

Buying Tissue Cultured Plants and Having Them Survive[©]

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Growing plants from tissue culture does not need to be a daunting and often unsuccessful endeavor. While tissue cultured cuttings are often much smaller than traditional cuttings, that is not the major consideration in plant survival. However, that is not the major consideration in plant survival. The critical issue is to consider the environment in which the cuttings are grown:

- 1) The culture room has long days or 24-h light.
- 2) The culture room is always warm.
- 3) The culture growth medium is nutrient rich.
- 4) The culture environment is very humid.

In our laboratory, we have each of our shelves on 16 h of light/8 h of dark but with multiple shelves set for staggered on/off light times, the room is never dark. Plants “see” 24-h light and we have the 16-h cycle only as an energy saving measure. This results in plants growing 24 h per day, 365 days per year. Terms like softwood and hardwood microcuttings are meaningless. If you want *Hydrangea* rooted microcuttings ready in December, we can have them ready in December. If you want *Hydrangea* rooted microcuttings ready in August, we can have them ready in August. It is one of the big advantages of micropropagation.

The culture room temperature is set at a constant 76°F but on the shelves, under the lights it's closer to 82°F. Our culture room does have a dedicated furnace but I don't think it has ever turned on. Cooling is our major problem – as long as it is colder than 25°F outside we can cool the room with fresh air. But if it's warmer than 25°F then the air conditioner turns on and we often have it running in February with snow on the ground. I occasionally have customers who want to buy unrooted *Amelanchier*. They are one of our trickier crops because if you don't keep them warm and lighted while they are rooting they go dormant! They make roots and set a dormant, fuzzy bud which results in nothing but problems.

The culture medium standard includes 20 g of sugar per liter of medium. Sugar is added because if plants don't have to make their own they will grow much faster and more predictably. The medium is also supplemented with all the elements (except hydrogen and oxygen) that plants require to grow.

Different laboratories sell different plant products. If you want to buy micropropagated plants, you need to ask questions about how to handle the plants when you receive them – labs want you to be successful as they need your repeat business. Are you buying rooted or unrooted cuttings? If they are rooted cuttings, were they rooted in vitro (in the culture jars) or ex vitro (in something like perlite or peat/perlite mix). Plants rooted ex vitro are often acclimated to low humidity (but not necessarily to high light) and can require much less attention. Plants that are rooted in vitro will need to be gradually weaned from high humidity to lower humidity. They need to grow a heavier cuticle to survive the lower humidity and that takes time. Further, a previous study by McClelland and Smith (1988) showed that roots produced in vitro were morphologically different than those produced ex vitro. Ex vitro root systems were well-branched with normal root hair development. In vitro generated root systems lacked secondary roots and had a sparse development of root hairs. They also had much poorer vascular connections. The roots produced in vitro are similar to hydroponic roots. These in vitro root systems can probably help act as nurse roots to newly planted tissue culture cuttings but they may shortly get replaced by a much better functioning root system.

Microcuttings sold without any roots need to be planted either in a mist system or other high humidity environment like clear plastic dome covers. Rooting can take anywhere from 3 weeks to 6 weeks but there is an additional period of around 2 weeks to slowly

lower the humidity – reducing the mist cycle or slowly cracking open the clear plastic domes. Most plants will root in either system but not all. We have been working on *Carpinus* selections and they will not root in domed flats but require a mist system that keeps a fine layer of water on the leaves at all times until rooted.

One of the unique features of tissue culture cuttings is their vigorous growth once they are rooted. The explanation for this is the juvenility of the cuttings. To be successful establishing plants in the culture environment they must be fully rejuvenated. This allows growth at a constant and predictable rate which is what you need if you are going to have cuttings available at any time of year (McCown and McCown, 1987). As soon as cuttings have roots they need to be put on a fertilization regimen. Helen Kunkel (2012) at J. Frank Schmidt says that as soon as cuttings are rooted they “seem to explode”. This characteristic has been described as “clonal seedling”.

Everyone I talked with who buys tissue cultured plants says you need at least one individual who is solely responsible for their care. That person needs to be sure the cuttings are lighted, warm, in high humidity until rooted and fed as soon as rooted.

Literature Cited

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