PROS AND CONS OF TREES FROM TISSUE CULTURE

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We at Bracken Tree Growers are convinced that tissue culture will revolutionize the future of tree propagation. Admittedly this technology is still in its infancy with many liabilities yet to be resolved. Our experience with the procedure leads us to believe that the positives of improved product quality and speed of production will soon make tissue culture an industry standard.

Our experience is strictly from a grower's viewpoint. We buy our material at stage three from several tissue-culture laboratories and acclimate it ourselves. We have been producing tree liners from tissue culture for two years—patented red maples, three cultivars of birch, amelanchier, flowering cherry, and crab apples. Beginning production for our field-grown liners, we now sell 20 percent of our tissue cultures as acclimated micropropagated liners.

While we still propagate from cuttings, our substantial commitment to tissue culture has given us a broad base for assessing the pros and cons of this technology. The advantages lie in the areas of greatly increased product quality and quantity.

The superior quality of tissue-culture plants appears in three main areas:

1. **Production of virus and disease-free plants.** Recent research has revealed the need to control viral and bacterial growths in plants, which are much more extensive than previously known. Such factors as ice nucleation figure prominently in this area. Our actively growing tissue-culture plants taken from the greenhouse to the field on September 26th experienced a 16°F freeze on October 15th. They showed no sign of injury while our non-tissue culture field-grown plants were severely damaged. Could the lack of bacteria in the tissue-culture plants have kept them from freezing? The possibilities for generating "clean" growth are only beginning to be investigated.

2. **Generally better quality and more rapidly growing plants.** Our tissue-cultured red maples did not require staking while our cutting-grown maples have. The tissue-cultured maples developed better caliper within the growing season without crooks from cutbacks. Rapid growth does make tissue cultures susceptible to stress-induced bends, but 'Heritage' birch forms clumps more easily due to juvenility and more basal buds.

3. **Uniformity of crop.** As plants are genetically identical, variance is due to water, fertilizer, insects and disease. These factors we can control.

Two further advantages can boost your profit margin:

1. **Elimination of a stock block.** With tissue culture there is no need to develop and maintain a stock block to provide cuttings. This entire overhead expense is eliminated.

2. **The speed of reproduction.** Once the formula is worked out in the lab, the number of trees produced is virtually unlimited. A liner producer can get "hot" market items into production and capitalize on the peaks of market trends.

In considering the advantages of tissue culture mentioned, some of the disadvantages are readily apparent. Most of these problems arise from the newness of the technology and will be solved through practice and research.

Tissue culture today is what mist propagation was in the 1950s. As then, one of the major concerns with new technologies is *over-production*. The industry adjusted to certain gluts produced by previous "breakthroughs"; tissue culture presents no greater threat. Actually not all plants respond readily to tissue culture, though new cultivars are available almost monthly. Perhaps the initial deterring factor with tissue culture is *cost*: micropropagated rooted plantlets are expensive—40¢ to 66¢ per plant. More exacting facilities are required for handling tissue culture. Sanitation procedures include weekly disinfecting, methodical washing of hands and feet, Clorox dips, to name a few. These routines quickly escalate production costs. In addition, plant loss can be high. Our rate is 100 percent to 30 percent livability. Add to this the pots, soil mix, bench space, and potting labor and you have made a substantial investment.

The major difficulties encountered involve dependence on the laboratories. We experienced several problems with the cultures themselves:

1. **Incorrect chemical mix.** We received a shipment in which half the plants appeared anemic. Upon inquiring, we learned that they had not received the right chemical mix but had been top dressed to compensate. They never responded. Our reimbursement for the plants did not compensate for loss of time and materials.

2. **Incorrect plants.** We had one large order of plants not true to name, a fact not recognizable until they produced mature leaves. As the trees were pre-sold, we were left trying to make up a 6,000 plant shortage.

3. **Uncertain delivery.** Dependency on the laboratory for your production cycle is the most debilitating aspect of tissue cultures. In 1987 we received plants April 1st, acclimated fully, went to the field in May, and made 5- to 6 ft. trees by October. But some of our 1988 order did not arrive until July. Intense heat reduced our livability and prevented transfer to the field, costing us not only one year's growth but one year's sales as well. The scenario could be worse: if a lab becomes contaminated, you receive nothing.

With all of its present liabilities, tissue culture is already a

viable part of our industry and with maturity will become a standard. Though far from a "magic bullet" it offers solutions to many propagation problems. All serious propagators need to investigate this expanding field and experiment to determine if it will work for their operation. Our advice is to hedge your bets: We know of several who went totally with tissue culture and lost 100 percent of their plants.

Bracken Tree Growers has given information and assistance to researchers, governmental agencies, and numerous individuals regarding the actual implementation of tissue culture propagation in a working environment. We trust our experience can aid the industry in assimilating this valuable new technology.

PROPAGATING NEW MAGNOLIA CULTIVARS

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Todd Gresham, the City Parks Director for Santa Cruz, California, hybridized Asian magnolia species and cultivars intensively during the 1960s. Some of the names Gresham gave earlier hybrids are 'Rouge Alabaster', 'Leatherleaf'. 'Raspberry Ice', 'Royal Crown', 'Crimson Stipple' and 'Royal Flush'. Specific information about these hybrids may be cited in *Magnolias* by Neil Treseder. Before his death Gresham dispersed 1600 of his seedlings, which had not yet bloomed, to the Gloster Arboretum located in Gloster, Mississippi. In the late 1970s these seedlings began to reach blooming age. Several enthusiasts began to select and number magnolias that had particular beauty. Ken Durio, owner of Louisiana Nursery in Opoleusas, Louisiana, named the following cultivars: 'Tina Durio', 'Darrell Dean' and 'Mary Nelle', named for the wife of the late Joe McDaniel. 'Sweet Sixteen' and 'Elisa' are two other early selections. Professor Joe McDaniel, Dr. John Giordano, and Dr. John Allen Smith made approximately 50 selections, which were propagated by cuttings and planted in their respective gardens. As these plants matured, their commercial value became apparent. Further observation and selection by Magnolia Nursery resulted in the following cultivars:

Magnolia 'Sangreal'. Cup-shaped, red-purple flowers, up to 8 in. across, open early and continue into the bloom season.