

bed from becoming too warm. This may have to be done many times each winter since our climate has frequent periods of severe cold. However, it is worthwhile as it does get the plants through the winter in good condition and they are a rather high value crop so that the extra effort is justified.

MR. MARTIN VAN HOF: I would like to ask you if these plants get hardened off sufficiently for our northern climate?

MR. TEMPLETON: They do by the time we ship them. They are not hardened off now but they will become thoroughly dormant by January, and we will ship all of them in the spring, in February and March.

MODERATOR COLE: Thank you, Mr. Templeton.

The next paper was to have been given by Mr. A. R. Buckley, Dominion Arboretum, in Ottawa, Canada. I understand Mr. Buckley is ill and consequently his paper will not be given, but rather included in the Proceedings.

## THE GRAFTING OF JUNIPERUS VIRGINIANA VARIETIES ON UNROOTED CUTTINGS

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Successful grafting of scions on unrooted cuttings as stocks is not a new technique of propagation, although references to it in literature are very brief. The best reference I can find among the books at my disposal is the half-page devoted to it in the recent work by Mahlstedt and Haber (1) where it is referred to under the heading of "cutting grafting." In Kains & McQuesten a few notes may be found under the same heading (2) and in Bailey's Nursery Manual the method of propagation is confused with piece root grafting.

Preliminary investigation into the use of cutting grafts for the propagation of *Juniperus virginiana* varieties began in 1955 when a number of scions of *J. virginiana hilli* and *J. virginiana canaertii* were grafted on unrooted cuttings of various species of juniper including *J. sabina* and *J. horizontalis*. At that time only a small number of grafts were made and these were placed under a polyethylene tent in a medium of sand and peat. Here they were sprayed with a syringe twice daily for two months. At the end of this period the cutting grafts were lifted and the large majority had rooted and the graft union completed. The established grafts were then potted into three inch pots and left in the tent until June when they were placed in another section of the greenhouses. The grafts made very good growth and were quite sizeable plants when they were set out in the nursery in the fall.

During the Fall of 1956 it was decided to carry out further investigations into this method and to make a larger number of grafts on more diversified stocks. November and December were selected as the best times for taking the cuttings, since at this time of the year there is less possibility of heavy snow fall. It is perfectly obvious that during January and February when snow is usually very deep, it is impossible to

find the labels and sometimes the plants of material required for experiment.

The procedure for making the cuttings and grafts in 1956 is as follows. Both the stocks and scions were gathered and brought to the potting shed the same day. Wood was selected from the apical and lateral shoots for the stocks and leading side shoots selected from the pyramidal type junipers for the scions. The stock material from plants such as *J. sabina vonehron* consisted of very large shoots cut near to the base. Where the cutting was less than nine inches, this heel was left as part of the cutting, but where a larger shoot was pulled off, no heel was left. The cuttings were made first and kept moist in water while the scions were prepared. Both the scions and stocks were not more than 1/10th of an inch in thickness. For grafting, the side or veneer graft was used and the grafts tied with polyethylene strips cut from 2 mil. polyethylene sheeting. This was used in place of rubber strips which were unavailable at the time the grafts were made and not because of any particular preference. After the grafts were made, they were dipped in Stim Root 10, a root inducing hormone similar to Hormodin 3.

Instead of using polyethylene tents for the grafts as was done the year previous, it was decided to place them in a cutting bed under mist which was controlled by a Humidistat set at the 75% R. H. level. These gave about 30 minutes of spray over a period of 24 hours. At one time during a particularly humid period in January, the spray did not operate for three days, whereas during a very cold spell when the temperature dropped to 30 degrees below zero outside, it operated almost continuously. If the spray had been mechanically controlled, I would suggest that a mist flowing for five minutes every three hours would approximate that given by our controls.

The medium used in this experiment was vermiculite placed on a bench formerly used in constant water level experiments to which adequate drainage was added. I felt that the sand peat mixture might have been too heavy for use under mist in the greenhouse. Under the same set-up, but with coniferous cuttings, Perlite worked very well and is the medium I would use in further experiments.

The cutting-grafts were inserted in the medium so that the level of the graft union was just below the surface. The temperature of the greenhouse was maintained at a level of 65°F. minimum night temperature and a 75°F. maximum day temperature. In the same bench as the grafts were many juniper cuttings, falsecypress, yew, Dwarf spruce and some other grafts of Blue spruce on Norway spruce. There was no disease whatsoever on any of the juniper grafts or cuttings, although every spruce was infested with a fusarium disease which prevented rooting.

All the rooted cuttings were potted on May 5, 1957. In most cases they had established graft unions, and in fact, in many of those not rooted, unions of stock and scion had occurred. The potted cutting-grafts were left under the mist for three weeks and then placed outside in the cold frames. During August they were planted out in the nursery by which time the grafts were thoroughly established. The top growth of the stock was removed gradually, some at the time of potting and the rest before planting out.



Table 1.—Rooting and take of various cutting-graft combinations

Scion and stock	Date inserted	No inserted	No rooted	No of successful grafts
<i>Juniperus virg hulli</i> on <i>Juniperus sabina</i>	5/11/56	25	17	15
<i>Juniperus virg hulli</i> on <i>Juniperus virg kosteri</i>	2/11/56	22	17	16
<i>Juniperus virg hulli</i> on <i>Juniperus virg vonehron</i>	2/11/56	28	16	16
<i>Juniperus virg hulli</i> on <i>Juniperus virg plumosa</i>	5/11/56	25	20	20
<i>Juniperus virg glauca</i> on <i>Juniperus sabina vonehron</i>	2/11/56	25	18	18
<i>Juniperus virg glauca</i> on <i>Juniperus virg kosteri</i>	5/11/56	25	12	10

Cutting grafts of junipers may or may not have any commercial significance. In any case it would be necessary to try out this method on a small scale under prevailing local conditions. The method is valuable as a quick means of ascertaining the types of stocks which might be used successfully for grafting in the ordinary way. *J. glauca hetzi* the stock commonly used for grafting *J. virginiana* varieties, was not available in sufficient quantities otherwise it would have been used.

Results of this test would suggest that *J. horizontalis plumosa*, the Andorra juniper, is an excellent stock for *J. virginiana* varieties. It roots very quickly and seems to carry the grafts very well.

Cutting-grafting is a much more simple operation than grafting on to established pot grown stocks. It might even be possible to use a tying machine in this operation.

#### Literature Cited

1. Mahlstedt, J. P. and E. S. Haber. 1957. Plant Propagation. John Wiley and Sons, Inc.
2. Kains, M. G. and L. M. McQuesten. 1947. Propagation of Plants. Orange Judd Publishing Co., Inc
3. Bailey, L. H. 1920. The Nursery-Manual. Macmillan Company

MODERATOR COLE: Our next speaker will be Dr. L. L. Baumgartner, Baumlanda Horticultural Research Laboratory, Croton Falls, New York. He is going to speak about "Potting Mixtures."

Dr. L. L. Baumgartner (Baumlanda Research Laboratory, Croton Falls, New York): Thank you, Mr. Cole, it is a pleasure for me to be here to discuss the subject of potting or growing mixtures.

Dr. Baumgartner presented his paper. (Applause)