

## Air Layering: A Rooting Alternative<sup>®</sup>

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### INTRODUCTION

Air layering is an old method of vegetatively propagating plants that is seldom taught in schools today. This method receives little or no mention in newer propagation manuals and, other than in south Florida where it is used for ficus propagation, it does not seem to be widely used for any major commercial ornamental plant production. During the past 20 years, Trail Ridge Nursery has used air layering as the method of choice for *Magnolia grandiflora* propagation. Air layering is also used to propagate other "difficult to root" plants. Under certain circumstances the procedure deserves more consideration as an alternative to cutting propagation under mist.

### AIR LAYERING

**The Process.** Air layering consists of removing a band of bark and cambium from a branch at a point just below where the development of roots is desired. With this band removed the branch terminal is still supplied with water and nutrients, however, the downward movement of the photosynthate produced from the terminal leaves is blocked at the point just above the band and is available to support root development. Auxin is generally applied at this point and then covered with a moist rooting medium which is then wrapped to keep the moisture in, usually with a plastic film and/or aluminum foil. The layer remains on the stock plant until it has rooted.

**Why Air Layer?** In 1982, Dr. Bob Hare from the U.S.D.A. Forest Research Station in Gulfport, Mississippi, spoke at the Menninger Flowering Tree Conference at Cypress Gardens. He was working on methods of vegetatively propagating pines for use in seed orchards. As a side project he had made selections of Formosan sweetgum (*Liquidambar formosana*) for their fall color and had successfully rooted them by air layering. Trail Ridge Nursery had just started attempting to root *M. grandiflora* under mist and, with his encouragement, it was decided to try air layering as well. After some trial and error, the air layers consistently rooted at a very high percentage compared with inconsistent results with cuttings and the resulting root systems were consistently better with the layers.

**Materials Used.** Air layering is a slow process, however, over the years some improvements have made the process more efficient. The standard sphagnum moss rooting medium was replaced with 3.8 cm (1.5 inch) Oasis root cubes that were cut in half and placed around the stem. Instead of using rolls of kitchen foil, precut 13 × 20 cm (5 × 8 inch) sheets of aluminum foil are used to wrap the cube. A disposable No. 12 curved blade scalpel makes a very good alternative to a knife for girdling the stem. Rooting powder is prepared at the nursery allowing for different blends and/or strengths than are commercially available and at a reduced cost.

### PREPARATION OF 1% (10,000 PPM) IBA ROOTING POWDER

- Dissolve 1 g IBA in 30 ml acetone.
- Pour the solution into 49 g talc-based baby powder and stir.
- Place mixture in open area and stir occasionally until acetone evaporates and powder is completely dry.
- Blend dry powder with 20 g sucrose (powdered sugar) and 30 g talc.
- Pass through sieve or pulverize in blender.
- Store powder in dry, dark container.

### MAGNOLIA GRANDIFLORA PROCEDURE

- The stock plants must be in an area that receives regular overhead irrigation. This will keep the root cubes wet.
- In Florida, layering is optimal in late August to early October when leaves are mature, terminal buds are firm and the bark is still slipping. Immature buds and leaves can be cut off if the process is started sooner. Pencil-sized or thicker wood is easier to work with.
- Cut root cubes in half and soak in water for a few minutes.
- Using water make a slurry of the rooting powder to the consistency of thick paint.
- Select a stem and remove all but the last 2 to 3 leaves. Cut the leaves in half horizontally. With long stems, 2 to 3 layers can be accommodated on the same stem treating the leaves the same way as with terminal layers.
- Remove a 1.3 to 1.9 cm ( $1/2$  to  $3/4$  inch) band of bark 15 to 20 cm (6 to 8 inch) below the tip being careful to remove all cambium material. If any is left it will callus and bridge the girdle.
- With a 1.3 cm ( $1/2$  inch) artist brush, paint a band of rooting powder slurry above the girdle.
- Gently squeeze out excess water from two root cube halves. The root cube should retain its square shape. If it is rounded, the squeezing was too excessive.
- Place a half cube on either side of the stem above the girdle and covering the powder slurry.
- Wrap snugly with aluminum foil.
- Normal nursery overhead irrigation is more than enough to keep the cubes moist due to water seepage down the stem.
- Ten to twelve weeks after the procedure, start checking for roots by feeling the sides of the foil.
- Cut off rooted layers, remove foil, and plant in an appropriate sized container (1 gal), fertilize, and treat in the same manner as any recently rooted liner.

**Note:** *Magnolia grandiflora* has a pithy wood and is fairly brittle, so always handle the layer below the girdle. Some may snap off initially but the technique becomes easier with practice.

## DISCUSSION

Each layer takes about 2 min to accomplish and someone practiced in the procedure can do around 200 in an 8-hour day. Trail Ridge Nursery consistently air layers three cultivars: 'Saint Mary', 'Little Gem', and an unnamed selection with 70% to 85% rooting. The market value of the resulting plant is around \$3.50 thus a day's layering produces at least \$500 worth of liners for use in production. The advantage to a nursery producing its own liners is not having to rely on availability from other sources. Also, we find that the root systems of air-layered plants are consistently better than those of misted cuttings, and they grow-off much faster. This is attributed to the layer being supported by the mother plant until it is fully rooted and not depleted of nutrients and food reserves. The root systems are also visible when unwrapped which offers the opportunity to cull plants with a few roots or roots on only one side. This is more difficult to do with conventional liners and can easily be missed, resulting in trees that are unstable as they get taller or even hazardous in later years.

Another major advantage of air layering is that once the procedure is done, other than seeing that the plants receive adequate overhead irrigation, no further attention is required as opposed to the constant monitoring of cuttings for successful rooting of magnolias. It requires just as much monitoring for a few hundred cuttings as it does for many thousand.

While air layering can produce excellent liners, it has not always been the panacea hoped for. A plant that is difficult to root using conventional methods is frequently difficult to air layer which has led to some disappointments using this process with other magnolia cultivars as well as other seldom rooted plants attempted at Trail Ridge Nursery. However, we successfully air layer loquat (*Eriobotya japonica*), golden raintree (*Koelreuteria bipinnata*), fringetree (*Chionanthus virginicus*), and live oak (*Quercus virginiana*). A recent success has been with Chinese round holly (*Ilex rotunda*), a tree with excellent commercial potential in the Southern U.S.A., which has previously not been available. Air layers will enhance rooting of a tree that normally roots around 5%, has a weak root system, and takes forever to grow-off (if it even survives); via air layering of the same tree, we can increase rooting to around 35% and produce a finished 1-gal tree in just over a year. While air layering certainly will never challenge more conventional methods of cutting propagation for large-scale production, for some small-scale niche situations, this classic procedure still has a place in this high-tech world.