

tree grown in Kansas would take a different shape than one growing in the New England states.

MODERATOR CREECH: Thank you, Mr. Crawford.

I want to talk on root cuttings just a little further, some of the basic facts we know about them.

Dr. Creech read from the article entitled "Root Cuttings" by John L. Creech, *The National Horticultural Magazine*, 33:21-24, 1954. (Applause).

PROPAGATING PLANTS BY ROOT CUTTINGS

JOHN L. CREECH

U. S. Plant Introduction Station, Glenn Dale, Md.

Cuttings can be made from the roots of a number of species that are difficult to root from stem cuttings. This method is quite frequently applied to the woody legumes but to a lesser extent in other plant groups. According to Priestly and Swingle (4), root cuttings tend to produce adventive shoots more readily than adventive roots just as stem cuttings are prone to regenerate roots, seemingly as if each were trying to replace that portion of the plant which was missing. In addition, the adventive shoots formed on root cuttings are more likely to be found at the upper (proximal) end of the cuttings than at the lower (distal). Thus, the most successful root cuttings will be those obtained as close as possible to the base of the plant. This proximity to the base of the parent plant might also be expressed in terms of the diameter of the root cuttings. Kvarazkhelia (3) reported in a study of the vegetative propagation of the tea plant that when he separated the root cuttings into thick (over 2 cm.), medium (1 cm.), and thin (less than 1 cm.) pieces, the thick cuttings gave the best results and the thin ones the poorest, namely 52-73%, 37-45%, and 9.5-18% respectively. This has also been observed at the Glenn Dale Plant Introduction Garden with *Cyrilla racemiflora* when cutting were separated into two groups, one-half inch or over and less than one-half inch. In addition to a higher percentage of rooting, the thick cuttings also produced more vigorous shoots than the small roots.

As a supplement to growing the plants derived from root cuttings, it may be desirable to use some of the newly developed shoots as softwood cuttings. This may seem a roundabout means of obtaining softwood cuttings but results show that these cuttings will often root better than similar cuttings taken from stems. Toole (5) took softwood cuttings of *Albizia julibrissin* both from root pieces and stem pieces. Those shoots originating from roots rooted 100% in twenty days while the ones obtained from stems failed completely.

Root cuttings should be made either in the fall or during the winter months. Hoblyn and Palmer (2) reported that root cuttings of plum grew much better when planted in December through February than if set in April. In the propagation of the Beach Plum (*Prunus maritima*), Graves (1) used roots of lead-pencil size collected in the fall. These were cut into lengths of 3-4 inches and buried outdoors at a depth of 2-3 inches with the cuttings laid

horizontally. By this method, a 50% stand of plants may be obtained. Roots can also be dug from around the parent plant and propagated in the greenhouse. The roots are cut into 3-4 inch lengths and placed in a flat of moist sphagnum moss. Cuttings may be laid horizontally or placed on end with the thicker (proximal) end uppermost and covered with an inch of moss. One text suggests that by reversing this latter position, better results will be obtained but in view of the relatively greater adventive shoot development at the upper end, there is little basis, theoretical or experimental, for this suggestion. Cuttings will produce new shoots and roots promptly and may be transplanted after three or four months, but in some instances, shoots will appear and immediately wilt due to the failure of adventive root formation. This lagging of root development is perhaps the main cause for failure of root cuttings to succeed.

Plants in the following genera have been described as developing successfully from root cuttings: *Albizzia*, *Chaenomeles*, *Clethra*, *Cyrilla*, *Daphne*, *Ilex*, *Koeleruteria*, *Lagerstroemia*, *Maackia*, *Prunus* (Beach Plum), *Rhododendron* (Azaleas), *Syringa*, *Wisteria* and *Xanthoceras*. No conifers have been described as rooting from piece-roots and root cuttings could not be used to propagate grafted plants unless the grafts had been planted deeply enough to permit scion-rooting.

References

1. Graves, G. 1944. The beach plum, its written record. *Nat. Hort.* 23:75-97.
2. Hoblyn, T. N. and R. C. Palmer. 1934. A complex experiment in the propagation of plum rootstocks from root cuttings. *Jour. Pomol. and Hort. Sci.* 12(1):36-56.
3. Kvarazkhelia, T. K. 1934. Vegetative propagation of the tea plant. *Trop. Agri. (Ceylon)*. 83:261-266.
4. Priestley, J. H. and C. F. Swingle 1929. Vegetative propagation from the standpoint of plant anatomy. *U. S. Dept. Agri. Tech. Bul.* 115. 98 pp.
5. Toole, E. R. 1948. Rootability of cuttings. *American Nurseryman*. 88 (2):72.

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Dr. Creech added: Those pieces of root which are closest to the base of the tree, in other words, the largest root cuttings generally give you the best results. Furthermore, you get much better results when the root cuttings have the proximal end, the end from which the adventitious shoots are going to develop, exposed above the medium. Theoretically, the cuttings should be stood on end. However, you can put them at an angle and get many more on. We use sphagnum moss for our medium, but it is immaterial what you use.

We have little time left and I want to show you some of the things we have learned about air-layering. I like to think that the technique has a potential use as an indicator of the success that can be obtained from stem cuttings.

To develop this point further, I have observed a correlation between the rooting of air-layers and cuttings. We have four selections of *Prunus mahaleb* at Glenn Dale, all with desirable habit and quite vigorous. When we air-layered the four clones last spring, two rooted 100%, one 50% and one failed

to root at all. When I took cuttings of these clones, the results were quite similar and the selection which would not air-layer would not root from cuttings. Thus in a relatively simple manner, it was possible to separate easily rooting clones from the difficult one.

We have had some interesting results with air-layering the oriental flowering cherries. Although most of the varieties of *Prunus serrulata* were quick to root, the Japanese weeping cherry, *Prunus subhirtella pendula* did not commence to root until late in October while the upright form, *P. subhirtella* variety Jugatsu-Zakura rooted in ten weeks. In both instances layers were applied in June.

I brought two air-layers of cherry with me to show the extent of the root development. These were layered in May. One plant (that with the active root system) was removed from the tree in mid-September and plunged in a cold greenhouse. This is a really successful manner to handle air-layers—removing them in the fall after they are dormant and plunging them in peat in a cold greenhouse where the temperature is low enough to prevent top activity but where the roots will remain active during the winter. The other layer was just cut from the plant prior to this trip and you can observe the extent of the root system. It is possible to leave a layer like this on the tree through the winter and remove it during the next year. Although the sphagnum will freeze solid and many of the roots die, there will be rapid root formation in the spring.

Perhaps we can now have some questions both on vegetative propagation of beech and linden and on the other subjects discussed.

MR. HOOGENDOORN: You mentioned in a reference on grafting that you cut the scions in February and grafted them just previous to leafing out. Does that give you any percentage?

DR. CREECH: Percentages were not stated but what they did was to cut the scions in February and store them until late March or April. I don't know how successful that method is with beech but I know it is very successful with the simpler things we bud and graft. We do it with all of the *Prunus* spp. at Glenn Dale. I like it for those. On beech I can quote only the citations from the literature.

MR. HOOGENDOORN: I have done it once and I cut my wood probably the last week in April. This was just before they started to leaf out and we had 98 per cent.

MR. FILLMORE: Is it practical to air layer the copper beech?

DR. CREECH: You recall when I gave the literature summary there were only two references to layering of beech at all. One of them was an observation where the branches were layered to the ground. I doubt if it would be very successful.

MR. FILLMORE: I am interested because I tried air layering on a very fine specimen. I figured if it would be successful I could do several hundred. I didn't get any results at all.

DR. CREECH: That would be entirely dependent on technique and we often fail because the sphagnum was too wet to begin with. That may be your difficulty.

MR. LESLIE HANCOCK (Woodland Nurseries, Cooksville, Ontario): I have two questions. Why do you put the air-layers so far down, Doesn't it take a long time to get balance between root and top when you have the air-layering so far down the stem?

DR. CREECH: One of the things I have found in the literature, and have observed myself, is that the balance is very quickly overcome. For example, on some of the American hollies that I air-layered and removed in August with shoots almost 18" - 24" long, the root system had become proportionate to the top within a month.

MR. HANCOCK: The other question is how much experience anyone has had growing the native beech from seed?

MR. CHARLES HESS, SR. (Hess' Nurseries, Mountain View, N. J.): We have grown them from seed. Actually, we have no trouble at all. The main thing with any beech is that you must sow it practically as soon as you pick it. If you store it and sow it in the spring you are going to have poor germination.

MR. MARTIN VAN HOF (Rhode Island Nurseries, Newport, R. I.): In 1919 I planted 3,000 beeches for Mr. Horvath Sr. in Mentor. We grafted them and waxed them. There wasn't enough room to set them out singly, so we sat one pot on top of the other, three high. They came out perfectly.

MR. JOHN VERMEULEN (John Vermeulen and Son, Neshanic Station, N. J.): I wonder why you haven't mentioned any bottle grafts. All the nurserymen must remember the type of bottle grafts. We used a very little bottle and skinned the branches and tied them together.

MODERATOR CREECH: If there are no further questions, I will turn the meeting back to the President.

PRESIDENT CHADWICK: Thank you for the discussions, Harold Crawford and Dr. Creech.

The next session on the program is the Annual Business meeting. While the voting lies in the hands of the members, we would be glad to have the junior members and the guests attend this meeting.

The scientific sessions adjourned at 3:10 o'clock.

The report of the Business session will be found on pages — these proceedings.

Fourth Annual Banquet

Following the banquet, President L. C. Chadwick called the meeting to order and introduced the speaker of the evening, Dr. Freeman S. Howlett, Chairman, Department of Horticulture, Ohio State University, Columbus, Ohio.

Dr. Howlett's discussion was entitled, "Some Aspects of Horticultural Research of Importance to Plant Propagators and Nurserymen."

At the conclusion of this discussion, the Fourth Annual Meeting of the Plant Propagators Society adjourned *sine die* at 9:30 p. m.