

subject to swelling when exposed to some solvents. Brass tips are the most common, but they wear rapidly when used to apply abrasive materials such as wettable powders, and are corroded by some liquid fertilizers. Brass tips are probably the most economical for limited use, but other types should be considered for more extensive use.

Thursday Morning, December 13, 1984

The Thursday morning session was convened at 8:00 a.m. with Ralph Shugert serving as moderator.

**CUTTING PROPAGATION OF SOME SHADE AND
FLOWERING TREES**

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The specific objectives of this paper are to review: 1) reported shade and flowering trees that can be commercially propagated by softwood cuttings, and 2) the morphological characteristics of the growth stage at which these softwood cuttings are most likely to root.

One advantage of propagating trees by cuttage lies in the fact that ease of propagation would stimulate the introduction of regionally-oriented cultivars from superior trees. An important consideration in selecting regional cultivars is the provenance expression of these plants for characteristics such as winter hardiness. As one moves farther north, trees are more photoperiodic responsive. Photoperiod affects vegetative growth, carbohydrate storage, abscission, the onset of dormancy, and overall winter hardiness, to mention a few responses for northern temperate zone trees.

Other characteristics one is searching for when selecting cultivars include disease resistance, environmental tolerance (air pollutants, chlorides, and high water tables), and unique phenotypic expression (habit, flower color, and fruit color and size). Trees selected and propagated with identifiable desirable characteristics could lead to new cultivars for use in park, street, home, or commercial landscapes.

There are several morphological characteristics for *Acer*, *Malus*, *Aesculus*, and *Magnolia* which have consistently indicated the stage at which to take cuttings to be successful. Chapman and Hoover (6) reported that elongation of new

growth should essentially be complete or that the new growth be hardening off. In addition, small terminal buds should be developed. Yawney (12) reported similar observations for *Acer* in that the shoots should be stiff and the terminal buds slightly visible. Also, he reported that for optimal rooting of sugar maple softwood cuttings the leaves should just have reached full size with slightly reddened petioles and pronounced lenticels. Lastly, he noted that large cuttings rooted better than small cuttings (12). Burd and Dirr (4) reported good rooting of different *Malus* species or cultivars when propagated by softwood cuttings.

It should be noted that cuttings taken from mid- to late May in Illinois (reported by Burd) are at a similar stage of growth as mid-June cuttings in Midland, Michigan (by Chapman) and in Vermont (by Yawney) (6,7,12).

There are several additional considerations that should be kept in mind when propagating by cuttage. Flemer (8) reports that some clones propagate easier than others. Yawney (12) supported this, suggesting that each individual tree will have varying potentials for rooting from 0 to 100%. Further, the tree's ability to root is consistent year in and year out (12). Brotzman (3) suggested that clonal selections should be made by their ability to root, as well as by the other desirable characteristics. In addition, Brotzman's results indicated that cuttings should be taken only from current season's wood (3). Table 1 lists some species of trees that have been propagated from cuttings.

At Dow Gardens we use softwood cuttings that are washed, disinfected with sodium hypochlorite, and treated with a hormone, such as Hormodin No. 3, Wood's Rooting Compound, or IBA crystals. The cuttings are then placed in an intermittent mist propagating bench that contains a medium of perlite and peat moss (1:1, v/v). To be commercially successful, one should achieve at least 65% rooting of the cuttings. Table 2 gives the results of our 1984 tests with *Malus* and *Ostrya*.

From the above literature review and our 1984 results, it becomes clear that many crabapple cultivars, a significant number of maples, and several difficult-to-grow native trees, e.g. American hophornbeam and pin oak, can be propagated by cuttage. This propagation technique should stimulate selection, development, introduction, and use of new cultivars. In addition, propagation by cuttage should support use of native trees in the landscape. Clonal introduction of native trees allows nurserymen to introduce superior trees that are tolerant to

disease, low-oxygen soils, chlorides, and exhibit regional provenance.

Table 1. Some tree species that have been propagated by cuttings

Species	Optimal time for taking cuttings	Reference
<i>Acer buergerianum</i>	late June	1
<i>A. campestre</i>	June and July	5
<i>A. carpinifolium</i>	late June	11
<i>A. ginnala</i>	mid-June	5
<i>A. griseum</i>	late June	9
<i>A. palmatum</i>	June	9
<i>A. platanoides</i>	mid-June to mid-July	6
<i>A. rubrum</i>	mid-June to mid-July	5
<i>A. saccharum</i>	June	12
<i>A. saccharum</i> subsp. <i>nigrum</i>	mid-June to mid-July	6
<i>A. tegmentosum</i>	July	3
<i>Aesculus hippocastanum</i>	late May to mid-June	6
<i>Cornus florida</i>	mid-June to July	1
<i>Magnolia kobus</i>	June	2
<i>M. × soulangiana</i>	June	2
<i>Malus</i> 'Donald Wyman'	mid-June to mid-July	7
<i>M. hupehensis</i>	mid-May to June	4
<i>M.</i> 'Mary Potter'	mid-June to July	6
<i>M.</i> 'Profusion'	late June to mid-July	7
<i>M.</i> 'Red Jewel'	mid-June to mid-July	7
<i>M. sargentii</i>	late June	7
<i>M.</i> 'Selkirk'	May and June	4
<i>M.</i> 'Snowdrift'	mid-June to July	6
<i>Ostrya virginiana</i>	late June to mid-July	7
<i>Quercus palustris</i>	mid to late July	6
<i>Tilia cordata</i> 'Greenspire'	mid-June to early July	8

Table 2. Rooting results with cuttings of *Malus* and *Ostrya* species and cultivars, 1984 trials

Species		Dates cuttings stuck		
		June 14	June 28	July 12
<i>Malus sargentii</i>	Decayed	6%	—	12%
	Rooted	8	17%	6
	Callused	3	—	6
<i>M.</i> 'Red Jewel'	Decayed	1	—	1
	Rooted	7	11	23
	Callused	16	14	1
<i>M.</i> 'Donald Wyman'	Decayed	3	—	—
	Rooted	20	25	22
	Callused	—	—	1
<i>M.</i> 'Profusion'	Decayed	2	2	7
	Rooted	9	20	18
	Callused	—	—	—
		June 22	July 5	August 30
<i>Ostrya virginiana</i>	Decayed	18%	3%	25%
	Rooted	1	11	—
	Callused	6	10	—

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PROPAGATION TIPS ON SOME LESS WIDELY GROWN PLANTS

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These wide ranging comments will include nothing spectacular or particularly new to anyone who is regularly propagating the particular plants mentioned but might be useful to those of you who may one day meet up with these same plants at your propagation bench — or they might be useful as something to try on some other plant which might present a similar type of obstacle to commercially acceptable success.

If, as is usually the case, we are propagating a specific cultivar, the most important part of the successful effort is the selection of the specific wood for propagation so that we achieve exact reproduction. However, in our rush to get on with it, we may very well spend a lot less time and care on wood selection than would be called for by its relative importance.