

JOHN WILDE: In the 1930's and 1940's, while working at Cornell University we did a survey of over 200 species concerning propagation by root cuttings. One of the things that we observed was there was no development of adventitious buds unless true secondary wood existed in the segments — the buds always develop from the secondary tissue. Another interesting observation was that if hypocotyledonous buds were present on seedlings grown from these species the plant could almost always be propagated by either underground stems (stolons) or root segments.

Most of the legumes can be grown from root cuttings and the easiest way for the small nurseryman to do this is to grow them *in situ* by driving a sharp shovel into the ground in concentric circles around the plant. By this method you can produce 5-6 liners of legumes such as *Gymnocladus* and *Gleditsia*.

CHARLIE HEUSER: You are right, a great many plants can be produced by root cuttings and the article by Stoutemeyer contains a considerable list of these.

## PROPAGATION OF WOODY PLANTS BY ROOT CUTTINGS

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Asides from growing by seed, the next oldest method of propagation of woody plants is by root cuttings or root sprouts. Early settlers of America brought woody plants from Europe by this method and used this method of transporting them as they moved westward in settlement of their new homelands.

Very little can be found in the literature on plant propagation concerning the use of root cuttings for woody plants. L.H. Bailey in *The Nursery Manual*, published in 1920, devotes three paragraphs to the subject. His primary discussion is of the bramble fruits, horseradish and certain tropical foliage plants. He states, with no elaboration, that fruit trees may be grown from root cuttings. Bailey also states that true root cuttings possess no buds whatsoever. This would seem subject to question. (Possibly I should have entitled this presentation "root sprouts" rather than "root cuttings".)

James S. Wells in his *Plant Propagation Practices*, published in 1957, devotes two paragraphs to root cuttings. He outlines briefly a method of making root cuttings, but does not state what materials may be grown by this method.

Today, aside from the growers of herbaceous perennial plants, very few growers extensively use the root cutting

method of propagation. Herbaceous perennials frequently propagated by root cuttings include: oriental poppy, summer phlox, echinops, summer anemone, stokesia, cornflower and other members of the composite or daisy family.

## COMMERCIAL PROPAGATION OF WOODY PLANTS BY ROOT CUTTINGS

Commercial propagation of woody plants by root cuttings is seldom found in our nurseries. One major producer of deciduous shrubs and trees in Iowa is using this method to mass produce hybrid lilacs. Aside from this grower, one rarely finds a grower who will admit using the root cutting method. There seems to be a mark of disgrace to use or to suggest using this method.

My business started using this method in 1938 for the production of many hybrids of the old-fashioned lilac, *Syringa vulgaris*. Since 1938 we have tested this method on many deciduous trees and shrubs. Many can be grown easily by root cuttings, but are more economically and/or more quickly grown by other methods. This is especially true of softwood stem cuttings grown under intermittent mist.

Woody plants that can and have been grown easily by root cuttings, but have not proven especially economical or practical are: almond, aralia, aronia, campsis, clethra, cotinus, euonymus, elaeagnus, forsythia, gleditsia, holly, mahonia, prunus, pyracantha, pyrus, rhodotypos, sarcococca, spirea, symphoricarpos and viburnum.

However, there are several important exceptions. Flowering quince, *Chaenomeles*, can gain one full years growth over softwood stem cuttings. A two-year root cutting plant is equivalent to a three-year softwood cutting plant and has more and heavier branching.

Hybrids of the old-fashioned lilac, *Syringa vulgaris*, grown by root cuttings produce own root plants in less than half the time required of those produced by softwood stem cuttings. It is possible to produce heavy 6 to 10 cane lilacs, 3 to 4 ft tall, after 2 years in the field.

Root cuttings may be expected to yield plants with a useful life expectancy of three to four times those grafted on species lilac or privet. In addition to understock suckering, grafted plants have a relatively short useful lifespan due to graft incompatibility, stem borers and non-renewal of wood. Should lilac borers infest own-root lilacs, cut out infested branches and destroy. Renewal is immediate and almost unnoticeable. We have own-root lilacs over 40 years old and these are in the best of condition.

Be mindful, lilacs that are weak as grafts will be equally weak on their own root. Strong graft produced plants are strong as own-root plants.

### FLOWERING QUINCE AND LILAC BY ROOT CUTTINGS

A simple, low cost, highly productive method of growing quince and lilac by root cuttings has been used by our business. Plants are dug in the fall as soon as dormant, but before freezing. Then, they are either stored or cuttings are made immediately. Heavy fleshy roots are removed and cut into approximately 4 inch lengths. Should these roots have above ground sprouts, remove by pruning at the soil line. Be sure to observe polarity while cutting and potting.

Potting is normally in 3 inch clay pots. Growth rate will be slower and watering will be a labor and maintenance problem if plastic or peat pots are used. Roots are allowed to project about 1 inch above the soil line. A potting mixture of soil, peat and perlite is normally used. The pots are placed and maintained with a perlite mulch in the greenhouse beds, the pots being covered to a depth of about one-half inch.

The potted plants are carried from December until March in a cool greenhouse at a night temperature of 33 to 36°F. About one thorough watering per month will be required. From March through April, the night temperature may be increased to 45 to 50°F with two to three waterings per month.

By late April, light monthly feedings of a soluble fertilizer is advisable. At this time plants should be 6 to 8 inches tall. One thorough weekly watering is all that is normally needed. The mulch of perlite should be allowed to dry slightly so as to make a good feeder root system that will withstand mid-summer field planting. Pot-bound, 12 to 24 inch plants should be ready for field planting in July. Little top growth should result for the remainder of the summer, but root growth should be heavy.

However, there is one production problem with lilac. There may be difficulty in securing your initial own-root stock plants for propagating. First, try to secure the desired varieties from a grower who has own-root plants. Be careful, some misrepresentation has occurred in the trade. Second, take grafted plants and set 6 to 8 inches deeper to have own-roots form above the grafts. After about 2 years, remove and cut off privet or species lilac root and replant. Species understock is difficult to identify. All cultivars of lilac will not layer. Third, taking softwood cuttings in May is a possible method. However, rooting is poor and rate of growth is slow; and this should be used as a last resort.

We have converted over 100 cultivars by layering, but have discarded many as not being desirable.

### FLOWERING CHERRIES

One unexpected experience with root cuttings occurred in growing flowering cherries. Root cuttings, especially *Prunus* 'Halle Jollivette', resulted in very crooked stems and nearly 50% were unsalable. Softwood stem cuttings gave reasonably straight stems of which over 90% were salable.

### FORSYTHIA

We have successfully employed an unusual type of root cutting propagation that we are pleased with although we have been accused of being crude and very non-professional. We have employed this primarily for forsythia, but it can be used for other shrubs.

In autumn, when a field is cleared of a crop, we plow the field at a rather shallow depth. This is followed by harrowing with a spring-tooth harrow, rather than a disk harrow. The young root sprouts or layers are collected by the harrow and dumped in piles, then forked on a truck and hauled to the propagating greenhouses. Here the root clumps are root pruned to about 6" stems. These root masses, with their pruned stems exposed, are packed in flats of wet perlite and stored in outside cold frames for the winter. These cold frames are unheated but are recessed and somewhat protected.

As soon as the ground can be worked in March or April these root masses are planted on normal field spacing with the planting machine. The flats go directly to the planter, giving minimum handling. By autumn, choice salable 2 to 3 ft plants are ready. This may be non-professional, but we have heavy, well-grown plants without normal propagating procedures.

### FUTURE POSSIBILITIES

There are other possibilities for using root cutting as a method of practical and economical propagation. We have grown flowering crabapples from root cuttings of the tea crabapple, *Malus hupehensis*, and the redbud crabapple, *Malus* × *zumi*. Plants on their own root have given more uniform growth, but the best feature is the small percentage of suckering from the base, which is so pronounced on budded or grafted plants on most understocks.

The only production problem is getting the initial crabapples on their own roots. This we are investigating. If successful, production of a superior crabapple is assured.

The methods cited here enable us to conclude that root cut-

tings are a profitable, practical and usable way of propagating certain woody plants. Additional possibilities for the future should not be disregarded.

#### LITERATURE CITED

1. Bailey, L.H. 1920. *The Nursery Manual*. The Macmillan Company, New York. pp. 99-100.
2. Wells, James S. 1957. *Plant Propagation Practices*. The Macmillan Company, New York. pp. 83-84.

GUS MEHLQUIST: I think it should be mentioned that periclinal chimeras do not come true from root cuttings.

LYNNE LAMSTEIN: Are you making a distinction between root cuttings and root sprouts and were the root cuttings placed horizontally or vertically in the bed?

CARL ORNDORFF: No, I'm not making the distinction between the two since it is often hard to do. The cuttings are set vertically in the pot and about 1 inch projects above the surface of the medium. With root cuttings you must maintain the polarity.

#### **Monday Evening, December 5, 1977**

A session concerning the teaching of plant propagation was held Monday evening with Dr. Bruno Moser serving as moderator.

BRUNO MOSER: The tremendous increase in enrollment in horticultural courses during the past few years has caused some problems in the usual methods of teaching. Classes, which up until the last 4 years had 10 to 25 students, could be worked with very conveniently giving individual instruction to each student in the course. There was a considerable amount of "hands-on" teaching and field trips consisted of loading the students into a few cars and going out to a nursery, but with classes today of 100 to 200 students, it is becoming more and more difficult to provide the student with the type of instruction we feel he needs.

This session is designed to show you what some of the people in other universities are doing and to tell you about some of the new things we are doing in plant propagation courses. We would also like to get some feedback from any growers present as to things you think ought to be included in a plant propagation class.