

Micropropagation of Select Deciduous Trees and Shrubs

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Microplant Nurseries, Inc. has been producing large numbers of trees and shrubs by micropropagation since early 1980. Our main production items have been ornamental and shade trees and fruit tree rootstocks of apple, pear, plum, cherry, peach/almond, and walnut. We are perhaps most well known for our high quality micropropagated *Acer rubrum* cultivars as well as birch, flowering cherry, flowering crabapple, amelanchier, elms, and linden. We carry over 35 lilac cultivars. Microplant also works with individual growers on a proprietary basis growing a whole range of plant material such as bulb crops, small fruits, (grapes, blueberries) and specialty shrubs and perennials.

Our nursery primarily sells product directly from the laboratory either as in vitro rooted plantlets or as microcuttings without roots. Our customers acclimatize the material for themselves. Since we don't handle this step, we have, by necessity, been forced to create a very hardy, relatively large plantlet as our finished product. Our plants must be able to withstand the abuse and neglect of experts and novices alike in a whole host of greenhouse situations. In many cases this means that we use lower levels of growth regulators and accept lower multiplication rates in the process. While it is a bit more expensive in the laboratory, larger plantlets give growers the added advantage of being able to "finish off" their greenhouse growing much quicker, so they can process more plant material in the same amount of space.

As with any propagation system, timing is everything (Driver and Suttle, 1987). While the laboratory can produce material on a year around basis, our customers dictate when they want the product and we schedule our production accordingly. This means that we ship material primarily between the warm weather months of February and August, the peak time being March through May.

Cold storage (in the dark, 2 to 4°C) is an integral part of our micropropagation system. Culture stock (i.e., ripe multiplying cultures) are stored during the off season or in periods of low demand. We've held cultures as long as three years successfully without transferring, although frequent monitoring and annual subculturing is now a regular part of our long term culture maintenance program. Storage of in vitro rooted plantlets—our finished product—provides us with great flexibility. We can prepare plants well ahead of time during the quiet winter months and pull them for shipping in the spring at our customers convenience. We have found that *Malus* and *Pyrus* grow much more rapidly and uniformly in the greenhouse if given at least 1,000 hours of pre-chilling. This chilling requirement is much more of a necessity when planting out occurs during the short-day early spring months.

We have found that some crops, notably *Acer* and *Prunus* do not tolerate cold storage for more than a few weeks. We now cold test plants on a crop-by-crop basis to avoid any catastrophes. When preparing plants for shipping—after rinsing the

agar off of rooted plants or making fresh microcuttings—our plants are immediately refrigerated and remain so all through transit. Once plants are “plucked”, we ship immediately and recommend our customers plant out within a day or two – keeping the plants refrigerated until they are ready to plant.

Some very exciting research work has been done on our plants by Dr. Dan Struve (1990) at Ohio State University and Dr. John Day (Day et al. 1988a; Day et al., 1988b; Day, 1992) at the University of Tennessee on extending the growing season using supplemental lights (100 f.c. and long-days) and heat to in effect “jump start” the plants earlier in the season (i.e. January). The results have been phenomenal. Containerized plants of *A. rubrum* cultivars reach caliper growth approaching one-inch after only 8 to 10 months out of culture with stem heights, if left unpruned, reaching 7 to 10 feet! A second year of container growth with suitable top working produces high quality trees approaching 2 in. in caliper. Most commercial growers have not tapped into this rapid growth advantage because supplemental heat and light are expensive, but it has served to open a few eyes to the potential that there may be a better way to do things.

During the past few years Microplant has begun working on the micropropagation of many rare or underutilized specialty plants which need better methods of propagation. Some of the plants we expect to have available soon as small liners are: *Hydrangea quercifolia* ‘Snow Queen’ (PP4458) and ‘Alice’; *Fothergilla* ‘Mount Airy’, *F. gardenii* ‘Jane Platt’ and ‘Blue Mist’; *Parrotia persica*; *Franklinia alatamaha*; *Corylopsis pauciflora*; *Disanthus cercidifolius*; *Cornus kousa* ‘National’ and ‘Satomi’; *Cercis reniformis* ‘Texas White’; *C. chinensis* ‘Avondale’; *C. canadensis* ‘Forest Pansy’ and ‘Alba’; and *Styrax japonicum* ‘Pink Chimes’.

Over the past 13 years we have seen the nursery industry begin to use micropropagation in an increasing variety of ways. In some cases, the main reason may be to simply increase numbers of a new plant quickly and at some point more traditional methods of propagation such as cuttings, layerbeds, or scaling may take over. In other cases, micropropagation has proven in the field to provide more uniformity, more vigorous growth, more branching, less cullage, better root systems, and less disease than other methods. Some of our customers use it to save money by avoiding costly mother block establishment, to bring in newly released disease resistant or virus free material, to give them more market flexibility, or a more reliable stock source. Sometimes there isn’t a single clear overriding advantage at all, it just seems easier. Regardless of the reason, we find it a very rewarding and exciting part of the nursery industry to be involved in. We look forward to the next 13 years.

LITERATURE CITED

- Day, J.W., W.T. Witte, and H.L. Dickerson. 1988. Acclimation of micropropagated tree liners: The response of *Acer rubrum* cvs. and *Betula nigra* ‘Heritage’ to fertilizer rate and light regime. HortScience 23(5):820.
- Day, J.W., W.T. Witte, and H.L. Dickerson. 1988. Winter acclimation of *Acer rubrum* ‘Red Sunset’ and *Malus* ‘Snowdrift’ propagated in vitro. Proc. SNA Res. Conf. (in press).
- Day, J.W. 1992. (Personal communication).
- Driver, J.A. and G.R.L. Suttle. 1987. Nursery handling of propagules. In: J.M. Bonga and D.J. Durzan (eds.). Cell and tissue culture in forestry, Martinus Nijhoff, The Hague, 2:320-331.
- Struve, D.K. and W.T. Rhodes. 1990. Turning copper into gold. Amer. Nurs. 174(4):114-125.