COMMERCIAL MICROPROPAGATION OF *KALMIA*

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Kalmia latifolia (mountain laurel), can be propagated by seed, grafting, cuttings, layers, or micropropagation. By far the easiest method of propagation is by seed. But for clonal reproduction, micropropagation is clearly the most successful mode of propagation.

Within the last five years nurserymen have seen literally an explosion of new introductions. This is partially due to market demands, but also it is due to the ability to dependably propagate *Kalmia* in large volume. The 1980 paper by Lloyd and McCown (1) presented a protocol for successful micropropagation of *Kalmia*. The nursery industry has benefited greatly from these and other researchers.

Within the last 5 years, Richard Jaynes has produced several new introductions of mountain laurel with improved flower, foliage, and plant characteristics.

Why micropropagate or use tissue culture to propagate *Kalmia*? Micropropagated *Kalmia* are own-rooted, true-to-name, vigorous, and have superior branching. Large numbers of *Kalmia* can be produced quickly. This facilitates the rapid introduction of new selections.

To succeed at micropropagating any plant, we believe a sound horticultural understanding of the plant is important. Firstly, *Kalmia latifolia* is a member of the Ericaceae family, requires cool, moist, acidic but well-drained soils. In the wild, mountain laurel is often found as an understory shrub along slopes, streams, or pastures. *Kalmia* thrives with moderate fertilization but can be easily injured or killed under conditions of high fertility.

Kalmia can be initiated in tissue culture from shoots from stock plants any time of the year. But we prefer to use green-wood stems from greenhouse-grown material. Shoots are defoliated carefully, so as not to injure the lateral buds on the stems. These shoots are then washed in running water for up to 30 min.; next, 7 to 10 washed shoots are placed in glass jars filled with 400 ml of water with 1 drop of Tween-20 and agitated for 10 minutes. Finally these shoots are placed in 400 ml of 10% laundry bleach (0.05% sodium hypochlorite) and agitated for 15 to 30 min. The explants are next placed in 1% laundry bleach. These shoots are then either trimmed into smaller sections or trimmed just to remove damaged tissue and placed in test tubes with liquid or solid woody plant medium (WPM) supplemented with N^6-(2-isopentenyl)adenine(2iP) (1).

Cultures are grown under cool-white fluorescent light (50 to 70 μmol $s^{-1}m^{-2}$) with a 16 hour photoperiod. The culture room temperature is regulated at 23°C±1°C. Shoots are grown on solid media in 25mm × 150mm test tubes or glass baby food jars.

Depending upon the timing and condition of the stock plant, new growth appears from lateral buds within 4 to 8 weeks. Once new growth appears, plants are subcultured on to solid WPM with 2 to 10 μM of 2iP. As we grow more selections of mountain laurel, we find that the specific growth regulator and its concentration may need to be adjusted for recalcitrant clones. Some researchers automatically include an auxin with every medium they test. We believe auxins are of no benefit in the shoot multiplication stage for *Kalmia*.

In general, mountain laurel responds very well to 2iP. A 13 to 15× multiplication rate is not uncommon. However, *Kalmia* can become easily habituated at these high cytokinin levels. Both leaf and shoot quality and rootability will suffer. We recommend to keep a multiplication rate of approximately 5×.

Plants are subcultured every 8 to 12 weeks. We have not noticed any decline or degeneration of cultures that others report (2). Perhaps this decline may be due to a gradual increase of a low level contaminant. We have some clones of mountain laurel in culture that are over 8 years old.

Cultures may be refrigerated when not needed. Sealed containers are placed in a dark refrigerated area at 3°C±1°C. Mountain laurel will remain viable for one to two years in this environment. Rooted plantlets in culture may live longer.

Kalmia can be rooted in the laboratory or in the greenhouse. We choose to root most all our *Kalmia* in the greenhouse. Microcuttings or cultures are sent to the planting crew and 25 shoots are stuck in a 10 cm square pot. The soil mix consists of equal parts of peat moss, perlite, and Douglas fir sawdust. The untreated cuttings are misted, placed in tents or are fogged, depending upon the weather and time of year. We start rooting mountain laurel in April or May and finish by October. It is not uncommon to get 80 to 95% rooting. Rooting occurs within 4 weeks. It is very important that quality microcuttings be produced to achieve these results.

Variation in rooting can be attributed to: the quality of the microcutting, timing, weather, a water or humidity problem, or soil mix aeration. Mountain laurel foliage becomes red when it is under stress. When the plants are large enough they are potted and grown on into liners. The plants are treated and respond like seedlings.

In order for commercial micropropagation to be a success, good business decisions and a sound management team is a must. Obviously, it would be easy to overproduce these items. However, the demand is not nearly as high for a particular selection of *Kalmia* as, perhaps, a *Syngonium* or *Ficus*. The major advantage of using

micropropagation for mountian laurel is not production of large numbers, but rather dependable production of new and old selections. Micropropagation has allowed *Kalmia* to move out of the arboreta and breeder's fields to be enjoyed and appreciated in landscapes and backyards around the world.

LITERATURE CITED

1. Lloyd, G. and B. McCown. 1980. Commercially feasible micropropagation of mountain laurel, *Kalmia latifolia,* by use of shoot-tip culture. *Proc. Inter. Plant Prop. Soc.* 30:421–427.
2. Bennett, L. 1987. Tissue culturing redbud. *Amer. Nurs.* October 1:85–91.

SOME IDEAS IN PLANT PROPAGATION: CUTTINGS AND GRAFTS (MOSTLY ROSES)

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Most likely much of what I am about to say is "old hat" to many of you. However, we can all learn something new or give an old idea a new twist. All too often we see something or get an idea but fail to follow it through. Sometimes we are too busy to bother or the idea fails to "click." Often we are just not ready or have no need at the time.

We know how to do many things in the nursery business but someone is always coming up with a different idea or a new need arises. Often an idea which may have been impractical at the time can come to life because of new materials. Rooting hormones, misting, plastic materials, etc. are some of the developments which have made older ideas more practical.

For many years I have worked at propagation (mostly roses) and have come up with several innovations . . . some original, some borrowed. Some ideas come about by accident and others out of necessity. Now I would like to go down my list of helpful ideas for the propagation of roses and other plants. I have worked with other kinds of plants and still do. My plant breeding work has covered a wide range of interests. I started with roses and they are still a top priority with me. But I have also worked with such plants as zinnia, cosmos, plum, cherry, gloriosa daisy, and crape myrtle.

In this work I have had to learn and use numerous ideas and techniques in plant propagation. First, there are seeds. Each species and (often) cultivar has special demands. In my work with dwarf