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

crape myrtle, harvesting and cleaning seed has its special requirements. I learned that often some of the best parents shed their seed too soon, or the seed capsules would not open properly, in which case it was necessary to crush the dried capsule to release the seed.

Some plants propagate easily from either soft or hardwood cuttings. Others need special care, preparation, timing, planting depth, light and moisture conditions. Some of these are learned by experience or through reading or training. Often the grower learns by close observation. Often the plants themselves seem to be trying to tell us something and it pays to become a keen observer.

In my work I have dealt with propagation from seeds, from cuttings, and by grafting. So I would like to make some observations and suggestions; to tell you some of my experiences in the field of plant propagation.

First, as all propagators know or must learn, there are several different kinds of cuttings and grafts . . . different methods to produce another plant. Many plants can be propagated easily and inexpensively from hardwood (dormant) cuttings. But I want to discuss mainly the propagation of roses (and other plants) from softwood or "green" cutting material. By "green" I mean wood of the current season's growth with leaves. Such cuttings may be made and rooted over most of the growing season if given proper care and conditions.

In roses (miniatures especially) the soft growing tip and material immediately below this makes excellent cuttings and roots quickly. Cuttings may be 2 to 4 in. in length. We do not remove leaves. The bottom cut is made just below the bud. If cut even ¼ in. below the bud the cutting takes longer to root. There are also several other ways the cuttings can be made or prepared for rooting: [1] Use a small length of twig (I like cuttings with 2 or 3 buds, and leaves). Shorten the leaves to save space and help prevent leaf drop. It is essential to have at least one leaf on each soft or green cutting. [2] Use a similar cutting except the base is cut at a sharp angle. This induces more downward rooting. [3] Prepare a "Slice" cutting in which a cut is made deeply into the wood near the cutting base as though you were taking out an eye for budding but do not cut it clear out. This heavy wounding will induce rooting. [4] Use the old fashioned idea of just splitting the cutting base. [5] Wounding: cut or scrape the side(s) of the cutting just above its base. [6] A "chip" cutting, in which a chip—like a heavy bud (with leaf and bud eye)—is cut out and rooted under mist. [7] Prepare a short, single bud cutting (1½ to 2 in.) with bud and leaf at top. [8] Use short cutting like above, only the leaf and bud are at bottom of cutting, using the wood (1½ to 2 in.) above the eye as a handle; this cutting will root quickly and better than the above.

Another propagation method is the budded cutting. One must

have available a healthy, vigorous understock plant, producing long succulent canes suitable for budding. If done late in the season and cuttings are to be used "dormant", all leaves may be stripped off the cane before budding. Buds are allowed to heal in and the canes made up into cuttings during the winter. Remove all unwanted buds before planting. Good plants can be grown in one season by this method.

If the canes are to be made into cuttings as soon as buds take, at least one leaf must be left on each cutting. Another reason to use the cane bud method is to "store" buds of some new or rare cultivar (on canes) for later use.

To hasten rooting of cuttings, the stock plant (from which cutting is to be made) may be wounded by girdling (making a knife cut around the branch or twig) and covering with black tape until the callus beneath the tape is well formed. Remove tape and plant in a rooting medium. Another type of wounding is to remove a bit of bark 1 to 2 in. long from one or both sides of the shoot and cover it with black tape as above. These methods work well with rose, camellia, redwood, plum, and metasequoia.

We grow quite a number of miniature tree roses and now use a budding technique which I saw in South Africa several years ago. Instead of making a T-cut and slipping the bud under the bark flaps, this method only requires a very shallow cut to remove a sliver of bark (we leave a bark flap about ¼" long at top of this cut) then a similar sliver (skin bud) is laid over the cut, tucked under the short flap, then tied in with Parafilm. This works very well for us.

Another variation of the above, when used outdoors in hot weather or if the bark is thick, is to tie the bud in with Parafilm, then overwrap with a rubber budding strip. This holds for a longer time and in closer contact when the stock and/or buds are heavier, thus insuring a good "take." I have done this on dormant cherry with 100% success.

To produce many cuttings from a rose plant we have used the following method for hybrid tea, floribunda, and others: Grow the stock plants in containers and keep them in vigorous soft growth. As flower buds appear they are pinched off to force vegetative growth from buds at each leaf. One to 3 soft, single bud cuttings (as mentioned earlier) may be taken as soon as growth from each leaf reaches 1½ to 2 in. in length. In a few more days another cutting or two may again be ready. This process is repeated and new canes from the base arise to replace those used up. If watched carefully many cuttings can be produced in this way, thus increasing a cultivar rather quickly.

Another method I use to hasten my rose breeding (and shorten testing and production time) is to use seedlings from my crosses. There are usually a number of discards . . . climbers which do not bloom or whose flowers are poor. These can be used as "clean,

virus-free" understocks on which a promising seedling may be budded. To test out a possible hanging basket or groundcover cultivar I usually bud at 24 to 36 in. For others, 8 to 12 in. is adequate. This gives a good idea of the shape, flowering and growing habit of a new selection, and can supply more propagating wood in a short time.

A variation on the above is to use rooted *Rosa multiflora* cuttings grown from clean virus-free material. I like to have a plant that is grown from a de-eyed cutting (leave 1 or 2 eyes at top) which heads out about 6 or 8 in. above the soil line (in pots). From this numerous shoots will grow. I select the strongest, removing all buds possible up to the height at which I wish to bud. This fast growing cane is easily budded and the "take" is usually excellent.

Other ideas: roses can be grown by grafted cuttings in which a short cutting (*R. multiflora* or any easily-rooted stock) about 4 or 5 in. long is made, leaving 1 or 2 leaves at top. All other buds are removed. Then a deep slanting cut downward is made in the understock (about 1 in. from base) into which a wedge-shaped scion is placed. This scion may have only one bud and leaf. We wrap with Parafilm, as the graft then heals much better.

SUCCESSFULLY GROWING PROTEACEAE

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This paper will cover growing of Proteaceae transplants, propagation by both seedlings and cuttings, transplanting, and cultural aspects, including soils, fertilization, and disease control.

PROPAGATION

Seedling Propagation. Our experience began with seeds of members of the Proteaceae family purchased from Australia and South Africa. We attempted germination in seed flats, and encountered the first problems with seedling propagation—seed dormancy. Many dormancy factors are built into different kinds and/or populations of Proteaceae seeds. Most Proteaceae plants are native to Mediterranean climates and seeds tend to germinate best in the cooler rainy seasons when ample water is available to the young seedling.

Seed scarification in Proteaceae plants (6) has been found to improve germination rates. Stratification (5) of seeds at 5°C for 30 to 60 days prior to planting improved germination rates. Oxygenation