

5. PLANT PROPAGATION BY HARDWOOD EVERGREEN CUTTINGS

Note: In this lab exercise, you will learn procedures for propagating hardwood evergreen trees and shrubs by cutting. Work in a group of two or three students. Turn in the lab report on April 8, 2009. 20 points.

A. Introduction

The rootability of evergreen cuttings is greatly dependent on the species involved. Most varieties of junipers, arborvitae, taxus, and boxwood root quite readily. Pine, spruce, and fir are readily grown from seed. However, in the interest of perpetuating specific forms, color, hardiness, etc., these species can and are propagated asexually. Although grafting is a common method of propagating pine, fir, and spruce, they can also be grown from cuttings.

In general, cuttings are taken during late fall and during the winter. This, however, varies greatly and the literature should be checked for specific times for each species as in some instances, a month's difference in collection time will result in success or failure. One notable exception to the fall or winter collection is Mugo pine which roots best from cuttings taken in June, just as the candles unfold their needles. Evergreen cuttings are made from the current year's wood excluding the tender, soft tip of each branch. The cuttings should be 5-7 inches long with the lower needles removed from that portion of the stem which is inserted into the media.

In most cases, it is beneficial to treat evergreen cuttings with a rooting hormone. The hormone to use, and its concentrations is dependent on species and variety. Mugo pine is again a good example wherein hormone treatment may be beneficial to some clones and detrimental to others. Bottom heat (65-75 °F) is usually required. Although a high humidity must be maintained during rooting, a mist system is not essential.

Broad-leaf evergreen cuttings, including boxwood, holly, ivy, myrtle, spurge, gardenia, rhododendron, camellia, etc., may be rooted from current year cuttings taken from late summer to early winter. Procedures are similar to those suggested for narrow-leaf evergreens. The purposes of these experiments are:

1. To learn the techniques of propagating hardwood evergreen cuttings.
2. To determine the influence of rooting media and growth regulators on the rooting of hardwood evergreen cuttings.

B. Procedures

1. Plant Materials:

- a. *Juniperus horizontalis* 'Plumosa Compacta' (Compact Andorra Juniper)
- b. *Juniperus chinensis* 'Monlep' (Mint Julep[®] Juniper)
- c. *Thuja occidentalis* 'Sherwood Moss' (Sherwood Moss Arborvitae)
- d. *Thuja occidentalis* 'Techny' (Techny Arborvitae)
- e. *Taxus cuspidata* 'Dark Green Spreader' (Dark Green Spreader Yew)

2. Influence of media on rooting of cuttings:

- a. Prepare 40 cuttings from each of 2 species of the plant materials available as demonstrated. Dip into 0.8% of IBA.
- b. Stick 10 cuttings of each species in each of the 4 rooting media.

- a) Peat
 - b) 50% peat and 50% perlite
 - c) 50% perlite and 50% vermiculite
 - d) Perlite
- c. Make observations of cuttings at 2 week intervals for signs of callusing and eventual rooting.
3. Influence of growth regulator treatment on rooting of cuttings.
- a. Prepare 70 cuttings from one species of your choice.
 - a. Control - No growth regulator treatment
 - b. 100 ppm IBA solution
 - c. 1,000 ppm IBA solution
 - d. 2,000 ppm IBA solution
 - e. 4,000 ppm IBA solution
 - f. 0.1% IBA powder (Hormex #1)
 - g. 0.3% IBA powder (Hormex #3)
 - b. Stick the cuttings in cell packs containing 50% peat and 50% perlite.
 - c. Make observations of cuttings for signs of callusing and eventual rooting as before.

C. Data

Score the rooting (% rooting, number roots/cutting) in each treatment. Average the scores and discuss the outcome of your experiment. Write a lab report summarizing your data.

D. Lab Report

Write a report (about 3 pages) summarizing your findings. Your report should have the following format:

- a. The title and your name.
- b. Abstract - a summary of your findings.
- c. Introduction - one or two paragraphs, including background, importance, and objectives.
- d. Materials and Methods – plants, growing media, how the experiment was run.
- e. Results and Discussion - data on rooting percentages, treatment comparisons, your comments.
- f. References - list literature if cited.

Table 1. Effect of plant age on rooting of selected evergreen cuttings.

It was found by chance that cuttings of apple taken from one-year-old seedlings rooted very readily. Comparisons of different aged plants were then made with other species. Some of the results were as follows:

Species	Percent rooting			
	1 yr	2 yr	3 yr	Older
<i>Ilex opaca</i> (American Holly)	100	64	47	0
<i>Pinus sylvestris</i> (Scotch Pine)	77	8	0	
<i>Pinus strobus</i> (White Pine)	98	51	12	
<i>Pinus resinosa</i> (Red Pine)	62	3	7	
<i>Pinus taeda</i> (Loblolly Pine)	46	6	0	
<i>Thuja occidentalis</i> (American Arborvitae)	100		42	
<i>Picea excelsa</i> (Norway Spruce)	90		50	
<i>Taxodium distichum</i> (Bald Cypress)	95	30	10	

Source: Gardner, F.E. 1930. The relationship between tree age and the rooting of cuttings. Proc. Amer. Soc. Hort. Sci. 26:101-104.

Table 2. A condensed summary of cutting propagation schedule for selected woody evergreens.

Plant	J	F	M	A	M	J	J	A	S	O	N	D	Rooting time (wk)	Remarks
Broadleaf Evergreens														
<i>Abelia</i>							x	xx	xx	xx			4-6	
<i>Berberis</i>									xx	xx	xx		5-7	
<i>Buxus semp. suff.</i>								xx	xx				5-8	
<i>Buxus, all other</i>									xx	xx	xx		5-8	
<i>Contoneaster</i>								xx	xx	xx	xx		4-6	
<i>Eleagnus</i>									xx	xx	xx		5-7	
<i>Euonymus fortunei</i>	xx	xx	xx					xx	xx	xx	xx	xx	3-4	
<i>Euonymus sieboldiana</i> (Manhattan F ₁)							xx	xx	xx	xx	xx	xx	3-4	Filler crop (root anytime)
<i>Ilex crenata, glabra</i>								x	xx	xx	x		5-8	
<i>Ilex fosteria, opaca</i>									x	xx	xx		8-10	
<i>Mahonia</i>										x	xx		6-8	Frost essential
<i>Pyracantha</i>									xx	xx	xx		4-6	
<i>Sarcococca h. humilis</i>									xx	xx	xx	xx	6-8	
<i>Stranvaesia d. undulata</i>									xx	xx	xx		6-8	
<i>Viburnum rhytidophyllum</i>											xx	xx	5-7	
<i>Yucca</i>	xx										xx	xx	10-14	Root cuttings
Coniferous Evergreens														
<i>Chamaecyparis nootkatensis</i>										xx	xx	xx	8-12	
<i>Chamaecyparis obtusa</i>										x	xx	xx	10-12	
<i>Cryptomeria japonica</i>			xx										8-10	
<i>Juniperus chinensis, upright</i>											xx	xx	10-12	
<i>Juniperus chinensis, spreading</i>	xx										xx	xx	10-14	
<i>Juniperus chinensis, sargentii</i>	xx	xx									xx	xx	8-10	
<i>Juniperus horizontalis</i>	xx	xx								xx	xx	xx	8-10	
<i>Juniperus virginiana</i>										xx	xx	xx	8-14	
<i>Taxus baccata</i>										xx	xx	xx	10-14	
<i>Taxus cusp., media</i>	xx									xx	xx	xx	10-14	
<i>Thuja occid., upright</i>	xx	xx									xx	xx	8-12	
<i>Thuja occidentalis, umbrac.</i>	xx	xx	xx									xx	6-10	
<i>Thuja occid., woodwardi</i>	xx	xx	xx									xx	6-10	
<i>Tsuga canadensis</i>	xx	xx										xx	10-12	

Cutting Propagation Lab 2
Evergreen Cuttings

PREPARATIONS NEEDED

1. Plant Materials

1. *Juniperus horizontalis* 'Blue Chip' (Blue Chip Juniper)
2. *Juniperus chinensis* 'Mint Julep' (Mint Julep Juniper)
3. *Thuja occidentalis* 'Techny' (Techny Arborvitae)
4. *Thuja occidentalis* 'Wareana' (Siberian Arborvitae)

2. Growth Regulators

1) Commercial rooting powders

Check the shelves in the greenhouse lab.

2) IBA solutions

Prepare IBA solutions (in 50% ethanol) in 300 ml bottles
(Dissolve IBA in 100% ethanol, and then dilute to 50%)

3) NAA solutions

Prepare NAA solutions in ethanol or NaOH, then dilute with water.

4) Also prepare control (water) solutions.

All growth regulator solutions must be kept in brown bottles or wrapped in aluminum foils. Store the bottles in the refrigerator until use.

5) Buy or get about 50 styrofoam cups to small aliquots of growth regulator solutions during the lab period.

3. Supplies and Tools

1) Pruning shears (13 pairs)

2) Plastic labels (one box)

3) Sharpee pens (5-6, or a box)

4) Rooting medium

A 50% perlite: 50% peat mixture (about 2 ft³)

5) Trays and cell packs

About 20 trays and 20 cell pack trays.

6) Other supplies: paper towels, etc.