

into cans in March and April and put those outside without any protection. Our results were good.

MODERATOR COLE: Thank you. Are there any questions?

MR. HOOGENDOORN: What do you intend to do with these one year old plants now, cut them back or grow them for another year?

DR. REISCH: I wish I could answer your question. I hope we can sell them next spring although they may have to be cut back to promote branching and then grown for another year.

MR. HOOGENDOORN: It seems to me you would have to cut the plants back next spring and let them sit in there another year. This is the impractical part and the place where your trouble is going to come.

MR. WELLS: What is the growing or propagating mixture used?

DR. REISCH: One part soil, one part sand and one part peat were the components of the mixture.

MR. D. D. QUINN (Willo'dell Nursery, Ashland, Ohio): Have they usually been fed with liquid fertilizers?

DR. REISCH: Yes, our fertilizers have been primarily liquid this season. We have some studies under way in which they have been fertilized every two weeks.

MR. JACK SIEBENTHALER (The Siebenthaler Co., Dayton, Ohio): Suppose that you took the hardwoods earlier in the year and possibly callused them, put them in the can and put the can in a warm area, such as the greenhouse, do you suppose that you would get initial root growth started much earlier? What would you imagine would be the result on saleability that first year?

DR. REISCH: In the study we ran last year we did protect some of them. There again, however, you get into added cost of handling. Whether or not it is practical is a very interesting question.

MR. SIEBENTHALER: They would have to be selected, high value plants.

DR. REISCH: I seriously doubt if you could get the money out of *Forsythia*. The problem of forcing comes up in the early flowering plants. For those that have to grow a couple of months before flowering such as *Abelia*, it will be an ideal situation.

MODERATOR COLE: The next paper is another one just along this line. Harvey Templeton will discuss the propagation and overwintering problems of viburnums.

Mr. Harvey M. Templeton, Jr., Phytotektor, Winchester, Tennessee, presented his paper. (Applause)

OVERWINTERING ROOTED CUTTINGS OF VIBURNUM

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As you know, propagation of most viburnums from cuttings is relatively easy and especially so from softwood cuttings under mist, although there is at least one notable exception. Since they are easy to

root and time is limited, I will omit the discussion of their propagation and go on to a phase of their production which, in some cases, is not easy, that is, getting them through their first winter alive and in good condition

Viburnum carlesii is probably the one which gives the most difficulty, although *Viburnum juddi*, *chenaultii* and even *burkwoodii* can sometimes be troublesome. Notice that plants containing *carlesii* "blood" seem to give the most trouble. The first evidence of winter damage is that the stems crack, usually just above the soil line, during one of the first few hard freezes in the fall. The obvious conclusion is that the plants were not dormant at the time they froze.

Now the question is, "why are these plants slow in becoming dormant in the fall?" Is their dormancy induced by a period of lower temperature or is their dormancy the result of a series of long nights? Or, is a combination of the two factors involved and, if so, what is the optimum combination for causing dormancy? If this information were known, it might be possible to provide suitable conditions for more successful over-wintering by inducing earlier dormancy. Since we do not know how to make them become dormant before the first freeze, all we can do is protect them enough during the early freezes so that they are not frozen enough to be damaged. However, the protection must not be so complete or last so long that they are encouraged to keep on growing as they might under, say, greenhouse conditions, since those conditions would not allow them the dormant period they seem to require. And they do seem to require a dormant period since, in our experience, trying to carry these viburnums and some others through the winter in a growing condition has not been successful. Therefore, our object is to keep them as cold as possible all winter without allowing them to freeze seriously before they are dormant.

Since they are all still growing in ground level beds of soil where they were rooted, it is necessary to erect some sort of shelter over them. One simple way is to build a wall of bales of straw around each bed. One bale high is enough. Sections of welded wire mesh are laid across the bed from the top of one wall of straw to the top of the other so as to form a low arched roof over the plants. The arch shape is necessary to shed water and give strength to withstand snow loads. Over the wire mesh is spread a sheet of 2 mil polyethylene and over that a sheet of 46% shade saran screen. Bricks or short sections of lumber are used to weigh down the edges of the polyethylene so that the structure is fairly air tight. However, in our climate, if kept enclosed all the time, the plants would stay too warm, so one edge of the plastic is folded back to make an opening about a foot wide the whole length of the bed. This gives free ventilation so that even on a bright winter day the temperature inside the bed is little or no higher than the temperature outside. This amount of ventilation is given continuously as long as the outside temperature is above or only slightly below freezing.

In the early fall, while the plants are still tender, the opening is closed whenever the outside temperature falls to about 27° by simply folding the flap of plastic down against the wall of straw on that side. As soon as the temperature rises the flap is folded back up to keep the

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