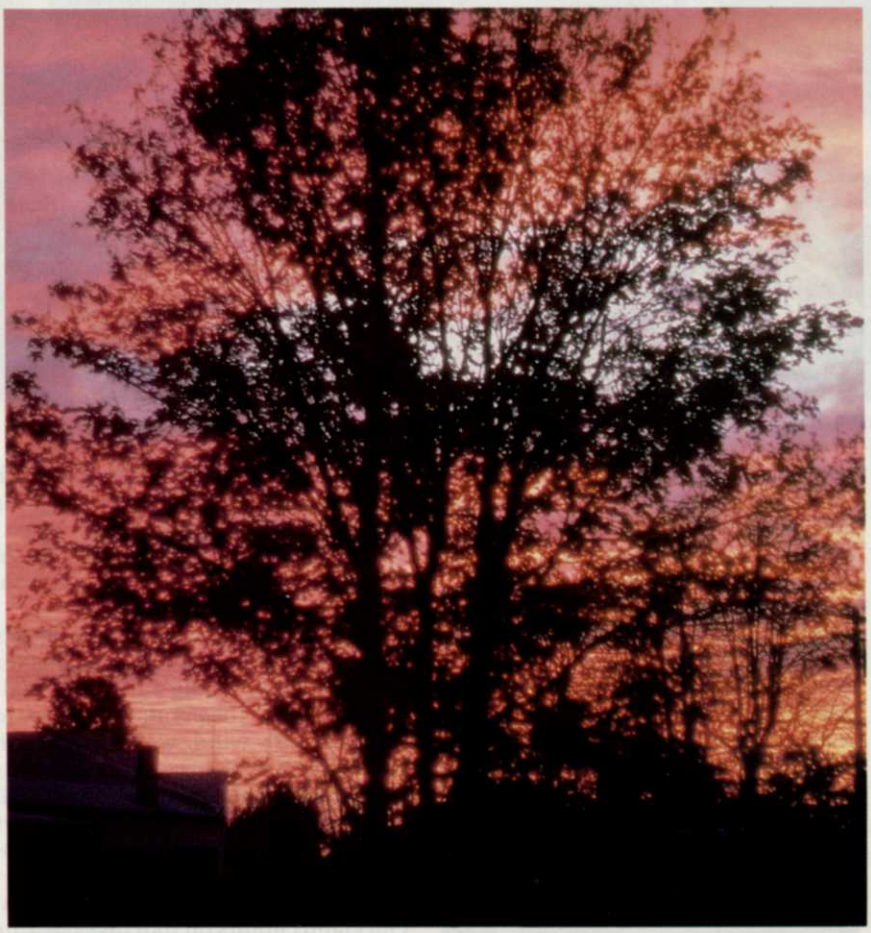
WHERE THE TREES COME FROM

The introduction of several biological concepts have allowed researchers to fine tune the art of tree propagation.

by Douglas Chapman, Dow Gardens



The number of shade trees successfully propagated by cuttage or tissue culture will continue to grow.

By providing interest and color, trees, shrubs and bedding plants are often the difference between an average and an exciting golf course. To better develop a course, a superintendent should be aware of new biological concepts that affect the quality, amount and type of trees, shrubs and herbaceous plants that can be grown on the course.

One current technology is propagation of trees by cuttage and/or tissue culture.

Shade and ornamental plant production has been moving more toward unique cultivars, or clonal plants, for specific goals. These goals should include disease resistance, environmental tolerance or crown uniformity.

Early problems

Many trees were produced by budding and grafting during the 1960s and 1970s. By the mid-'70s however, symptoms of incompatibility were appearing with the descendants of many red maples breaking off at the rootstock union. This incompatibility even occurred on trees with a diameter of up to 2 to 4 inches. Further, many trees were suckering excessively, increasing maintenance costs, and producing trees that were not remaining vigorous or healthy over the long run. In short, new propagation techniques had to be found.

TREES PROPAGATED BY CUTTINGS

Acer buergerianum (1)	late June	*A. saccharum*		*M.* 'Profusion' (6)	late June - mid July
A. campestre (4)	June - July	*subspecies Nigra* (5)	mid June - mid July	*M.* 'Red Jewel' (6)	mid June - mid July
A. carpinifolium (16)	late June	*A. tegmentosum* (2)	July	*M. sargentii* (6)	late June
A. ginnala (4)	mid June	*Aesculus*		*M.* 'Selkirk' (3)	May - June
A. griseum (12)	late June	*hippocastanum* (5)	late May - mid June	*M.* 'Snowdrift' (5)	mid June - July
A. palmatum (12)	June	*cornus florida* (1)	mid June - July	*Ostrya virginiana* (6)	late June - mid July
A. platanoides (5)	mid June - mid July	*Malus* 'Donald Wyman' (6)	mid June - mid July	*Quercus palustris* (5)	mid - late July
A. rubrum (4)	mid June - mid July	*M. hupehensis* (3)	mid May - June	*Tilia cordata*	
A. saccharum (19)	June	*M.* 'Mary Potter' (5)	mid June - July	'Greenspire' (8)	mid June - early July

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Researchers at Rutgers first reported propagation of Norway maples, red maples and *Acer ginnala* by cuttage. In 1981 this list was expanded to include crab apple, which was shown to be propagable by cuttage.

By 1984 researchers had extended the list of crab apples that could be propagated by cuttage to include Snowdrift, Candied Apple, Sugar Tyme, Silver Moon, *Malus sargentii*, Sentinel, Mary Potter, and Red Jewel. Researchers had thus introduced and confirmed several important factors:

1. Propagation of trees by cuttage is possible, but one cannot make a generalization that all sugar maples can be propagated by cuttage. Individual trees must be tried until successful, then propagate that individual as a clone.

2. Plants to be propagated by softwood cuttage must reach a certain stage of physiological maturity. *Malus* cuttings taken after rapid elongation (new growth) is completed is an example. Sugar maple, when leaves reach full growth and petioles become slightly red, is another.

These identifiable morphological characteristics indicate that there is a specific physiological state of maturing for each plant at which propagation by cuttage is optimal.

Clonal, or cultivar selection, is often made for some desirable phenotypic characteristic, like disease resistance, environmental tolerance, habit, flower color, foliar color and/or fruit size and color. Some suggest that another criterion when selecting trees for clonal production is its ability to be propagated by cuttage in commercially acceptable percentages.

The list grows

Many plants have now been reported propagatable by cuttage (see table). Much of this research has been done in the Northeast and Midwest; therefore, the optimal period would change as one moves south, but the physiological stage remains the same.

When developing new cultivars, a frequent problem is being able to propagate a large enough number of individuals quickly from the mother plant to make it profitable. Tissue culture is the preferred propagation technique used for rapidly developing a large number of individuals from a single mother plant. It has been reported that that one can propagate cultivars of red maple by tissue culture.

The advantages of propagating trees by cuttage includes: little or no suckering, no incompatibility and a rapid growth rate compared to other propagation techniques.

A large number of shade trees are propagated by cuttage as evidenced by G.M. Moller's 1985 report that *Acer ginnala*, A. rudrum, Amelanchier, Cercidiphylum, Cornus kousa, Platanus, Prunus, Malus, cv. and *Tilia* were propogated by cuttage. Others reported trees propagated by cuttage include some of the more outstanding cultivars of crab apple, Donald Wyman, Mary Potter, Profusion, Red Jewel, Sugar Tyme, Snowdrift and Selkirk, and *Tilia cordata* clones. In adition, the reported propagation of *Cornus florida* by softwood cuttage has become significant in the nursery industry.

During the next several years, it appears that there will be a great increase in the number of shade trees propagated by cuttage and/or tissue culture. This is not to indicate that the other techniques, such as seedage or budding, will not be continued. But where possible, propagation by cuttage requires a less-skilled propagator, eliminates incompatibility and reduces suckering. It also results in trees available for sale that are economical and of high quality. **LM**