

The Use of Second Generation Cuttings to Increase the Rooting and Quality of Micropropagated Elms

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INTRODUCTION

Knight Hollow Nursery has been micropropagating selections in the genus *Ulmus* for over 15 years. We have always found elms growing in vitro problematic. Shoot proliferation is poor and generally single-node pieces are required to obtain bud break. This multiplication protocol requires a significant amount of tedious labor for each subculture. Additionally, in vitro elm shoots produce large numbers of “blind” buds, nonviable buds in the leaf axils, thus complicating multiplication using nodal explants. The shoots that are produced in microculture are slender, almost thread-like. Consequently, the rooting success of microcuttings is variable with a 50% rooting/acclimation success being considered a good response. Time required to root, acclimate, and grow elms using microcuttings to a shippable size is approximately 12 weeks.

Many of the elm propagules we produce are shipped into states with strict import limitations. Plants must be micropropagated and grown in a greenhouse or other facility that is protected from insects from 1 June through the first killing frost. Because of the difficulties in elm micropropagation and such interstate shipping limitations, we needed to explore other methods of generating high quality elm cuttings.

USE OF ROOTED MICROCUTTINGS AS STOCK

Microcuttings of elm cultivars stuck en mass in flats rooted non-uniformly (Fig. 1). Rooting success varied from approximately 35% to perhaps 50%.

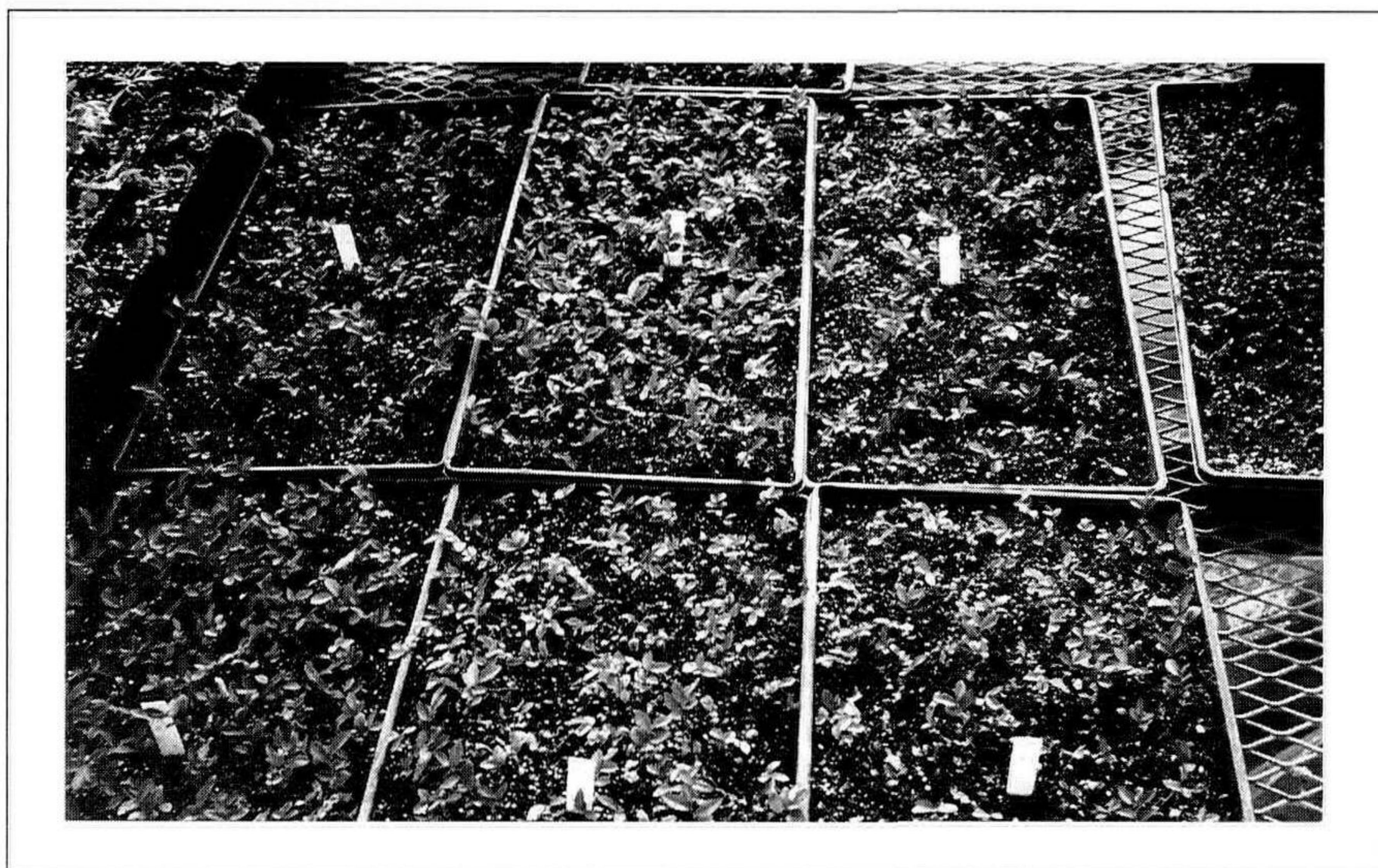


Figure 1. Response of microcuttings of *Ulmus parvifolia* 'Emer II', Allee™ elm (PP# 7552).

Three hundred cuttings were stuck in Pro-Mix BX in a standard 1020 flat. Cuttings were stuck in late August and moved to a greenhouse in mid November. Photograph was taken when microcuttings were moved from our rooting facility to the greenhouse.

The flats of rooted micropropagules were then moved to a greenhouse that was minimally heated in the winter months with night temperatures set at 35°F. Since *U. parvifolia* is a southern elm, we determined 600 h of temperatures below 40°F was probably sufficient to break dormancy. At the end of the 600 h of chilling (last year, this occurred by the 3rd week of January), flats were then moved to a greenhouse with a minimum daytime temperature of 60°F and a nighttime temperature of 45°F. After the surviving plants in these flats produced a new growth flush, 2-inch (5-cm) cuttings were harvested periodically and stuck in flats using the same procedures as originally used for the microcuttings. Due to the branching characteristic of juvenile elms, more cuttings than were originally planted in each flat could be harvested. Generally, we got a 4- to 5-fold increase in number of harvested cuttings over the number of surviving plants in each flat.

Experience from several years of trying to root elm cuttings taught us that we would again get variable results unless we treated the second generation cuttings with rooting hormone. A Dip 'n Grow treatment at a 30% dilution rate gave us the favorable results (Fig. 2).

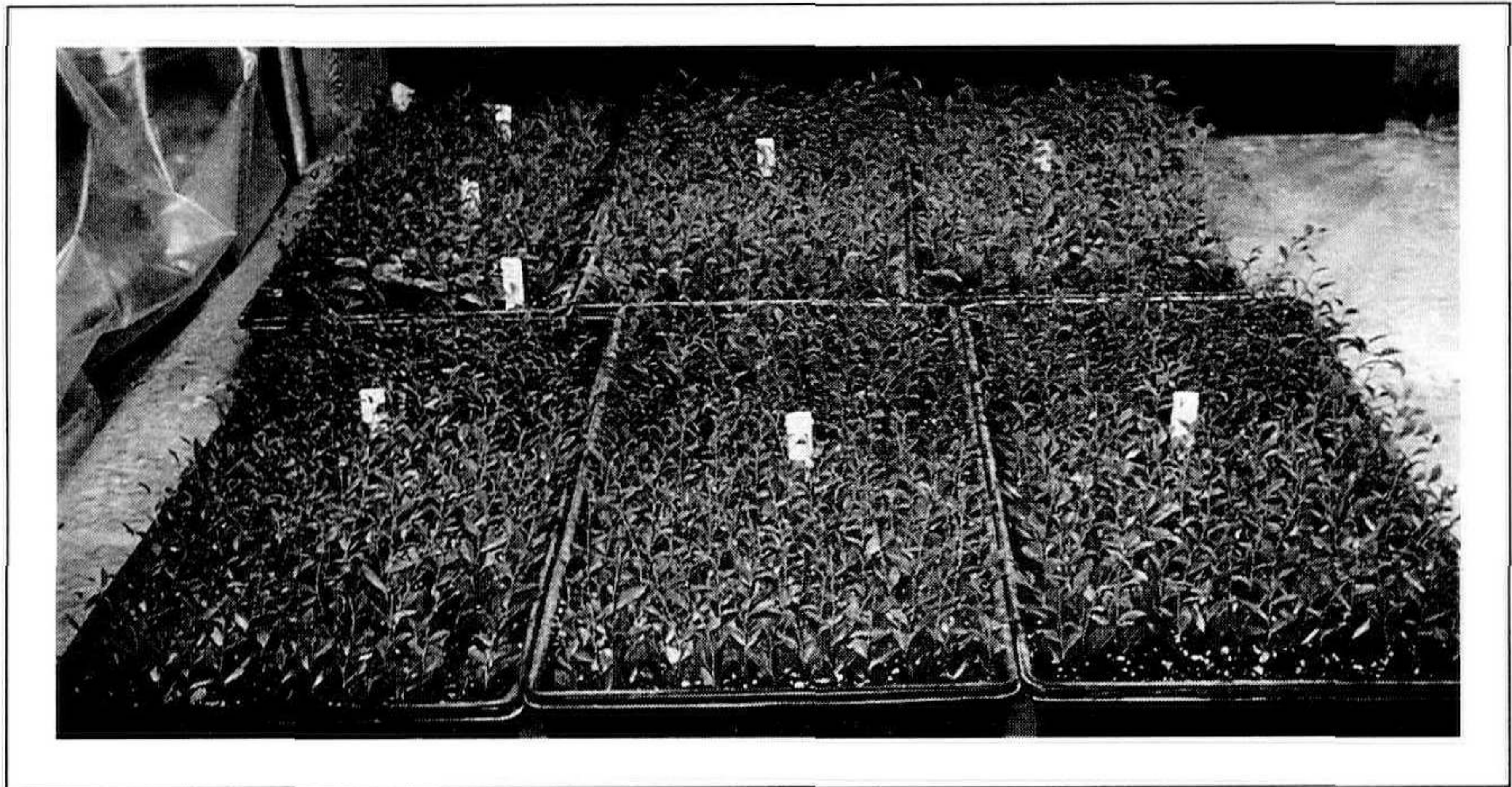


Figure 2. Growth of newly rooted elm cuttings that originated from flats of rooted microcuttings (as in Fig. 1).

All rooting occurred under 24-h artificial light with bottom heat. Daytime temperatures were 68°F; nighttime temperatures were a minimum of 50°F. Three hundred cuttings were stuck per flat.

Cuttings rooted quickly; root initials were visible in less than 1 week. Cuttings were shippable in 3 to 4 weeks at which time they were 3 to 4 inches (10 cm) tall and fully acclimated to normal humidity. Quality grading yielded 275 shippable cuttings out of a flat of 300 cuttings stuck, or a 92% yield.

CONCLUSIONS

The basic conclusion is that microcuttings of elm are of low quality and generally produce variable rooting and acclimation results. However, the surviving micropropagated plants make excellent stock for a new generation of cuttings. Such "second generation" cuttings will root with high success and produce quality propagules within a month.

Cercidiphyllum japonicum 'Amazing Grace' a New Weeping Katsura Selection From Theodore Klein

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Cercidiphyllum japonicum 'Amazing Grace' is a weeping form of katsura tree which has recently been released to the marketplace. The primary features which set apart this selection from the typical weeping form are plant size, branching, and fall foliage color.

The typical *C. japonicum* 'Pendulum' grows from 15 to 25 ft tall and unless staked and heavily pruned, will form a dense tangled mass of weeping branches. 'Amazing Grace' forms a larger spreading specimen up to approximately 40 ft tall or more with an equal or greater spread. The plant will form a sturdy graceful but ascending main trunk with only minor support initially. Branching is far more open than 'Pendula' and produces a superb specimen in the landscape.

Foliage color in *C. japonicum* 'Amazing Grace' is a soft blue-green in the summer, changing to a bright golden-yellow in fall. This is in contrast to the typical *C. japonicum* 'Pendulum' which often fails to produce much in the way of fall foliage color.

This new release is a selection of the late Theodore Klein of Crestwood, Kentucky who also released *Cersis canadensis* 'Silver Cloud' and *Ilex opaca* cultivars 'Judy Evans' and 'Virginia Giant'. *Cercidiphyllum japonicum* 'Amazing Grace' was discovered around 1960 as a chance seedling in an Indiana nursery. Two of the original plants produced are at Bernheim Arboretum and Cave Hill Cemetery in Louisville, Kentucky. The plant is easily produced by budding onto seedling rootstock. A 6- to 7-ft-tall budded whip is easily produced in one season under Kentucky growing conditions. Budwood is available from Bernheim in limited quantities.