# The Good, the Bad, and the Ugly: Young Plant Production at Magnolia Gardens Nursery©

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## INTRODUCTION

Magnolia Gardens Nursery specializes in young plant production using tissue culture, in particular that of numerous *Nandina domestica* cultivars. Young plant production comes with many rewards but there are also many challenges that must be overcome to reach them. These include deciding what plants to produce, determining the best production protocol, acclimization and finishing of plants, and finding innovative ways to deal with a slow economy. One of the biggest rewards is the discovery of a new plant and having the ability to use tissue culture to bring it to market more quickly than traditional propagation methods.

## PRODUCTION CHALLENGES

**What Plants Should We Produce?** To answer this question we have to ask:

1) Is the plant worthy?
2) Can we grow it?
3) Are we able to generate a profit from it?

Before starting any new product in the lab we first trial it outside to make sure it is truly unique compared with other products already on the market. This trialing period is a good time to note whether the plant can be grown in our climate and whether it is easy to propagate conventionally, as the tissue culture process is costly.

Once we've established that a plant is worthy, the next step is to find out if it we can produce it with a high success rate. Some plants, such as trees, prove extremely difficult to grow in the lab. Others don't grow well in either the lab or the greenhouse and the losses are too high to make sufficient profit. An example of this for our lab would be *Ensete* 'Maurelli' with plant losses over the whole production cycle of well over 50% — excluding the space and labor losses. Other plants grow very well in the lab but then the Texas climate causes poor to no survival. *Phormium* and *Libertia* are examples of this type of plant, which look fine in the cooler months but cannot make it through the extreme summer.

Lastly, we ask, can we make a profit on this item? Some plants are worthy and we can grow them but other issues make them bad choices for production. Bananas such as *Musa acuminata* 'Dwarf Cavendish' are examples of this. *Musa* sp. is a great candidate for tissue culture but the problem was that it would take 2 to 3 times more labor than a woody plant to keep them maintained in the lab. Also, the big sales season is in the spring so the rest of the year is spent on maintenance or subculturing the mother stock. There are many reasons to produce a product (or not); each plant must be looked at individually to make an informed decision.

**How Do We Get a Plant Into a Sterile Environment?** There are many factors that come into play when deciding what steps to take in getting a plant clean of

contaminates. Plant type, age, the growing environment that the plants were in, and time of year are among the many factors that determine how successful the sterilization procedure will be.

We have a general sterilization procedure for the plants we commonly produce but a given procedure can produce varying results even on different material of the same type from a single plant. The best method is to determine the procedure details on an item-to-item basis after considering the relevant factors. For example, tender plants can be burned easily by the sterilizing solution; plants that are more mature may need more sterilization. A combination of sodium hypochlorite, ethanol, along with sterile distilled water and detergent (Tween), is used in our sterilization procedures.

**How Do We Grow a Plant in a Sterile Environment?** Once the plant is clean it is time to figure out what media it will best grow on. To keep processes efficient we usually try to grow a new plant on media we are already using and making in large batches. Small batches of media are made for plants that we know will not grow on our common media, and for experimental media for plants that are not performing to our standards.

Not only must media be considered but the crop cycle time must be decided as well. Some plants will let you know very quickly how long their crop cycle is. *Yucca* 'Color Guard', for instance, will start dying after 4 weeks so if they are not transferred on time the crop will be lost. Woody plants can survive longer than most herbaceous plants and some need to be subcultured less or they perform poorly when weaning. The most common crop cycle is 6 weeks but many plants can go longer than this.

**Acclimization.** Plants produced in tissue culture become accustomed to living in a perfect environment and then they must be able to survive the great outdoors, which has a higher light intensity, less humidity, and, for the most part in Texas, is warmer. We wean plants under a double shade system — black shade cloth on the outside of the greenhouse to reduce the light intensity and Svensson XLS firebreak screen on the inside to reduce temperatures. We also cover the plants with a plastic dome — these are purchased clear but given a light coat of white shade paint to allow for even greater protection from the light. The domes also keep the humidity levels high. After a week the plants are uncovered to start to adjust to the drier air. To keep the temperature cooler in the summer months a Kool Cell pad and fan system is used. No fertilizer is used in the weaning area to avoid burning the roots of the sensitive plantlets.

After around 4 weeks plants are moved to their final location before shipping. These growing areas have high light levels and liquid feed is used. Plants have the hardest time adjusting to the outside environment during our summer, which can be very hot and humid. We must pick plants that can handle this rather than try to fight the climate. Also we have to be very careful planting during extreme heat, such as in June 2009 when we had 7 days in a row above 38 °C. Plants that are sensitive in the weaning process should be held in the lab during extreme heat when possible until the weather cools.

## MARKET CHALLENGES

**How Do We Handle Production in a Bad Economy?** A slow economy comes in cycles so one must be prepared for this to happen. The most important thing we do

is keep in contact with customers to see how they are doing; what products do they need and what orders will need to be cancelled. Even with communication it is still hard to know exactly when things are going to come to a stand still and when things will start moving again.

There are several steps we take to keep plants in the pipeline so that we are ready when sales pick up. Young plant production has a continuous pipeline of product being produced, once sales slow the numbers coming out of the pipeline must be adjusted. The mother stock must always be maintained or subcultured even if product is not needed otherwise the crops will decline and eventually die. We usually try to maintain motherstock at predetermined inventory levels. When subculturing, any excess product produced will be disposed of to keep the supply in check with the market demands rather than putting it into stage-three production. This is also a good time to weed out any weak plants and get crops in top-notch condition. Discarding plants in the micro stage is the most cost efficient, as the cost of subsequent planting and maintainence in the greenhouse can be considerable.

Production should not stop completely to ensure that there is product ready to go when sales pick up — if the flow is completely shut off it could take 30 weeks to get product ready for sales. Ways of doing this include holding plants in a cold store at 4.5 °C to slow growth, holding plants on the shelf longer before sending to wean, holding plants in the weaning area longer, and by decreasing fertilizer use once plants are moved to their finishing location. Because sales are slow in a downturn, finished material must be discarded eventually because the quality no longer meets our standards, and all products have a limited shelf life no matter how much care is given to them. As old plants in various stages of growth are discarded, new plants are replanted in hopes sales will pick up, keeping the pipeline full.

## CONCLUSION

Producing plants is tricky as they are living products and will not fit a factory production model. This can cause much frustration at times but for us there is no better reward than to discover a new product and to then see it through to production, marketing, and eventually sales. It is the light at the end of the tunnel that drives us. At Magnolia Gardens Nursery, we decide what plants best fit into our production model by fine tuning a selection of product that is in good demand, that will receive a fair price, and that we can produce with great success and quality.