

**TISSUE CULTURE PROPAGATION OF NORWAY
AND SUGAR MAPLE**

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(Dr Cheng was unable to prepare a manuscript for her talk)

PROFITABLE TISSUE CULTURE

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My wife, Elyse, and I considered starting a plant tissue culture lab when my previous employer, Sherman Orchid Gardens in Glendora closed its business of growing cymbidium orchids for the wholesale cut-flower trade. During my 25 years there we had followed the work of Dr. Morel of France on the tissue culture of cymbidiums. Within ten years of the first meristemming of cymbidiums, Mr. Sherman sold out for, with the advent of fan and pad cooling of greenhouses, and the availability of good hybrids the market became oversupplied.

My whole career has been in the horticultural field, including two years at an agricultural school on Long Island, New York, student gardener training at the New York Botanical Garden, plus some work at Kew Gardens in England; therefore tissue culture seemed like the next logical step

Therefore, after a year's study of literature at the California Polytechnic University, Pomona, California, we took a three-day intensive tissue culture course at the University of California, Riverside, under Dr. Murashige. Following the details for constructing a small lab given during the course we proceeded to construct our lab. We converted our garage, measuring 20' × 25', by running one-half as an insulated room for the hoods and for shelves for the bottles; the other half was considered our work area. Later we constructed a 13' × 30' greenhouse and utilized a three tier bench arrangement which made its capacity — 400 flat size. We installed a desert cooler, gas heater, humidity set-up, circulating fan, and used Saran cloth on the outside for shade.

For equipment — our two hoods were procured from Ray Products in El Monte, California and are the type used in assembling electronics, costing around \$350 each. Our balance scale

was secured from a used-scale dealer. Our son, Martin, and Dave, a neighbor, built our wheel patterned after the one at University of California, Riverside, which incidentally has now been copied for the eighth time. The wheel has five revolving drums and holds approximately 400 test tubes which revolve once every 57 seconds.

Our shelves are 2' × 8' and 18" distance from the fluorescent tubes; and are of pressed wood. Incidentally do not purchase second-hand fluorescent fixtures.

The walls of the culture room were insulated and covered with masonite, which was then painted white. On the floor of the culture room a grade of linoleum was used which is now disintegrating and will now have to be replaced. Most of our original lab supplies were purchased from Van-Waters & Roger; now we deal with Scientific Products. However for the second stage bottles in the fern production we use discarded bottles which were used at a local hospital for intravenous injections. In order to cool the culture room, a small in-the-wall cooler was used; due to the insulation no auxiliary heat is needed.

At first we used our electric stove in the kitchen to prepare and sterilize the media; later a used two gas burner was installed in the work room and a roof fan installed to remove the fumes.

Our employees are usually part-time students from Cal-Poly, or the local high school who average 20 hours per week and receive \$5.50 per hour.

I deliver the plants to the customers and they, in turn, save the used flats and inserts, which upon return are soaked in a chlorine solution for 24 hours, reassembled and rinsed with clear water and left in the sun for 24 hours.

Potting soil. We started with a peat-lite mix recommended by U. C. R. Extension, which did not prove satisfactory. The Soil and Plant Laboratory, Orange, California then recommended a soil mixture and feeding program. This worked satisfactorily until I had a small stroke and lost strength in my arms, wherein I started using Metro-mix, a prepackaged soil mix. Despite the seemingly high price it works out to 23¢ per flat which holds 96 plants. We use a dilute Peter's fertilizer, using a M. P. Mixer-Proportioner in a constant-feed feeding schedule.

It usually requires 7-8 months from the time we insert the runners until the finished product is available. We charge for 90 plants so as not to have to count the plants in each flat. When we plant a flat it is watered in with fertilizer water and covered with a plastic bag for 2-3 weeks. Having been placed in the shadiest lower bench, it is moved upward when uncovered and ends up on the top bench prior to delivery.

All shelves in the culture room and greenhouse are washed between crops with Physan @ 9.75 ml/3 liters of water and periodically the greenhouse side-walls are also washed.

Running this profitable tissue culture lab has been a very worthwhile endeavor, climaxing 40 years of growing. I regularly review over 40 technical journals at Cal-Poly in Pomona, copying those articles on tissue culture and card indexing same. We feel that our achievements in tissue culture is due to our life-long interest and hobby in plants. One of our customers in Anaheim is starting his own lab under our training.

OVERVIEW OF TISSUE CULTURE AT K. M. NURSERY

JIRO MATSUYAMA

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We, at K. M. Nursery, have been involved in tissue culture since 1969. We have met and talked with many researchers and commercial producers from almost every country in the world about the problems we have encountered.

The foreign countries are working on mostly vegetative crops, such as those grown for paper pulp and number, especially in the smaller countries, while in the United States it seems we are producing mostly ornamentals commercially, although much research is going on in tissue culture of herbaceous crops. So it will not be very long before many of the important herbaceous plants will be produced through tissue culture.

Many nurserymen do not understand propagation by tissue culture although many articles have been written and talks have been given by speakers on this subject. Many people think tissue culture is as simple as mixing some media formula for all cultures, then placing shoot tips in a test tube and culturing it in an ideal room temperature and in a few weeks having sizable multiple plantlets. This is wishful thinking. It takes many man-hours of research for each species and cultivars that you are going to culture for commercial production, especially for hardwood plants.

When first starting commercial production sanitary conditions aren't a problem as laboratory equipment and the culture room are new and easily kept clean. But as time goes on, in mass propagation contamination will appear.

I have always said research is one thing that we all need.