An Improved Method of Air Layering Tropical Hardwoods for Forestry, Fruit and Ornamental Nurseries

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Tropical Plant and Soil Science
Topics Covered

• What is air-layering
• Review of air layer art in patent records
• Study species for improved air layer method
• Details of improve air-layer method
What is Air-layering
Liberty Hyde Bailey – 1858 - 1954
What is Air-layering

Pot-layering, circumposition, air-layering and Chinese layering are terms applied to the rooting of rigid stems by means of surrounding them, while in their natural position, with earth or moss, or similar material. The stem is wounded—commonly girdled—and a divided pot or box is placed about it and filled with earth (Fig. 34). The roots
What is Air-layering

35. Air-layering in a paper cone (x 1/4).

36. Air-layering in a paper cone (x 1/4).

37. Layering-cone.

38. Layering-cup.

39. Layering-cup.

Then the leaves may be cut off and potted independently, the old stump being discarded.

The French have various handy devices for facilitating pot-layering. Fig. 36 shows a layering-pot, provided with a niche in the side to receive the stem, and a flange behind for securing it to a support. The pot shown in Fig. 33 is a similar device. Fig. 37 represents a layering-cone. It is made of zinc or other metal, usually 4 or 5 inches high, and...
Cotton gauze bag attached to clear plastic sheet
Slit tube of hydrophilic polymer with growth media
Review of air layer art in patent records
Report-Ashmar Technology-08/05/201

Patent #: GB2057234-03/08/1979
Football-like shell with clasp filled with growth media
Review of air layer art in patent records
Report-Ashmar Technology-08/05/201

Patent #: GB2108813-01/10/1982
Hollow round shell with clasp filled with growth media
Review of air layer art in patent records

Report-Ashmar Technology-08/05/2010


Hinged cone with water reservoir below media chamber
Local air layer method with media in bags

Images courtesy Dr. Ken Leonhardt-UH TPSS
Study species – Cassia x nealiae Irwin & Barneby

A hybrid of C. javanica L. x C. fistula L.


Crosses made 1910-20 by David Haughes in Honolulu, selected 1917-20
Study species – Cassia x nealiae Irwin & Barneby

C. fistula L.- male parent

Origin: India
In HI for 160+ yrs.

Heavy pod production
Study species – Cassia x nealiae Irwin & Barneby
C. javanica L. – female parent

Origin: Java & Sumatra, Indonesia
Study species – *Cassia x nealiae* Irwin & Barneby

*cv. Wilhelmina Tenny*

*Official Street Tree of Honolulu - 1965*

*cv. Queen’s Hospital White*

*cv. Lunalilo Yellow*
Improvement to existing air layer systems

Girdle > callus formation > hormone + sphagnum moss + plastic film
Improvement to existing air layer systems

Girdle > callus formation > hormone / sphagnum moss + plastic film
Improvement to existing air layer systems

Problems

1. Time consuming to prepare moss on film strips
2. Sealing ends w/string caused failures due to constriction above root formation zone w/species with soft bark-e.g. HK-orchid
3. Ants invaded moss and caused rots
4. Opaque film = Uncertainty of root formation
5. Working off the ground, hard to apply film wraps
Improvement to existing air layer systems

Improvements to reduce time and improve % rooting

1. Best time of year in HI: Sept to Nov., varies tree type
2. Insure active growth and barks slips off easily
3. Fill net sack with sphagnum moss, for hands free film application
4. Apply insecticide to net sack prior to wrapping stems
5. Shrink wrap for easy sealing and viewing root formation
6. Wrapping procedure to prevent constriction above root zone
7. Incorporate drainage for work in higher rainfall areas
Insure active growth and barks slips easily
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Remove cambium layer to prevent reconnection of phloem need to expose woody stem
Insure active growth and barks slips easily

- Cut through bark and cambium layers at a angle with serrated knife
- Insures exposure of proper stem layer for hormone induction of root growth and maximum hormone surface area with groves from knife
Insure active growth and barks slips easily

0.8% Indol -3- butyric acid (Hormodin 3)
Improvement to existing air layer systems

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Fill net sack with sphagnum moss, for hands free film application

Long media sack for branches of various sizes
Improvement to existing air layer systems

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Sevin 5% Dust applied to sphagnum moss rooting media

**ORNAMENTAL SHRUBS AND FLOWERS**
For outdoor use only. To kill bagworm, blister beetles, boxelder bug, boxwood leafminer, flea beetles, Japanese beetle, lacebugs, leafhoppers, leafrollers, periodical cicada, plant bugs, psyllids, rose aphid, rose slug, scale insects in the crawler stage, tent caterpillars and exposed thrips, apply thoroughly to the infested plants at the first sign of damage. Do not repeat application more than once weekly or more than 6 times per year. For best results on scale, apply in spring and early summer when scale crawlers are present.
Improvement to existing air layer systems

Improvements to reduce time and improve % rooting

1. Best time of year in HI: Sept to Nov.
2. Insure active growth and barks slips off easily
3. Latex paint with insecticide for ants
4. Fill net sack with sphagnum moss, for hands free film application
5. Shrink wrap for easy sealing and viewing root formation
6. Wrapping procedure to prevent constriction above root zone
7. Incorporate drainage for work in higher rainfall areas
Shrink wrap secures media for strong root growth
Improvement to existing air layer systems

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7. Incorporate drainage for work in higher rainfall areas
Opening at top side requires ant control and drainage
Prolific root growth allow for direct field plantings
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Good root growth on air layers allows for direct field plantings without nursery grow out phase.
Prolific root growth allow for direct field plantings
Layers planted 02/25/07
Photo on 08/13/11 = 4.5 yrs.
Removed from mango 03/18/11

Estb. 07/07/11

Estb. 07/07/11
Improvement to existing air layer systems

Improvements to reduce preparation time and improve % rooting

Dr. D’s Wrap

1. Media in long net bags for branches of various sizes
2. Hands free attachment of media allows for easy film application
3. Loose wrap at top side prevents constriction above root zone
4. Insecticides keeps out ants other pests
5. Drainage system essential for high rainfall areas
6. Tight fitting wrap helps with strong root development
7. Wrap keeps roots safe for transportation off site and ideal for soilless shipment to address phytosanitary restrictions.
For more information on topics covered

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