Clippers, loppers, or saw  
Appropriately-sized pot  
Potting mix and gravel  
Water



David Maxwell (left) and John Farmer demonstrating air layering on a song of India stem, Urban Garden Center, May 17, 2024. Photo Dana Matsunaga.

### Steps:

1. Select a time of year during the active growing season, typically in the spring or early summer, when the plant is actively producing new growth. This ensures the plant has the energy to support root development.
2. Depending on your plant, you may want to wear eye protection, rubber gloves, and other PPE (on some plants, sap will ooze from any cuts you make). Wear rubber gloves when applying the rooting hormone.
3. Select a suitable stem (or branch) on your plant. First, identify stems you can access easily: not too high; not obstructed by other stems. Then, find one that best fits the purpose for which you intend to use it: do you want a vertical stem or not? a single stem or multiple ones? Air layers are usually made on stems from the previous season's growth. The best results are from shoots with several leaves on actively growing stems.
4. Girdle the stem: Make two parallel cuts about 1/2 to 1-1/2 inches apart through the bark all the way around the stem (the distance between the cuts is generally 3–4 times greater than the stem's diameter). Connect the two parallel cuts with one long cut and scrape the exposed surface to completely remove the bark, taking care to remove both the phloem and the vascular cambium. For your reference, the vascular cambium is the thin, green layer of tissue below the phloem.
5. Moisten the exposed wood with a paintbrush dipped in water. Then, following the instructions on the label, apply the rooting hormone, which comes in powder form.

6. Enclose the cut area around the stem in a medium that holds moisture and is well-aerated. For example, you can use slightly moistened (not dripping wet) sphagnum moss, peatmoss, or even potting soil. Place about two handfuls of the medium onto a sheet of plastic wrap. Then place the bundle around the exposed wood, taking care to wrap the plastic around itself. Add another layer of plastic. Then tie the top and bottom of the bundle with twist ties or tape to make sure that no water can seep inside. The goal here is to create a “pot” of soil in which the roots can grow.
7. Wrap the bundle of rooting medium with aluminum foil to further seal it off from water and insect infiltration and to help maintain moderate temperatures by reflecting sunlight. Write the date on the foil with a felt-tip pen.
8. Check back in a month to see if any roots have grown. Remove the layer from the parent plant when roots are observed through the plastic wrap. The earliest adventitious roots are generally thick and corky: depending on the plant, wait for the emergence of secondary fibrous roots. Removal of the layer for transplanting is best when growth is not active.
9. Pot the removed layer into a suitable container. Pruning the removed layer in proportion to the roots is generally advisable.

#### References:

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