FRIDAY EVENING SESSION

December 10, 1965

PLANT PROPAGATORS' QUESTION BOX

The Friday evening session convened at 8:00 p.m. in the Cleveland Room. Mr. Gerald Verkade was moderator.

MODERATOR VERKADE: Have any growers rooted directly in the new plastsic flats or cube flats in which individual plastic pots are formed into a single flat? Also, after rooting and hardening off, have the liners been put into the field?

PETER VERMEULEN: This is getting to be a rather common process as we discussed here at the mist symposium. There are quite a few people, comparatively speaking, rooting directly in the pot and then going directly to the field. We've done quite a bit of this and I'm sure others have, too. There is no particular disadvantage or difference in going from the pot to the field with a plant whether it be potted in the pot subsequent to rooting or rooted directly in a pot. I don't quite understand the question.

ANDREW ADAM: What I was trying to get across are these new cube-type trays which are being used for rooting of a plant or liner under the mist, hardened off and taken directly to the field eliminating the process of going from bench to the pot and then to the field?

PETER VERMEULEN: There is a tray similar to the one you are referring to put out by Vaughn called "multi pot". And it comes in various sizes such as $1\frac{3}{4}$ inch square.

JOERG LEISS: This thing Mr. Adams is referring to is a tray made out of plastic just the same as a flat. It is molded in one piece.

PETER VERMEULEN: Well, essentially it's just a matter of form, is it not? Is it not just a plastic flat that is compartmentalized?

JOERG LEISS: No, not exactly.

MODERATOR VERKADE: I would like to know a recommended disinfectant for cleaning greenhouses, flats, tools, etc.

VOICE: Chlorox.

GERALD VERKADE: It also says here — when do you change your medium for placing the next crop?

ROBERT DEWILDE: There is a phenyl mercury product that you buy that's a hospital disinfectant. It's quite satisfactory for killing all types of fungus and bacterial organisms. I cannot remember the name of it precisely, but it was purchased from Geigy Co.

VOICE: It will also kill some plants.

LINCOLN PEARSON: There is a material that is on the market labeled as LF-10 which can be used even on the naked hands, although I prefer to wear gloves and can be used as a germicide, bacteriocide, and fungicide and is being used in the geranium

industry and in their culturing processes. And this is much ahead of Chlorox and formaldehyde.

MODERATOR VERKADE: Is it toxic to plants also?

LINCOLN PEARSON: No, we dip pots in it; we dip plants in it and where other products kill, this does not. What they do is mix up a barrel of the material in a 55 gallon drum and soak things in it for a period of 20 minutes and take them out and let them air dry and then immediately plant.

ALBERT WILL: In Florida quite a number of nurserymen are using this LF-10 product and quite successfully. It has no phyto-toxicity. That is you can sterilize pots or clean the benches or walls or anything like that.

MODERATOR VERKADE: Where can I obtain a #6 Bard Parker blade holder and blades as recommended in a paper last year? Any surgical or scientific supply company such as Fisher Scientific Company, of Chicago.

DONALD CATION: That was my question and the catalogs of this Bard Parker don't have a #6 blade that was recommended. They have a number 2 and 3.

JOHN ROLLER: Those blades can be purchased in your local drug store.

MODERATOR VERKADE: What is considered the best growing medium for Taxus in containers?

BOB DEWILDE: We gave it up. We tried a great number of things; peat and perlite, sand, peat, and sand and peat mixtures. We could not grow them as well in containers — one of the few plants we could not grow as well in containers, as you can in the field.

MODERATOR VERKADE: Well, who is growing them in containers? There should be somebody in this room.

HARRISON FLINT: They aren't growing perfectly for us but we are at least growing them, Bob. We do grow them in our experimental program; 1/3 perlite, 1/3 peat, 1/3 sandy loam. With the right additives and careful watering we experience no problem. Not necessarily growing as well as then do outdoors, but we have reasons for wanting to do it this way.

BRUCE BRIGGS: Actually we grow Taxus in quite a few forms in containers and we can grow them twice as fast in containers as we can out in the field. And we use pretty much 100% bark mix supplemented with a lot of organics.

VOICE: 100% bark mix? What kind of bark is that?

BRUCE BRIGGS: Actually we are not too particular about the kind of bark but the bark we have is hemlock. We prefer hemlock because it has no splinters. I presume fir would be just as good. Now you probably don't have either one of these two; the main thing we want is a very light fluffy mix that the water will go through very rapidly. We have used a compost of sawdust which we have sometimes as a mix. It is made up of soil, sand, and 2/3 sawdust decomposed with ingredients put in for a period of maybe 6 months to neutralize the loss of nitrogen and it works just as well as the other mixes.

DR. PRIDHAM: We have had the same experience as Harrison Flint with the exception that we try to take our Taxus cuttings with a base of 1 year or 2 year wood that was mentined earlier today. We take those in November or December, carry them on to the Spring and move them into plastic containers, using the same mix as Harrison mentioned — ⅓ each peat, vermiculite and soil. In September they're ready for planting. We do pick up a good deal of root growth during the summer so that we have very little in the way of loss in September and October.

MODERATOR VERKADE: Can anybody identify the nozzle we saw in use at Yoder Brothers?

DR. HESS: They had it specially made for them and they called it a Boston nozzle.

VOICE: I don't know whether it's made in Boston or not but it looks like a "Mister 100". They said they were going to give us the address and we never did get it.

MODERATOR VERKADE: Do we have a policy prohibiting commercial propagating equipment at our meetings?

No, we haven't. We had a whole panel on equipment in the round table discussions. There's no policy against any equipment used in propagation.

PETER VERMEULEN: Well, there's a policy against commercializing, because it might lead to an embarassing situation. If the product is relatively new and hasn't been exposed to the Society before and it has potential benefit, then it should be shown, such as Laursen's nozzle. But we have to be careful in that we don't allow any commercialism in the Society.

MODERATOR VERKADE: How long are the scions of budwood immersed in water prior to budding?

BOB SIMPSON: From 2 - 3 hours to maybe 24 or 48 hours. For example, from Saturday afternoon to Monday morning. *They go into refrigerated storage.*

GERALD VERKADE: You let them soak all the way from Saturday to Monday?

BOB SIMPSON: Yes. We let them soak sometimes from 2 - 3 days sitting at temperatures of about 35° F.

PRESIDENT BAILEY: In regard to the question and answer that was proposed, we've budded quite a few ornamental crabs and I assume that is what is referred to in the question. We also feel that the buds should be submerged in water to keep the budwood moist and we have no trouble taking the bud away from the inner part of the stem.

BOB SIMPSON: When you talk about de-wooding, do you cut the bud and then pull the wood out, or do you take the bud off leaving the wood on the stick?

PRESIDENT BAILEY: We leave the wood on the stick. They are carried in a very moist container. We have boxes that each budder carries with him lined with burlap or cloth. When he cuts a bud, he cuts from the bottom up and makes the cross cut on the top being careful not to cut through the wood on the top.

Then he picks the bud off and leaves the wood on the stick.

BOB SIMPSON: We had many cases where scions wouldn't do that so we started keeping them in water. It works so well and it's so simple that we have them just carry a bucket full of sticks out into the field.

HARRY HOPPERTON: Everyone has their own process here of handling these, but that bucket can get awfully heavy carrying it along the row all day long. We take a wet burlap bag and wrap our scions, maybe 50 sticks, and tie it around our waist rather than carry that heavy bucket.

DR. NELSON: Maybe this is not a firm rule and certainly we have broken it a few times, but with all the work at Ottawa it has been shown quite clearly that de-wooding is not essential at all. As a matter of fact in some cases we have had greater success with the wood in the bud rather than without the wood.

MODERATOR VERKADE: What are the directions for rooting *Cercis canadensis*? They want to know what time to take it, what hormone to use and what rooting medium to use.

HAROLD DAVIDSON: This past year we had an opportunity to try rooting *Cercis canadensis*. A very large branch of *Cercis* broke on campus and while doing some other rooting experiments, I just took a series of cuttings from the *Cercis*, softwood cuttings, and put them in a mist house where we did not have bottom heat. The temperatures ran about 65° F. We got about zero rooting. Where we maintained a temperature of about 75° F. we got about 90%. We used Hormodin #2.

VOICE: We have been quite successful with outdoor rooting just as soon as the leaves have reached their full size. The stem is still quite soft. This outside without any bottom heat.

MODERATOR VERKADE: Has anyone been working with *Euonymus vegetus* standards? What is the procedure? How does grafting compare with budding?

JOERG LEISS: We use *Euonymus europaeus* as an understock. We cut it back after the second year, and shoot it up into a whip. We either double bud in the summer or graft in the winter or until early Spring with defoliated plants with good success.

MODERATOR VERKADE: What, if anything, is being done with fogging systems?

PERCY EVERETT: I'm the one who asked that question. I have been trying to find something out about fogging systems because we have one in our small nursery operation. I know the Monrovia Nursery has one in Azusa, California. We've had pretty good success with it. The reason we installed it was because we had rather a high mineral content in our water and many of the plants that we propagate had a lot of hairs on the leaves and they were slower to propagate. They collect quite a bit of this mineral, calcium, and after they're rooted and we begin to wean them off — the leaves will drop. Oftentimes even the buds will be so covered with this material that they won't leaf out. So along with the intermittent mist we have

installed this high pressure fogging system. All it is four jets that are above the intermittent mist and we can regulate these as much as we want. With the low pressure water and high pressure air it pulls out the water into a fog. On cooler days it's just exactly like a fog. We can maintain a high percentage of humidity without using much intermittent mist. Oftentimes we can bring things in from the field or from the wild as bare root plants and establish them very well with the use of this system. Also, we have some plants that drop their leaves immediately or within a few days or a week after growing under intermittent mist. You'll have to take them out of that mist and put them up in the individual pots and just root them with fogging. I was wondering if there was any other work being done anyplace else?

DR. NELSON: Sir, are you talking about a centrifugal system or an air pressure system?

PERCY EVERETT: Air pressure.

PRESIDENT BAILEY: We have used a humidification system and from the comments I suspect our system is about what you're talking about. We carry some clones in storage at 96% humidity — it looks like it's pretty foggy in some of these rooms. In the propagation house we don't carry that high a humidity. However, we find this humidification system is a great benefit in the greenhouses for propagation. It is uniform at least.

MODERATOR VERKADE: I think this would be a good subject for next year.

CASE HOOGENDOORN: Is that what they call a Swiss humidifier?

PERCY EVERETT: I don't know if it's Swiss or not. We had it installed by a local greenhouse company. It has a little tank about 12 inches square. It is rectangular and probably doesn't have more than a couple or 3 gallons of water in it. It is kept full all the time by a regulating valve. Then outside the greenhouse we have a 7 horsepower compressor and every so often according to the clock — the way it's set — that compressor will come on and the needle will go up to 60 to 70 pounds. The fogging system will shoot a stream of 4 jets from each one of their heads.

DR. PRIDHAM: I think at one time we had one of these at Cornell and it's called a Binks Humidification system.

DR. SYNDER: The 1954 Proceedings contained a very good articles on humidification by Vince Bailey.

MODERATOR VERKADE: This one is to Dick Vanderbilt. Have you used peanut hulls on your cans of rhododendrons as a mulch?

DICK VANDERBILT: No.

MODERATOR VERKADE: Any herbicides on your rhododendrons in cans?

DICK VANDERBILT: No.

MODERATOR VERKADE: How do you keep them clean?

DICK VANDERBILT: We just pull the weeds out.

MODERATOR VERKADE: I understand that Mert Congdon has used Treflon on the entire nursery. Has any stock been affected adversely?

MERTON CONGDON: It's not quite true that we use it on the entire nursery, certainly not on seed beds and so forth. But we did use it on an excess of 100 acres, I would say closer to 200 acres, with a wide range of material and no adverse results at all. And we did have check plots, too.

MODERATOR VERKADE: Any other growers have experience?

BOB DEWILDE: This past spring we applied two quarts per acre and then stuck hardwood privet cuttings in it. The material was incorporated immediately in the soil after it was applied. We had absolutely no effect upon the rooting — they all rooted very well and we only had to hoe the block as a skip hoe job once during the season.

MODERATOR VERKADE: What effect does a weed killer have upon cuttings taken from treated plants?

KLAAS VAN HOF: We use simazine as a direct spray over yews, arborvitae, and junipers. We have taken cuttings not immediately, but maybe a week or ten days after with no apparent effect.

PRESIDENT BAILEY: We've used simazine at 1.5 pounds per acre active ingredients on scion blocks. We have found no adverse effects in either conifers or deciduous material.

MODERATOR VERKADE: The manufacturer of Casaron has been cautioning against its use on Japanese hollies especially on light soils. We have been told that the manufacturer has now withdrawn this warning this Fall. Does anybody know anything about this?

DAVE PATERSON: We used it last year about this time to clear up a mixed plot that was fairly heavily infected with quack grass and there happened to be *Ilex* in this particular area. We used it at the rate of 150 pounds per acre. I think now they've moved that up to 200 pounds per acre. We found no damage to the *Ilex*.

BRUCE BRIGGS: West Washington Experiment Station has used it over 3 years on trial plots with *Ilex convexa* at the rates of four pounds actual and eight pounds actual and they also used other herbicides along with it. He did get a little discoloring — the very end of the leaf turned a little bit yellow. On the whole, at the end of the season, the growth compared to the check was just as good on Casaron as it was with the others. As I said we did have a little difficulty with the foliage at the time of application.

JIM WELLS: We've been using Casaron for a couple of years now, and this last summer we used it on azaleas and rhododendrons up to 350 pounds per acre of the 4% granular. No damage, whatsoever. Just weed control.

RICHARD STADTHERR: We have used it on *Ilex crenata convexa* and we do get damage. This is especially true on the

real sandy soils in contrast to planting soil. In the mountains this is not true with the heavier soil where you get more clay content. But we get a regular chlorosis, and actually some of the plants have been killed. This is at three pounds active material per acre.

DR. PRIDHAM: We have worked with Casaron for quite a while in comparison with a number of other herbicides. Casaron will control artemisia, quack grass, bind weed, nut grass, Canada thistle, horse tails and I don't know how many other weeds. This group is characterized by underground stems. So I think you can bring this fact down to horticultural plants with underground stems and with them I think there ought to be trouble. However, now is the hour. It is December 10th. Casaron put down at this time of year will take care of these perennial weeds listed here and, you don't have to work it into the soil. As a matter of fact I think it's better if it is used only on the soil surface and in granular form. Mr. Wells, I think said something in the neighborhood of 300 pounds granular, this is 4% active material and therefore 12 pounds Casaron in the 300 pounds. This is more than we have found necessary to deal with the artemisia, quack grass, and these other weeds. Probably in the neighborhood of 7 pounds or 7½ pounds of active chemical is all that's really needed. Five pounds will do a pretty good job on these weeds. They'll be places where for some reason you can't get a complete kill. Ten pounds is the rate we started out with, and with these perennial weeds in among stock such as *Ilex*, rhododendrons, Taxus, and the normal run of narrow leaved evergreens. it has given consistently good results over the last five years. We had a paper in Northeastern Weed Control Conference last year indicating that soil samples after five years with repeated treatments of Casaron showed no indication of Casaron being present. What we use is a soil sample and grow ordinary garden beans in it. Usually, if Casaron is present, the beans may grow with a bit more red color in the hypocotyl than you might usually expect to find. If you add fertilizer it usually greens up and the plant is all right. If there's any serious quantity of Casaron present, usually the bean root as it first emerges begins to decay. If this is the situation, then it might be worthwhile not to use that soil for immediate planting of nursery crops particularly those that have soft fleshy roots or stems. Under field conditions with 10 pounds per acre of Casaron, we have planted garden flowers and things of that sort in the spring after a fall application. That is just a little background in terms of the few serious weeds that this particular chemical is doing a better job than the simazine. Simazine does a good job on quack grass but not quite as good on the artemisia. It seems to make the bind weed grow, encourages the nut grass, and the horse tail still seems to grow when we treated with simazine. So as I say this is a useful thing from that point of view. In comparison with the spring treatment of weeds, I don't think that Casaron needs to be used

at anything like the 10 pound rate. You chop it down to four pounds or two pounds. The other material that I think should be mentioned here is amizine. This is a combination of amino triazol and simazine. It does almost the same job that the Casaron will do, either used as a spray this time of the year or used during the growing season.

CARL KLEHM: Do I understand that if it's applied in the fall or winter you should not transplant during the spring for hollies?

MODERATOR VERKADE: Yes, that's the way I took it. Dr. Whatley, what is the pH of the vermiculite and the perlite used in your experiments?

DR. WHATLEY: The pH of the vermiculite was 6.0 and the perlite was 7.2.

MODERATOR VERKADE: Have there been cases where natural plant extracts have improved the rooting of cuttings?

DR. HESS: That's a loaded question. There is a product that is well known; it is called chloromone. It is supposedly a natural plant extract, extracted by the "2 x 4 method" as best we could find out. It is supposed to be extracted from alfalfa. We did check it out one time and it does have a high concentration of naphthalene acetic acid in it. It may also have some other materials in it that we haven't been able to identify. I know Dick Vanderbilt tried using the same concentration of naphthalene acetic acid that we estimated Chloromone contained, and he felt that he had better results using Chloromone. This may indicate that maybe it does have something else in it. Other than that as far as commercial products are concerned, I don't know of any natural plant extracts that have been used. There is one other case, however, also rather notorious. A number of years ago a man was offering for sale a method to produce rooted blue spruce cuttings. It was supposedly an extract of Norway spruce seedlings, and I don't know if anyone has had good results with this extract after paying their $50.00. The trouble with natural plant extracts is that the total extract is likely to contain inhibitors as well as promoters. Until you get the extract refined, and purify the substances you want, you're liable to have more trouble than positive results.

DICK CROSS: I tried this spruce formula that Charley Hess just mentioned. I obtained the procedure from a gentlemen at a Garden Club meeting held a few years ago. I wasn't successful with it. This solution was made up of bark of spruces put into liquid solution. The cuttings were supposed to be dipped into it. I followed his directions implicitly, but they didn't produce results. There is a variation in the climatic conditions and that may have been the reason it wasn't successful.

MODERATOR VERKADE: Have continuous or repeated hormone treatments been used during rooting and compared with a single treatment?

JIM WELLS: We have done this continuously for years and I think it's a sign of failure. When we lifted the cuttings —

any that have rooted, of course, move on. Any that are just likely to be rooted are set back to root better and any that are not rooted at all are recut and retreated. This in theory should not be necessary. If you have a good batch of cuttings that are getting along well, they will all root, or very nearly all of them. You're way ahead to throw those cuttings away rather than re-sticking again and then start with another batch.

HOY GRIGSBY: The University of Arkansas put out a folder on the rooting of cypress trees which they got good results treating with 20 ppm, sticking them and after 45 days retreating them with 500 ppm. I tried the same thing on pine and without any positive results.

MODERATOR VERKADE: *Cryptomera* — can they be rooted from cuttings? If so, describe timing, hormones, etc.

DICK VANDERBILT: We have been fairly successful in rooting quite a few clones particularly the dwarf ones of *Cryptomera*. We root them usually in December to mid-January in a medium of sand and use Hormodin #3.

AL LOWENFELS: I just wanted to know if anyone has been able to root that subject. I haven't had good success.

CASE HOOGENDOORN: Which variety?

AL LOWENFELS: I don't know, it's just *Cryptomera*.

CASE HOOGENDOORN: The only one that we've been able to root is the *Cryptomera japonica* which is the seedling that we use as an understock. But when you try Lobbii, then you have a problem. We have never rooted them yet.

DICK VANDERBILT: We rooted that Lobbii compacta once. We took a graduated set of cuttings from very small to something unbelievable — 2 feet tall and ¾ or a ½ inch thick. The only ones that rooted were these 2 feet tall things; they rooted very nicely. We planted them out; they grew much more slowly than grafted plants. I never tried it again.

CARL ORNDORF: I have rooted *Cryptomera japonica compacta*, the cuttings being taken in the latter part of July. We get about 70 - 90% of them. I have also rooted quite a few of *Cryptomera Lobbii compacta* in the greenhouse; 40 - 50% is about all we get. It's just not consistent.

MODERATOR VERKADE: What hormone, what time, etc.?

CARL ORNDORF: We took the cuttings in the latter part of July and used intermittent mist in the greenhouse. We used perlite for the medium and no hormone treatment.

JOHN VERMEULEN: We should ask the Western members to put out a paper on rooting *Cryptomera*. They root a number of varieties which grow into very nice plants. We buy a number of rooted cuttings from the West coast.

MODERATOR VERKADE: S h o u l d one strip needles from evergreen cuttings before inserting in rooting medium? Maybe I can answer that. I believe you have to strip *Taxus* so that the rotting does not get ahead of the rooting. However, I saw today that not stripping the needles on spruces works very well.

BILL CURTIS: In the northwest we used to strip the cut-

tings such as *Picea albertiana* and your dwarf spruce — the low-growning ones, but we found that this was not necessary. And we don't have too much trouble with rot. I visited Mitch's Nursery near Aurora, and he was putting out Albertas, heel cuttings in July and just before I left to come out here he was potting them up. He took a heel cutting and just took the end of the heel off and put the cuttings in sand with bottom heat and no mist and no hormone treatment.

MODERATOR VERKADE: This question is for Dick Vanderbilt. Do you expose rooted *Rhododendron* cuttings to long day treatment before canning?

DICK VANDERBILT: Yes, after they're rooted and transplanted they are then chilled for a period of 20 days under 40°F. After the 20 day cool period, the heat is raised to 70 degrees and then they are lighted.

MODERATOR VERKADE: Mr. Savella, how old are the blue spruce you have grown from cuttings?

LEONARD SAVELLA: The oldest plants we have are four years old and one of them is in the back of the room.

MODERATOR VERKADE: There is another part to the question and I think you may have answered it this afternoon and that is, do they grow straight?

LEONARD SAVELLA: There again, I can only tell you to look in the back of the room. They seem to be growing straighter than the grafts.

MODERATOR VERKADE: How may an adult clone be reverted to the juvenile condition for propagative purposes?

DR. HESS: Actually there are a number of ways. Commercially a stool bed may be used. The reason the stool bed works, for example, with the Malling apple stock, is that the plant is kept cut back and shoots develop from the base. Juvenility is retained at the base of a plant, and if you can get shoots to develop from the base, they are usually juvenile. Sometimes these are seen as water sprouts from mature trees. Another technique that has been successful with the mature form of English ivy has been the application of gibberellic acid. I don't know whether this is applicable to other plants. Another way of obtaining juvenile shoots from mature plants is seen in the English holly — *Ilex aquifolium*. You can find growing on the trunk of mature trees, small bubbles of tissue called spheroblasts. These may be broken off and planted as seeds. They will form a plant which will be juvenile. Stoutemeyer at the University of California, has been able to induce spheroblast formation in apple shoots by continuously removing the vegetative buds. The shoots which develop from the spheroblast are juvenile. The best commercial technique, however, is severe pruning to induce shoot development from the base of the plant.

DR. NELSON: Another example is to take the bud from a mature plant such as MacIntosh apple and bud it onto the base of a juvenile seedling such as robusta 5. You will obtain a juvnile form of the MacIntosh.

DR. HESS: There is another specialized example in the case of the nucellular seedlings of citurs. These seedlings develop from tissues within the seed but not the embryo. They have the exact genetic makeup as the mother plant. These plants are highly juvenile.

VOICE: Mangos and avocados also have a high proportion of nucellular seedlings.

MODERATOR VERKADE: What is your procedure in rooting of blue spruce cuttings?

PETER ORUM: We take a cutting in the beginning of July, the first week in July, and we dip them in hot water mixed with Hormodin, Hormodin 3 powder. The water is 120° F. and leave them in there for half an hour and stick them outside with mist and no shade.

VOICE: Do you use heel cuttings or is the cutting stripped?

PETER ORUM: No, we just use a plain cutting — no heel cutting.

VOICE: What is the concentration of the Hormodin in the water?

PETER ORUM: I can't give you that exactly now.

MODERATOR VERKADE: Could I have some information on the propagation of *Yucca glauca?*

JOERG LEISS: You can propagate them from seed from Northern and Southern Italy.

HUGH STEAVENSON: You can raise a dandy liner from seed in one year

MODERATOR VERKADE: What is DMSO?

VOICE: It is a by-product of the paper industry and is called Dimethyl sulfoxide. It is manufactured by the Crown-Zellarbach on the West Coast. We have used it on the rooting of rhododendrons and the results have been less than desirable.

PETER VERMEULEN: I have some literature here on DMSO. The compound has the ability of enhancing the penetration of chemicals into plant tissues and may have some potential for getting plant growth promoters and retardents into plants more efficiently.

JAMES WELLS: We have obtained some DMSO from Crown-Zellarbach, but we are not about to use it. We have been told there may be dangerous side-effects such as affecting the eyes. It has an extraordinary penetrating effect; if you put it on your skin, within a few moments you can taste garlic in your mouth. Our purpose in getting it, and I still think it's a good idea, was to use it as a carrier with some of the newer fungicides to try and control rhododendron wilt.

DR. STOLTZ: I know of some work with DMSO on orchids in an attempt to use a smaller concentration of IAA or IBA and obtain maximum effect. There was no promotive effect at all and by itself it had a slight retarding effect upon root initiation.

JAMES FLEMING: There is one use that has not been mentioned, and I've seen reports of it in European literature. They

stated it would stimulate seed germination and suggested that water penetration might be more rapid.

PETER VERMEULEN: Treating *Pyrus* seed with 50 - 100 ppm of DMSO in water stimulated germination and shortened the chill requirement. Other seeds with chill requirements are now being studied. It has also been shown that virus infections of fruit trees such as stony pit in pear and leaf mosaic in peach appear to be controlled or retarded by DMSO application.

MODERATOR VERKADE: Ralph Shugert, is the 100 pounds of Juniper seed you sow clean or in the berry?

RALPH SHUGERT: Yes, it is clean.

MODERATOR VERKADE: Do you spray more than once a week in very wet weather?

RALPH SHUGERT: That's a good question, Jerry. No, I set up this weekly spray program and don't miss a week from when we start till frost. By never missing a week I believe I obtain as good a control as I can get and still keep the cost reasonably in bounds. We can't afford to spray after every rain. For example, in Nebraska we have in the month of September, 17.3 inches of rain which meant of the 30 days of September, I believe rainfall was recorded on 23 days.

MODERATOR VERKADE: Dr. Waxman, was any bud breaking or top growth apparent prior to rooting on blueberry cuttings under light?

DR. WAXMAN: No, usually you see rooting first and then bud break on top.

MODERATOR VERKADE: Jim Wells, what do you think of air as a rooting medium for cuttings?

JIM WELLS: I should really give this question to Dr. Chadwick; he is the expert on mediums. However, I would say that if we had all factors under control, I don't see any reason why we couldn't use air as a medium.

DR. HESS: I disagree with you, Jim, in that you may get a side effect from the medium which you wouldn't get from the air. In a medium the bottom part of the cutting would be in darkness and therefore b l a n c h e d or etiolated. As you well know, etiolation has an excellent stimulatory effect upon rootinig.

JIM WELLS: You're right, Charley, absolutely right, but yet I feel that when we have complete control of our cuttings including water loss I feel we can get rooting of a wide range of materials right in the air. For example, this year we have had excellent rooting of rhododendrons and in a few cases cuttings which have been left on the top of the bench have sent roots out of the wound which curved down and found their own way into the medium. Now of course, all things were just right.

ALBERT WILL: I had some experience down in Ft. Lauderdale, Florida with *Ficus*. I had a bunch of 18 inch *Ficus* cuttings which I didn't have time to stick and I just threw them under the bench to keep moist. Although this selection was

fairly difficult to root, when I went back to them four weeks later they already had four inch roots on them. I potted them up and they are doing beautifully.

BRUCE BRIGGS: We have been doing some rooting of cuttings suspended in air and I'll have to report that they root faster in the air than in the medium. We used an enclosed chamber and the cuttings were stick through a black poly sheet and sprayed the base of the cuttings with warm water. The base of the cuttings was enclosed but the top was open. [*Editor's Note*: In this case you would still have the benefit of blanching or etiolation of the base.] In this set up this summer Japanese maple cuttings rooted in 10 days and that was much faster than similar cuttings in the medium. Clematis gave up similar results.

JIM WELLS: Did you use a clear plastic or a white plastic?

BRUCE BRIGGS: When we started out, we thought we needed the light so we started with clear plastic using *Daphne Cneorum* and azaleas. Now this didn't get started until Christmas. The Daphne didn't root for six weeks and the azaleas didn't root for three months and so we discarded the whole thing. Then along toward the spring, we tried the whole thing over again. But this time we used black poly. When we used black poly, the *Daphne* cuttings rooted in about 20 days as compared with 30 in the summer and so from now on we are using black poly.

MODERATOR VERKADE: What type of paint is best for use on polyethylene for shading during the winter and what type of thinner is safe to use with this plastic?

KLAAS VAN HOF: I use a rubber base paint and I thin it down with water about 1:5. I take a one gallon can of rubber base paint and add four gallons of water and spray it on.

PETER VERMEULEN: We use "solar shade". This is a compound on the market for shading purposes. I can't give you the exact dilutions at the moment. But it's a little more expensive than the rubber base paint.

MODERATOR VERKADE: How do you patch holes in plastic greenhouses? I noticed some patches over at Yoder Brothers.

PETER VERMEULEN: I have some of that material; it is called "miracle tape". We're not satisfied with this material; however, we did purchase some material in a hardware store called "contact" and it was still in place when we took the plastic off this past spring.

RALPH SHUGERT: If you will write Minnesota Mining, they have several tapes manufactured especially for polyethylene.

JIM KYLE: We had a little trouble putting this tape on in the winter time because of frost on the inside of the plastic house and we found that a woman's hair dryer did an excellent job of heating the plastic up, making the patch stick and almost welding them together.

MODERATOR VERKADE: Dr. Cannon, have you experimented with rooting *Rhododendron carolinianum* using a hormone-talc dip?

DR. CANNON: Yes, we used Hormodin #3 with good success.

MODERATOR VERKADE: Has anyone further experience in trying to increase plant hardiness through the use of Decenylsuccinic acid as described by Dr. C. J. Weiser of Minnesota?

DR. MECKLENBURG: I tried it on a variety of plants at Michigan State with no success at all.

MODERATOR VERKADE: What are the possibilities that government may consider entering the production of nursery stock to supply the needs of the President's National Beautification Program?

PRESIDENT BAILEY: I think this Society has a great stake in that very problem. As I said in my opening remarks, one of the problems is likely to be a shortage of plant materials as this highway beautification program moves forward. I can foresee the calling for bids in various states or areas and not being able to get any bids. What will be their answer if they want it in the next week? "We'll have to have federal nurseries." And as nurserymen and plant propagators we could not say a thing. If we can't furnish the stock, they'll say they've got to have it. I think the shortage of plant materials is a more serious problem than over production from the plant propagators standpoint.

RAY BRUSH: This is a very real problem. We as an industry need to at all times maintain the best possible liaison with your state and federal agencies that will be working in the beautification program. Now, part of this problem is a lack of their understanding of our industry and its problem. It is up to us to make these contacts and to see to it that they understand the problem. Some of the things that have happened in the past couple of weeks leads us to believe that they are beginning to comprehend the problem of this industry in producing the masses of material they are thinking they will want. So we are in hopes if we can get to these people, that they will be reasonable with us. I think those people we contacted so far are most cooperative, and they are understanding. They are sincere in wanting to accomplish these goals as set forth. So, we as an industry have an obligation to establish and maintain contacts and I think we can come out of this much better and do a wonderful job both for our Society and for our own industry.

HUGH STEAVENSON: I have been on both sides of the fence, being employed by the government for a decade or so. And I do know this, that many government agencies now are aware of this problem, and see an opportunity to expand their bailiwick so to speak, I don't know why, but government agencies love to have nurseries. It seems to be popular amongst people and whenever they have an excuse to do so, they will take hold of it. There is no question that the people here in this room and the industry we represent can do a much better job of producing this material as required, more quickly and expediently than any government agency could do. It's obvious that we can do a far better job and that not only the agencies, but our representatives in Congress must be constantly aware of this.

We must be darn sure our congressmen and senators are fully cognizant of that, and we must insist that they not permit agencies to set up government nurseries to produce nursery stock. Obviously, we have the facilities, we have the land, the equipment, we have the know how which the agencies would have to acquire. So we certainly could do a far better job and get the job done more effectively. But it's ridiculous for an agency to call for something that we have no idea in the world they wanted, and they must understand we must get advance notice before it's going to be needed so the program can be orderly carried out. Also the members in Congress must know this, so they do not appropriate funds for any agency to set up federal nurseries. That's a political problem we have, if we are alert I'm sure we can help.

RAY BRUSH: May I add one other comment on alerting and knowing what we have. I question whether the nursery industry itself knows as a whole, what we have available at any time. Now one of the problems that is going to be with us for some time, is the location and availability of plant materials. I think the area of the country that probably has come the fastest in this area is in the Eastern Region where we built expressways, and have the housing agencies, the highway contractors, landscape architects, landscape contractors. These people are maintaining membership in LMIS, landscape materials information service. This type of service is set up in other regions of the country. We feel that it should be, but it may be that in some other areas of the country it should be set up on a different basis. This I do not know. But it is something that certainly should be explored and considered in other sections of the country. In this way all of these different groups that are interested in the use of plant material, will at all times as near as possible know what is available and where it is available.

JOHN VERMEULEN: I think we are trying to do something that is no business of our organization whatsoever. We all have a state organization. Our state organizations are alert to those things and they have written about them in the papers. We have a wonderful American organization which is willing and has been taking care of the thing you people mentioned. It is none of our business at all. We are propagators, not sellers.

MODERATOR VERKADE: With plants which produce leggy growth would it not be beneficial to light them from the side or the bottom?

DR. HESS: Sid mentioned in his discussion that when plants were grown under continuous light they do tend to get "leggy". He recommended that you give them a rest with short days, next, give them a cold treatment and then long days again to stimulate lateral bud development and growth. Lighting from the side vs. lighting from the top would not be any different as far as inducing lateral bud growth is concerned.

MODERATOR VERKADE: What is a propagator?

JIM WELLS: I'm not going to even attempt to answer that

question, but I will refer you to the first Proceedings of this Society and first Proceedings of the Western group in which that was fully covered. There is a little item I would like to bring in here; it's part of the mist symposium and it's in the current issue of the *Royal Horticultural Society Journal.* It was written by a man named Hannibal in California and is entitled: The Sprouting of Seeds on Brass Sieve Screens.

The various methods tried in sprouting seed are almost legion, but basically the problem is to provide sufficient moisture at germination temperature without promoting damping off. This may sound elementary in areas where the natural humidity is high, but in dry climates a high humidity is an immediate invitation for every spore of fungus to become active and seed mortality can be a very serious problem.

Some twenty years back the use of live sphagnum moss was suggested as a planting medium for *Lilium* and *Hippeastrum.* It was effective but had definite limitations. Vermiculite, exploded perlite granules, quartz sand, fine glass beads of the "Scotch-lite" variety and other sterile sprouting mediums have all been tried, and of all the materials tested the perlite granules in a sealed plastic container was one of the best. Recently the Auckland Lily Society of New Zealand suggested the trick of floating seed on water to have it sprout, and the results have been rather startling. But several annoying things occurred for the writer, in a half-dozen instances the water became stained and made a good paramecium culture, and in another glass he found a good crop of mosquito larvae.

Recently the writer had picked up some used laboratory screens with the thought of using these to winnow seed. Several of these units had 100 to 200 mesh brass wire screening such as used to sieve out fine clays or flour. What would be the result of using these sieves to retain seed while exposing it to a slow drip? This has now been tried quite thoroughly and the results have exceeded our fondest hopes when the screens were stacked one above the other in a manner such that the water could trickle down from one deck to the other. Practically 100 per cent germination is possible, starting with *Pinus* seed in late winter and terminating with *Zephyranthes, Hippeastrum,* and Australian Wattle during the mid summer. Most seed can be left upon the screens until the primary leaves have developed, then picked off and planted in a satisfactory planting material. Trace of copper may be present as no difficulty with damp off or decay has been encountered on the screens, and as long as the tap maintains a slow drip there is no problem in trying to retain a high humidity level throughout the stack.

The only seed giving difficulty thus far has been *Callistemon* and this was due to it being so fine that it passed through a 100 mesh screen. Possibly this seed could have been suspended on a piece of filter paper, but in this instance some of it was floated on water in a watch crystal and the bulk of it sprouted in six days. Even that which sank sprouted as readily.

Initially there was some speculation whether brass or copper enhanced the aeration of the tap water by catalytic action creating conditions comparable to rain water, but it was soon learned that many seeds contain strong growth inhibitors which have to be leached out by water before germination can proceed. In fact the success of embryo culture depends partially upon the removal of the endosperm which contains such growth inhibitors. Perhaps the old gardener who insists that there is nothing better than a good gentle rain to sprout seed never heard of the technical reasons, but it is plausible that the wetted surface areas on the screen both enhance aeration and leaching of the enzymes as germination is good. The arrangement is so simple and yet so natural that we wonder why it hasn't been suggested previously. [*Editor's Note*: The author of the above article was L. S. Hannibal, Fairoaks, California.]