bench. We were often able to root a high percentage of cuttings only to lose half of them after potting because of mildew or blight.

We seem to be getting satisfactory control now with a weekly spray schedule, using Malathion for two succeeding weeks and Systox the third week. We also use electric sulphur vaporizers in the greenhouse and ventilate during winter to change the air and cut down on the moisture in the vicinity of the foliage.

Some varieties are very susceptible to red spider; however, this is very easily controlled by our spray program, provided the underside of the leaves are well covered with the material.

SUMMARY

1. Miniatures are easy to grow and require a minimum amount of care.

2. They may be propagated using either hardwood or softwood cuttings and may be rooted in frames or in the greenhouse.

3. Rather rigid watering and fertility cycles must be adhered to in order to obtain optimum growth.

4. Disease control is the biggest problem but can be controlled by adopting a timely spraying schedule and an adequate sanitation program, both in the rooting and growing areas.

MODERATOR BLAUW: Are there any questions?

MR. F. L. S. O'ROURKE (East Lansing, Mich.): I would like to have one minute, if you please

Mr. Chairman, fellow members: I am prepared to present a paper by a graduate student at Michigan State University, one James R. Feucht, who has done a good job of air-layering of pine and spruce. However, since time is limited I will merely pass this paper around and will plan to publish it in the Proceedings. I also have a tool in my pocket which was devised by Mr. Feucht that I would like to show anyone interested in making a girdle.

(*Editor's note*: The paper by James R. Feucht and Professor F. L. S. O'Rourke follows.)

AIR-LAYERING OF PINE AND SPRUCE

JAMES R. FEUCHT AND F. L. S. O'ROURKE
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The widespread use of many superior selections of conifers is limited by the difficulty of propagation. While established clones of pine and spruce are commonly grafted on seedling rootstocks, the method is seasonal, costly requires special facilities. Several propagators and scientific investigators have reported on trials with both cuttings and air-layers but without any marked degree of success.

This report concerns an investigation started in the spring of 1958 to determine the influence of some factors which affect the formation of roots on marcots. Studies were also made toward developing a satisfactory technique that might possibly assure a fair degree of rooting with certain conifers.

Air layers were placed on terminal shoots of lateral branches of seven-year old Scots pine (*Pinus sylvestris*) and nine to twelve-year old White spruce (*Picea glauca*). The needles were stripped from a portion of the stem on one-year old wood about six inches back of the apical bud. In the center of the needle-free area, a ring of bark two to three mm. wide was removed with a special tool consisting of two razor blades spaced apart with small springs and two corresponding steel guide edges to prevent uneven cutting. The tool was so constructed that the width of the girdle could be adjusted simply by turning three small bolts.

After removal of the bark, a ball of moist sphagnum was wrapped tightly around the wound with polyethylene film. The polyethylene was wrapped from the top downward and overlapped in order that rain water would not penetrate through the fold. "Twistems" were used on each end of the plastic to bind the material closely against the stem.

A number of synthetic hormones at various concentrations were tested in 1958 by applying aqueous solutions of the chemicals into the sphagnum with a hypodermic syringe. While some of these treatments appeared promising, further trials in 1959 showed that there were no significant differences due to chemical application

In 1959 fifteen marcots per tree were placed on fifteen trees each of pine and spruce at the beginning of April, May, June, July, and August. The air layers were equally divided between the top, middle, and bottom branches After 100 days they were removed and examined for rooting.

No significant results were obtained in respect to the position of the marcots on the trees but a significantly greater number of White spruce stems rooted from air layers applied in May (41 out of 225 stems) than when applied at any other time. The July treatments resulted in the least rooting, perhaps due to high temperatures immediately after application.

The highest rootings from the Scots pine air layers were obtained from those applied in July but were largely confined to individual trees suggesting that some trees are more capable of producing roots on marcots than others of the same species. These experiments indicate that this method of air layering of conifers is not as yet developed sufficiently to be a practical means of propagation but may have a use in securing a small number of rooted plants from unusual trees for observational purposes.

* * * * *

MR. J. PETER VERMEULEN: I forgot to mention that we have some of the plants that were rooted at the side of the room and they can be seen there.

DR. CHARLES HESS: Pete, did you punch holes in the bottom of your peat pots for dramage?

MR. PETER VERMEULEN: No, we did not.

DR. HESS: Do you think this would help or does the pot swell?

MR. VERMEULEN. I don't think it would help unless you had a very large hole. Perhaps most of the moisture that was giving us trouble was contained in the peat pot itself.

MR. JIM WELLS: I would like to direct a question to Hugh Steavenson. Would he describe first of all the physical setup whereby he applies fertilizer through his portable irrigation system, particularly when he pumps from a pond, and secondly, what fertilizer does he use?

MR. STEAVENSON: Well, Jim, that is a very simple matter. If you have a centrifugal pump, because you can simply draw in on the suction side whatever you want to draw in, and you can proportion it very simply with the use of an ordinary garden hose valve, any simple valve.

We mix the fertilizer, and obviously, it has to be something that will go into solution and, of course, we put on whatever fertilizer we care to do, according to soil tests, and what we think the plants require.

MR. WELLS: How do you graduate or how do you calibrate it?

MR STEAVENSON: That is also very simple, Jim. We irrigate about two acres at a time, as a rule. Well, let us say we want to put on 500 pounds of 5-10-5 per acre, for example. We can mix up the ingredients, using anything we want to for nitrogen. We would probably use ammonium nitrate, potassium chloride and one of the soluble phosphoric acid constituents, and dump this stuff into a horse tank which holds a known amount of water, pump the horse tank full of water and after a very simple regulation with a valve, we know how long it takes to draw it into the suction side as the pump, which is pumping water out of our pond

Now if we are putting on from an inch to two inches of water per irrigation we start drawing the fertilizer in when the pumping starts. We usually pull it right on through the entire fertilization and usually run it off with clear water when the fertilizer is exhausted from the horse tank.

With our allyl alcohol we do the same thing except we draw the alcohol in from a 55-gallon tank. In that case, we are putting on 5,000 gallons of water per acre to 25 gallons of alcohol. Of course, we always rinse out the line with clear water, since this acts as a water seal, after the alcohol is on That amounts to about a quarter of an inch of water in the case of the alcohol. So, with irrigation, we will be putting on an inch to two inches of water with the fertilizer. The same thing as spreading with the spreader.

MR. WELLS: How long do you have to leave the land after putting the allyl alcohol on before you think it is fit to go into seed?

MR. STEAVENSON: About a week, depending on the temperature and wind condition, and so forth. You can smell the ground and when it no longer has an odor, it is all right.

MODERATOR BLAUW: Any more questions?

MR RICHARD FILLMORE: I have a question for Sidney Waxman on the first part of his presentation May this photocell for the control of mist be operated with a normally open solenoid valve, that is a solenoid valve which, if the photocell fails, will continue to deliver water? And one on the second part is, is this apparatus available commercially, and if not, may plans for it be obtained?

DR. WAXMAN: To answer the first question, I have just been told yesterday that it can be arranged with the normal solenoid valve. To answer the second question, it is not commercially available yet, and I might say to some manufacturer, here is an opportunity. Thirdly, we have blueprints and if we have enough requests we will print them up.

MR. MARTIN VAN HOF. Will we get a condition when we store our rooted cuttings and put them in bags with any kind of moss or whatever we use? I heard somebody puts those cuttings in bags without any moss or medium.

MR. VINCENT K. BAILEY: We have used moss experimentally in these polyethylene containers where we stored bareroot deciduous greenwood cuttings over winter. We also experimented without any packing of any sort. We did not find any adverse results from using the moss but we did not find any beneficial results. The stock that was stored without any packing of any sort came through just as well So in the last two years we have used nothing in the containers where we stored the rooted cuttings

MR. VAN HOF: Would it also apply to evergreens and broadleafs?

MR. BAILEY: I haven't had any experience with the storing of broadleaved evergreens in polyethylene We have stored evergreens, as I said, last year from September to April very successfully in controlled conditions of temperature and humidity without polyethylene, only moss over the roots in a dark room, of course.

MR. VAN HOF: What do you think about some light on the evergreens? Do you think it would be necessary?

MR. BAILEY: We have not found it necessary We have found no adverse results or detrimental results from storing in darkness.

MR. KARL KERN (Cincinnati, Ohio): Going back to the topic of Roy Nordine of budding *Crataegus.* I have been carrying on experiments with the idea of producing or growing cotoneasters on the stems of hawthorns. I have two-year old *Cotoneaster apiculata* on stems about three feet high *Crataegus* stems. When I carry this on I want to graft *Cotoneaster horizontalis* and *C. dammeri* on the standard stems to produce plants for accent points in landscape composition. So far, *Crataegus cordata* seems to be the largest understock I have used

MODERATOR BLAUW: I thank you, ladies and gentlemen, and especially the speakers for this afternoon.

PRESIDENT NORDINE: The next item on the program, of course, is the business meeting, and we hope we can do this as quickly as possible.

The meeting recessed to reconvene in the Annual Business Meeting (See page 12).

NINTH ANNUAL BANQUET

Our Past President, Mr. Roy M. Nordine, and the newly elected President, Mr. Harvey M. Templeton, Jr. presided at the annual banquet.

Highlighting the evening was the presentation of the Plant Propagators Award to Mr. James S. Wells of Red Bank, New Jersey. Mr. Louis Vanderbrook, in making the Award, noted Jim's prominence in the organization which took the form of his being the only man to hold the presidency for two terms. Mr. Wells was the opening "Spark Plug" which launched the organization back in 1951 at Cleveland, Ohio. In recognition for his book, Plant Propagation Practices, for his willingness to share information, and for his loyal service to the Plant Propagators Society, Mr. Jim Wells has rightfully been so honored.

For his loyal service to the organization, Mr. Roy Nordine also was honored and received an inscribed gavel to remind him of his years tenure at the helm of the Society.

Climaxing the Annual Banquet was a talk and series of slides given and shown by Dr. Cornelis Broertjes on the Experimental Station for Ornamental Trees and Shrubs at Boskoop, Holland. Dr. Broertjes, who was currently working as a research fellow at the Brookhaven National Laboratory gave the Society a most interesting and first hand account of the nursery research work being done at Boskoop. Many in the audience recalled pleasant memories as the slides were being shown as evidenced by an occasional remark.

The Ninth Annual Meeting of the Plant Propagators Society adjourned Sine die at 10:00 P.M.