

FRIDAY EVENING SESSION

December 9, 1966

PLANT PROPAGATORS' QUESTION BOX

RALPH SHUGERT: I would like more information on the modification of temperature with the freezing and thawing of water under polyethylene structures. Isn't this heat from freezing lost too quickly to be of value? Are there any temperature data? What about 3-5 days of 10° F.? Would it help here?

DICK VANDERBILT: I think you can get about 10 days of useful heat between 5 and 0° F. This seems to be what it did. You can take the penalty out of the first deep freeze and if you continue to get low temperatures the rest of the winter you are just going to stay cool. But at the five days at near zero temperatures the water in the canal will be just like a frost in October. In the other houses the cans will be frozen up completely.

RALPH SHUGERT: If potted evergreens showing fall discoloration are placed in unheated greenhouses covered with opaque plastic—will the "greening up" process in spring be hastened or retarded compared to clear poly shaded 25% by white latex paint?

KNOX HENRY: Our experience has been that the opaque plastic or white plastic has a tendency to retard the greening up process in the Spring. Our procedure is to cover with white plastic and then about the middle of March we remove the white plastic and replace it with clear plastic and allow a temperature build up which brings on the green color.

JAKE TINGA: I don't like the plant material to get discolored in the first place. I am trying to preserve October green until April. Once it is discolored, I don't think you can effectively green it up except by new growth.

TOM PINNEY: I disagree. It can be done by using clear plastic. We have done it 6 or 7 years in a row. Take an *Arborvitae* which will typically discolor in the Fall. We put them under plastic in November and December and they are nice and green by March.

KNOX HENRY: I want to be sure I made myself clear. If we put evergreens with winter coloration in clear plastic houses and in the white plastic houses, the greening process is retarded in the white plastic houses as compared to the clear plastic.

RALPH SHUGERT: Has anyone used P.V.C. plastic from Japan on overwintering houses and for how long?

KNOX HENRY: We have used a little of it. It is quite satisfactory. To us it gives the same net result that a colorless plastic or white plastic depending upon whether you use a colorless P.V.C. or a white P.V.C. We have experimented

a little with a green tinted P.V.C. The results were identical with using regular polyethylene. The only problem was that the cost was not identical. The P.V.C. is a great deal more expensive for us.

ANDY ADAMS: We would prefer to use fiberglas to P.V.C. for two reasons. You have no guarantee how long P.V.C. will last and we know a piece of fiberglas will give 10, 15, or 20 years service. Also on long runs with wide bar spacing the expansion (of P.V.C.) on 100°F. days is great enough to pull the nails.

JOHN KNAPP: I visited a fellow who had quite a range this summer and he had P.V.C., plastic, glass, polyethylene, and his comment was no more P.V.C. for any house. There were large holes in his P.V.C. houses. He said he had a high wind and the P.V.C. disintegrated. The polyethylene was not damaged.

KNOX HENRY: I think most of you will recognize that we should remember that there are a great number of manufacturers of P.V.C. and consequently there are as great a number or variety of quality. The P.V.C. we used came with a written guarantee for 10 years. We had to do a lot of looking before we found it. If anyone is interested, I would suggest you compare the cost with fiberglas, which I agree is a better product and second, make sure the quality of the P.V.C. is good and try and find someone who is already using it first.

BRUCE BRIGGS: We have used P.V.C. for two years. We used it because it is the clearest plastic and lets the most light through. If you don't need all the light then use polyethylene.

RALPH SHUGERT: Are there any results of the rooting cofactor work that can now be applied to the rooting of difficult-to-root cuttings?

LEN STOLTZ: At the present there are no directly applicable results, but there will be in the future.

RALPH SHUGERT: How does the esterification of DMSO with IBA increase the effectiveness of IBA?

CHARLEY HESS: If an ester does form between the DMSO and the IBA, the combination may be more soluble and be better able to enter the plant tissues.

RALPH SHUGERT: What is an ester?

CHARLEY HESS: It is the combination of an acid and an alcohol. Our gracious hosts, the Newport Nurserymen, will show you how it is done.

RALPH SHUGERT: Would it be possible to apply the hormones to the tip of a cutting by a spray?

JOHN MCGUIRE: We have used sprays and they are as equally effective as dipping the tips in the solution as I described in my paper. We did not recommend it with the higher numbered carbowaxes because it interfered with gaseous exchange and caused chlorosis of the foliage. With low numbered carbowax it worked all right.

RALPH SHUGERT: What is Cutstart?

PETE VERMEULEN: We really don't know. It is made by Vitamine Institute in Hollywood, California. Dr. Thompson will not release the formula. Charley has worked with it.

CHARLEY HESS: It contains thiamine, or Vitamin B1 and naphthaleneacetic acid or its derivatives. It may also have some other auxins. We do not know the concentrations of the auxins of the various strengths of Cutstart.

HARVEY GREY: You can mix IBA in talc by using a ball mill or by first dissolving it in alcohol and then mixing the alcohol solution and the talc together and then evaporate off the alcohol. Charley, did you feel the two techniques will give different results?

CHARLEY HESS: The alcohol technique probably gives the most uniform results. The things that you have to watch out for is that you do not add too much alcohol in relation to the amount of talc being used. As the alcohol evaporates, the mixture should be occasionally stirred to keep it uniform. However, the most effective method to get a root promoting substance into a cutting is as a concentrated dip. The hormone is already in solution, so it goes directly into the cutting. When you use talc, you have to rely either on the moisture of the medium or moisture on the surface of the cutting to dissolve the hormone before it gets in.

RALPH SHUGERT: Tom Pinney, would you describe your method of adding Captan to the quick dip solution which Dr. Snyder spoke about in his presentation?

TOM PINNEY: We use a quick dip just as Charley has mentioned and I like to vote for this because we think it is the best way. Starting with the 10,000 ppm or the 1% concentrate, using carbowax, ($\frac{2}{3}$ carbowax and $\frac{1}{3}$ water) we then make our dilutions, say to a 1000 ppm or 0.1%, we will then add to each 100 cc of the final solution $\frac{1}{4}$ teaspoon of 50% wettable Captan. If you made up 400 cc you would use one teaspoon of Captan. We add the Captan last because we want to be sure everything else is in solution. The Captan will not dissolve, it is a suspension.

ZO WARNER: Why not dip the whole cutting in Captan when you bring it in and then treat it with the concentrated dip?

CARMINE RAGONESE: I find that a total dip in Captan inhibits bud development.

JIM WELLS: For those of us who like to stick with powders, there is a reasonable substitute for the quick dip. That is any powder that is made up from the potassium salt of the indolebutyric acid is immediately water soluble and we think it has a much more rapid and complete penetration of the cuttings.

DICK VANDERBILT: Where do you get the potassium salt?

JIM WELLS: We bought ours a number of years ago from May and Baker in Dagenhan, Essex, England.

BILL CURTIS: Why not use Chlorox to clean up your cuttings?

CARMINE RAGONESE: The New Jersey Chapter of the Rhododendron Society experienced difficulty in rooting deciduous azaleas. They used a 5% mix of Chlorox and quick dipped the entire cutting in the solution. The results were astounding, there was no fungus and no problem from inhibited bud break.

RALPH SHUGERT: Has anyone used traumatic acid to increase the rooting of cuttings or to increase the formation of callus when grafting?

CHARLEY HESS: Traumatic acid is known as a wound hormone, and is synthesized by tissues which have been wounded. It is not active as a root promoting substance and I suggested it might be tried in grafting. I have received a letter from Holland and they have tried it a number of times without success.

RALPH SHUGERT: Has anyone used hormones as an aid in grafting?

ARIE RADDER: At one time we used Chloromone on juniperus and it helped considerably.

JOHN ROLLER: We also use it on juniper grafts such as *J. canareti* and *J. virginiana glauca* and it helps considerably.

CASE HOOGENDOORN: Do you get equal callus formation on stock and on the scion?

JOHN ROLLER: We paint both stock and scion. Actually the scion is dipped and inserted into the union while the scion is still wet.

RALPH SHUGERT: What strength of Chloromone?

JOHN ROLLER: We use full strength.

GERRY VERKADE: Is there any Boron in Chloromone?

CHARLEY HESS: Not to my knowledge. It is included in Jiffy Grow.

DAVID BAKKERS: We tried a grafting paste from Germany which is supposed to contain a hormone. It did a nice job as a grafting wax but I could see no difference from normal wax.

CHARLEY HESS: I should say that there have been numerous trials with growth substances and grafting. The reports are varied and some report benefits, others no effect. It varies with plant species, time of application, and condition of the stock and scion.

RALPH SHUGERT: What is the best hormone for *Kalmia* cuttings?

AL FORDHAMS: 1000 ppm each of IBA and NAA.

RALPH SHUGERT: Has anyone had success rooting *Acer griseum* cuttings?

VOICE: Yes, by taking very soft cuttings from young plants.

RALPH SHUGERT: Can *Robinia psuedo tortuosa* be grafted on *Gleditsia triacanthos inermis*?

JOE MCDANIEL: No.

RALPH SHUGERT: Has anyone observed witches broom or a mutation on *Cedrus atlantica glauca* or *Sciadopitys verticillata*?

AL FORDHAM: We have found one on the Cedar of Lebanon but not on *Cedrus atlantica glauca* or *Sciadopitys*.

CASE HOOGENDOORN: What understock do you use for *Cedrus atlantica glauca pendula*?

HANS HESS: We graft them in December on *Cedrus deodora* with good success.

CASE HOOGENDOORN: Ours seem to take and even start to grow, but then we lose two thirds of them.

GERRY VERKADE: Get them out of the sweat box, Case. What size stock do you use?

CASE HOOGENDOORN: We use two year old seedlings, pot them up and grow them one year in the pot. Then we graft them.

GERRY VERKADE: That's your mistake. Put some seed in this winter and graft them next fall, on those little tiny stocks and you will have no problem.

RALPH SHUGERT: How do you propagate *Rhus cotinus* Royal Purple?

PETE VERMEULEN: We make them from soft wood cuttings. We top the long shoots so we can get the short shoots, 4-6 inches long, all up and down the stem. This in our area is early June. They are treated with the Germain formula I mentioned the other day. They are inserted in a medium of 50% peat and 50% perlite and under intermittent mist outside.

RALPH SHUGERT: How do you keep birch seed?

TOM PINNEY, JR.: We have to keep birch seed over from year to year because we can not always count on a crop. We store it in plastic bags in 35°F. storage. The viability will drop and by the third year it is pretty well down, and the resulting seedlings will be very weak.

RALPH SHUGERT: What is the pre-germination treatment for *Taxodium distichum*?

HUGH STEAVENSON: You can fall seed it after you collect it or give it 60 days at 41°F. But fall seeding after it is collected will give you good germination in the spring.

PETE VERMEULEN: How do you treat *Davidia* seed so that the 4 or 5 seedlings in the nut germinates instead of just one?

AL FORDHAM: We put them in a polyethylene bag together with a medium of damp sand and peat moss and we watch them. When the radicles have emerged we put them in cold storage for 3 months after which we get a very complete germination in about 4 or 5 days. The seed is planted about 1/2 inch deep in flats.

RALPH SHUGERT: I am confused on this question of bottom heat. Some say yes, others not. Bill Curtis, for exam-

ple, used 85°F. to root *Magnolia grandiflora*. What is the right answer?

BILL CURTIS: We used to have problems with magnolias. But I remember the advice from Alabama was to burn them up. So I use real strong bottom heat—85 to 90°F. and get excellent results. I could not do without it. However, you must watch the water and not allow the flats to dry out.

STU NELSON: I guess I better defend myself. There are exceptions to every rule and anybody can pick examples where something is going to work. But when you speak in general, I feel you do not need bottom heat. Sure on shy rooting rhododendrons it will work. But in general the literature, and I think most of you people will admit that most of the things you grow don't need bottom heat. As you increase the efficiency of the propagation system it becomes less necessary as does hormone. If you try to push the cutting too hard, you go flat on your face.

HARVEY GRAY: I think bottom heat is a tool and as such it must be used properly. For example, I think it is very beneficial for outdoor mist particularly if the water temperature is low, from a deep well for example.

LESLIE HANCOCK: With all due respect to Stu, I think a man who can challenge a 150 years of experience has a lot of courage. You have to understand the physiology of the plant to know to what extent bottom heat is important. We do know that heat stimulates cell activity. If cell activity takes place at the top of the cutting, it will grow instead of rooting. If you heat from below, the top will stay dormant until the roots are formed. You will have more cell stimulation where you have more heat, and when you want to put roots on a vegetative shoot, why of course it is best to stimulate the lower portion of the cutting.

MARTIN VAN HOF: I can take both sides of the question. You don't need bottom heat if your timing is right and you are not in a hurry. But if you want to prolong your season, because you know we are not always on time, then you should use bottom heat.

STU NELSON: I just would like to say that bottom heat like hormones are not going to put roots on cuttings that are not going to root. Rooting is a race for survival and all things being equal the cutting will eventually root or it will die. In some cases bottom heat will speed up rooting, I don't think there is any doubt about this. Bottom heat will speed up rooting but bottom heat is not necessary for rooting.

RALPH SHUGERT: Now for some questions on cost accounting. Mr. Wells, your rule of thumb of direct labor costs as a percent of total production costs was apparently arrived at prior to 1960. Have your indirect cost risen at the same rate as your labor costs so this relationship still applies today?

JIM WELLS: Yes, they appear to have done so. I don't

think its going to last, our labor costs are going to jump ahead.

RALPH SHUGERT: I believe everyone's operation is a little different. Therefore, wouldn't it be correct to assume that it is necessary for every operation to determine its own total labor percentage as well as its own direct labor percentage?

JIM WELLS: Yes. I tried to show the method which we used. The important thing here is that anyone can determine the ratio that exists now by looking at his balance sheets between his labor costs and all other costs. Whatever this ratio you can determine it. At the time I worked it out, the ratio was exactly half. You may be half, you may be $\frac{2}{3}$ or you may be $\frac{1}{3}$, if you are automated you may be $\frac{1}{4}$. The whole of the talk was to clear the air of all the multitude of details which is likely to clutter up our thinking in trying to establish a system that will work. The nursery business is a very difficult one in which to set up cost accounting.

HUGH STEAVENSON: We have used the Wells' formula in our operation and I find it very valuable. It is just as valid now as when he first worked it out. Jim has made many contributions to the Society and I feel this is one of the finest.

RAY BLUE: Presently at Koster we can not use Jim's formula as stated because of change in the machinery and labor situation. The basic breakdown today is based on deciduous tall material, deciduous low material, evergreen tall, evergreen spreading and rhododendrons. Then we have an operational cost. So a plant will be given a number that will fall in this range and then the operation will be given a letter. So that B-6 may be digging rhododendrons. We can go back and pull out an operational cost. I feel that cost accounting is time well spent, no matter what is the size of operation.

KNOX HENRY: I was trained as an accountant before I came into this business and in the last few months we have installed a computerized bookkeeping system. We are not solely a nursery. We are doing some nursery production as well as nursery retail sales, greenhouse operations and a large bedding plant operation. Our situation is not unique, a lot of you have similar operations where you would be classified as having more than one department. The relationship between the direct labor cost at any one time on a certain crop does have a definite bearing on the ultimate cost on that item as Mr. Wells has pointed out. I agree with him wholeheartedly. If anyone is interested, after we have had some experience with the system, I will be glad to describe the automated operation you are operating.

VINCE BAILEY: The American Association of Nurserymen through the Horticultural Research Institute has done considerable work setting up a bookkeeping system whereby you can determine your costs of plant material, labor, etc. and I agree this system is important no matter what size unit you are operating.

RALPH SHUGERT: Has any other material been grown other than rhododendron under the mercury vapor lamp?

WALT PEFFER: Last year the only thing I grew was rhododendron but at the present time I am growing viburnum, some azaleas and a few hollies. Although good growing conditions will not develop until later in the season, these items at the present time are looking very good.

RALPH SHUGERT: What do you think about using a sodium light for growing in the greenhouse?

WALT PEFFER: I do not know of any case where a sodium lamp has been used but I would not be in favor of it because the sodium light consists of 87% infrared. It does not contain much light useful to the plant.

HANS HESS: What is the cost of the mercury vapor lamp?

WALT PEFFER: The cost of the lamp is approximately \$35.00. It is the G-33 for the 100 watt lamp. The transformer is included in the lamp.

ED HUME: Don't the mercury vapor lamps contain a lot of ultra violet light in the range of 3000 A which is inhibitory to plant growth?

WALT PEFFER: The output of the mercury vapor lamp I recommended is only 15% in the ultra violet and is not inhibitory.

VOICE: Are the mercury vapor lamps operated continuously?

WALT PEFFER: No, they are operated from 8 o'clock in the evening to 5 o'clock in the morning. This is not a predetermined factor, but the low cost of operating the light allows me to run it all night. Do not use the mercury vapor light as a intermittent light or for flash lighting because it will damage the transformer.

RALPH SHUGERT: Will your aqua-vapor control work up to 100% humidity?

VERNER REXER: Yes.

RALPH SHUGERT: Is the aqua-vapor control commercially available?

VERNER REXER: I expect it will be on the market in January or February in 1967. The cost should be in the range of \$35.00 to \$40.00.

(Editor's Note: Mr. Bruce Briggs showed slides of his air propagation technique at the end of the Question Box.)