

## QUESTION BOX

This session of the program convened at 3:15 p.m. with Dr. William Snyder and Mr. Charles Parkerson serving as moderators.

MODERATOR PARKERSON: Isn't some caution needed in applying Lasso in polyhouses? This was not brought out in the papers presented at the meeting today.

I reported on problems of using Lasso in polyhouses at the Chicago meeting. This material should not be used in polyhouses because it will kill plants in there. We are still experimenting with it and we don't have any trouble as long as we keep it out of polyhouses.

WAYNE LOVELACE: I know of one instance of the use of Lasso in a polyhouse which effectively put the house out of use for one full year. Lasso was spread on a chat floor and bedding plants were set on this; the crop was a complete loss. Charcoal was used to try to tie up the material but it did no good and crops placed in the house after the bedding plants also were badly affected or completely killed. The plastic had to be stripped from the house and it was 1 year before it could be used again.

BRYSON JAMES: One other comment needs to be made with respect to this compound and that is, if you are using sprayers with PVC valves or piping, you will need to wash them out thoroughly after using Lasso. Lasso or some solvent or carrier in its formulation will dissolve PVC and turn the material to almost a mush; if your sprayer has any plastic parts and you use Lasso in it I would certainly recommend that it be thoroughly washed out immediately afterward.

ED KINSEY: Is there any danger from applying Lasso in the spring and then placing treated plants in a polyhouse in the fall?

BRYSON JAMES: No, the material won't last that long, but I would not apply it in the fall just before moving plants into houses. This material should not be applied within 2 or 2½ months of putting the plants into polyhouses. (There were comments by several members advising the use of EXTREME CAUTION in applying any type of herbicide in or near a closed structure.)

MODERATOR SNYDER: Dave Dugan, are there any materials that will control the black vine weevil?

DAVE DUGAN: Yes there are, but at the moment they are not cleared for use for that purpose. At a meeting with EPA officials which I attended in Cleveland it was brought to the attention of the administrator that one material which can be sprayed on the *Taxus* for control of mealy bugs will also control black vine weevil. A nurseryman asked the administrator why he could not therefore spray this same material on *Taxus* for control of black vine weevil and the administrators reply was "I think we have a problem here."

At the moment that is where the situation stands.

MODERATOR SNYDER: Are eucalypts, in general, subject to blowing over as young trees?

KEITH MACINTYRE: In general, I would say no, but they are subject to root-curl especially when planted into very small pots when they are young. This condition will often persist when potted into a larger container and I have seen trees as much as 30 to 40 ft tall blow over, but when they were checked they all had root-curl.

MODERATOR SNYDER: What is the longevity of seeds of *Eucalyptus gunnii* and *E. camphora* when stored at room temperature?

MARIANNE MACMILLAN: We kept these in glass jars at about 75°F for 3 years with little loss in viability; after that there is a gradual decline. The time and rate of decline is dependent upon the quality of the seed at the time it was collected. In general I would say they should last 10 years or more.

MODERATOR SNYDER: How do you handle *Franklinia alatamaha* from seed?

JIM KAUFMANN: Each flower on the plant forms a seed pod about the size of a marble which turns a dark grey to brown in late October. The pods are harvested and it breaks up into three or four sections with many small seed in it. As far as I know there are no stratification requirements for it. We sow the seed indoors in December in a half sand, half peat mix. Germination is usually good and they must be kept inside during that first winter. Seedling growth is quite variable from 2 to 14 inches for the first year.

I did try some cuttings this year with fairly good results as far as rooting goes; I could not get them to flush again but I understand they can be propagated from cuttings.

MODERATOR PARKERSON: Is *J. c.* 'Hetzii' a satisfactory understock for *Juniperus virginiana* clones?

JOHN ROLLER: *J. c.* 'Keteleeri' is the only one that has given me any trouble on "Hetzii."

ELDON STUDEBAKER: Is there any problem with winter hardiness of 'Hetzii' as a stock? We had 2-yr-old liners in the field, some on 'Hetzii' and some on *J. virginiana* and we lost almost all on *J. c.* 'Hetzii.'

HUGH STEAVENSON: In the milder areas of Canada and up in the northeast 'Hetzii' is satisfactory but in the cold climates up in Minnesota, the Dakotas and the colder areas of Canada you would have to use *J. virginiana*.

MODERATOR PARKERSON: Has anyone succeeded in reproducing woody plants by tissue culture; if so, what plants and who is doing it?

CHARLIE HESS: There is considerable work at the University of California, Riverside by Dr. Murashigi who has a lab that is specialized in the propagation of plants by tissue culture. It is also being done on a commercial basis by George Oki. For information on media and techniques I would suggest you contact Dr. Murashigi or if you want insights as to the commercial application contact George Oki. Bill Cunningham in Indiana is also doing this on a commercial basis using mostly herbaceous perennials. At the moment, I'm not sure what, if any, woody plants are being propagated but they are trying citrus, English ivy, possibly sweetgum, and eucalyptus also.

JOHN ROLLER: I was talking to George Oki and he indicated that they were trying about a hundred different plants. He also told me that in order to do this properly you are going to need an investment of about \$50,000.

MODERATOR SNYDER: Has anyone successfully used growth regulators for grafting? The answer to that is if you survey the literature there is usually a negative response from using growth regulators in the grafting operation.

MODERATOR PARKERSON: What is the shelf life of IBA crystals stored under dark, refrigerated conditions?

CHARLIE HESS: I would say 5 to 10 years under the conditions described; however under liquid conditions especially if exposed to light the UV light will break it down rather rapidly. The talc powder formulations should also be relatively stable. If you had some which you wanted to check you could treat a relatively fast-rooting plant, such as chrysanthemum, with some of the old material and some new material to make sure it is responding properly.

MODERATOR PARKERSON: Why must technical papers prepared and presented by our learned members be presented in such scholastic lingo that less scholastic members cannot convert the information received into usable knowledge? Statements such as 0.01 ppm might have more meaning and tried more often if presented as 1 level teaspoon per 10 lbs, or 300 ppm as 1 drop from an eye dropper to 3 oz of water.

I think this is a good point and probably the directions sent out to speakers ought to contain a note to this effect. I know this has often caused me problems in being able to put information immediately to use.

MODERATOR PARKERSON: Have growth regulators been used on root pieces to stimulate vegetative growth?

BILL SNYDER: The auxin type of growth regulators will stimulate the formation of roots on root pieces but will inhibit the formation of buds. This past year we've been working with PBA, which is a cytokinin, and have found that it will increase the bud formation on certain types of root cuttings. We have not gotten too far along

with this work but we are continuing our studies in this area. One problem in working with root pieces is to first establish the buds and then to get roots formed on them. It may well be that we will have to use a sequential treatment to establish whole plants.

MODERATOR PARKERSON: How long can a peat-perlite propagation mix be reused with proper pasteurization before it breaks down?

WAYNE LOVELACE: We have done this for 5 years so far and have found no problems.

MODERATOR SNYDER: Is there any work being done in growing *Eucalyptus* from cuttings?

KEITH MACINTYRE: Fairly good success has been had with *Eucalyptus grandis* by wounding the tree, such as girdling it with a wire, close to the base which forces epicormic shoots which will strike roots. If they arise close to the ground they do not seem to have the inhibitory substance which prevents rooting. Several nurserymen are trying this at present with some success. I think this is particularly applicable to the eucalypts which have lignotubers, which are the swellings just below the soil.

MODERATOR SNYDER: Can *Kolkwitzia amabilis* be propagated by cuttings, hard or soft?

LARRY CARVILLE: We do this from softwood cuttings taken about the middle of June treated with No. 8 Hormex placed outdoors in raised beds with washed sand as a medium and they root quite readily. We take tip cuttings about 4 to 8 inches long with no wounding other than stripping off the lower foliage.

MODERATOR PARKERSON: I would like to graft *Cedrus atlantica* 'Glauca' but can find no understock other than *C. deodara*, which I have been told is not hardy in the north — the root will freeze out after grafting. Is this true?

CASE HOOGENDOORN: Years ago we used to use *Cedrus atlantica* seedlings but we switched to *Cedrus deodara* because it has a much better root system. It may not be as hardy but we have had no trouble and some of these plants are now huge trees in cemeteries and on estates.

MODERATOR PARKERSON: Is there any difference in root structure in light vs. heavy container media which might have substantial effect on transplanting to heavier landscape soils?

HUGH STEAVENSON: I think it is worthy of note that plants grow well in the light-weight mixes but when they are planted out in the heavy soils they don't do well.

BRYSON JAMES: I don't believe there's any difference in the structure of the root; I think the problem to which Hugh is referring has to do with the interface between the light-weight media and the

heavier soil. There is an apparent water barrier which is set up here and the roots just never penetrate out of the lighter weight mix.

GEORGE GOOD: There are some precautions which need to be taken with respect to appropriate backfill and disturbance of the root when planting container-grown materials into a landscape setting. I think some of these things need to be taken into consideration when we sell the plants to the customer so that it doesn't reflect back on us.

DAVE DUGAN: I think we forgot what we learned back in the 1920's, and that is, when you bought plants out of the east in those fine sandy loam soils and planted them into soils which were much heavier you sold the customer a bale of peat to properly amend the backfill. I think we need to go back and look at some of the old literature; the reason it didn't work is you didn't sell them a bale of peat when you sold them the plant; in other words, you didn't sell them the complete package.

MODERATOR PARKERSON: Can paraquat be sprayed over deciduous azaleas and birch seedlings during the dormant season to get post-emergence weed control in these potted materials? I don't think that it can; if the tissue is green the paraquat will kill it.

ARTHUR CARTER: In Great Britain crops get weedy; I don't know why they do, but they do. Having budded roses in 1975, they're headed back in January or February of 1976 and often they are covered with chickweed. Several growers are spraying them with paraquat; I would never recommend this but they are doing it and getting away with it. This practice is happily accepted by some rose growers there.

I would also like to comment on glyphosate. It should be used only prior to planting, not when there's a crop in. In tests where drift has occurred the azaleas looked all right the first year but the second season some of the new growth formed a rosette instead of growing on. This same sort of damage has occurred on black currant and strawberries.

We grow our containers on sand on poly. Normally paraquat had been used to clean the weeds out of the sand but when glyphosate came out we tried it and conifer roots picked up the glyphosate from the sand. This was surprising because it is supposed to go in through the green portion of the plant but in fact it was picked up by the roots and we had damage 2 years in a row.

MODERATOR SNYDER: Does anyone do any storage of rooted or unrooted cuttings for an extended period of time? If so, have you seen any beneficial or adverse aspects from your procedure. If not, do you have any suggestions for why one might want to store cuttings. I am a graduate student working on storage and would like some grower input for my research.

LARRY CARVILLE: I talked to this student and he is working up a project on vacuum storage for nursery stock and he feels the

minimum investment for this type of equipment would be about \$60,000. I told him that we and several other nurserymen on the island do store fresh and rooted cuttings but we store them in a different unit than the type he intends working on. Perhaps we might have some comments on storage techniques at this time.

WAYNE LOVELACE: We store deciduous cuttings bare-root in poly bags at about 34°F with no trouble at all.

DAVE DUGAN: We take *Taxus* cuttings out of the bench in February and place them into poly bags with just the tops sticking out and store them in an apple storage. I have been concerned with how far we can extend this with the apples in there because of the ethylene gas that is evolved. I would like to know if anyone has had any damage under similar conditions.

ARTHUR CARTER: About 3 years ago there was some work at East Malling in which they stored apple rootstocks along with apple fruits and, as a result, the stocks were seriously damaged even though they were in a dormant condition. As a result we do not recommend storing any type of plant material with apples.

MODERATOR PARKERSON: At Tulsa last year we saw workers at some of the nurseries making cuttings as rapidly as they could and putting them into coolers with sticking being done during February and March. They said this was standard operating procedure for them because they like the condition of the wood in December and January.

MODERATOR SNYDER: How can one get more than one flush of growth per year on *Euonymus alatus* 'Compactus', spruce, and pines? Can photoperiod, cold treatment, gibberellic acid, or chemical defoliant on deciduous material be used to stimulate more than one flush per year?

JOHN ROLLER: I tried getting an extra flush of growth on *Euonymus alatus* 'Compactus' by putting them in a polyhouse which I could heat. I applied intermittent lighting during the night but I don't believe I kept them cold long enough before heating because what I did was to prevent growth next spring.

LARRY CARVILLE: I think all of us see this when we take softwood cuttings of euonymus, forsythia, weigela, etc. and put them under mist; they root and while you're hardening them off under the mist they make a flush of growth. It is a weak flush but it is a flush, nevertheless. Dr. Tukey was attempting to stimulate us into thinking along these terms of extending the growth period by regulating the natural factors to which a plant responds.

MODERATOR SNYDER: With many woody plants the cessation of growth is controlled by photoperiod. One of Dr. Moser's students has shown that this stoppage of growth may start as early as July in some species and last as late as September with others. Once photo-

period has brought on dormancy, additional light will not induce the plant to grow more until it has had a cold period. There are some plants, of which I believe euonymus is one, which if they are growing in long days and are switched to short days they will stop growing but when changed back to long days they will start up again; many other plants will not do this.

ARTHUR CARTER: A few years ago we investigated the effect of leaf removal on the growth of black currant the subsequent year. We were interested in this from the standpoint of a mechanical harvester. We normally harvested the plants in July and to stimulate this we removed all the leaves, half the leaves, half of each leaf, etc. and we found that where we took off all of the leaves the plant became confused and was flowering at Christmas time. I think this would be analogous to the use of defoliant which was suggested in the question. We also did some of this with roses and if we defoliated too early the plants broke growth in September.

CASE HOOGENDOORN: Several years ago we had a hurricane in September and I had a bed of 2-yr-old grafted Japanese maples and they lost all of their foliage. Shortly after that they threw a flush of growth and people visiting the nursery commented that they didn't look like they were hurt at all but I said wait until next spring and they'll all be dead. When spring came I was right — they were all dead.

ED KINSEY: We grow *Euonymus alatus* 'Compactus' in containers; it has been an expensive plant to grow because it takes about 3 years before it is ready to sell. If it were possible to defoliate it in early summer and get a strong flush of second growth, perhaps it would be economically feasible to carry it over in a heated polyhouse and have it ready to sell sooner. This may also be a possibility with pines and some other plants; I think some research is needed in this area.

LARRY WATSON: In Colorado the Forest Service has an intermittent lighting program to promote growth. Pine and spruce grown in this manner for 2 years is giving them fantastic growth. The spruce were 2 to 2½ ft and we are then set out the following spring. They were also beginning to do some work with lilac and other deciduous materials; this may prove to be a fruitful avenue.

MODERATOR SNYDER: I did some work in growing some of the woody ornamentals under continuous long day conditions without a cold period with the possibility of using them indoors for interior decorating and design. One of the plants we were using was Atlantic cedar and, under short-day conditions they stop growing almost immediately; under long day conditions they keep on growing continuously. Some continued to grow on into the third year. Within 1 year the terminal buds and the branch buds of the short-day plants died and the plant died from the top to the bottom. After 3

years of growth under continuous long-day conditions these plants also stopped growing and began to die from the tip back also. As a word of caution, you can't continuously grow some of the plants which have a cold period requirement.

TOM MCCLOUD: We had an experience with rooting hardwood cuttings of *Euonymus alatus* 'Compactus' late in the year; they rooted readily and we potted them but it was too late to put them outside so we put them in the greenhouse. They did not grow by spring so we set them in a coldframe and they sat there all year without growing. They did not grow until the following spring after having gone through the winter cold period; they did break and grow fine after that.

GEORGE GOOD: The work of Dr. Tukey's students with this plant showed that the only thing which was reliable to cause it to break growth and grow normally was to subject it to about 8 weeks of cold temperature.

MODERATOR SNYDER: One of my students found that they did require a cold treatment before they would start to grow and up to a certain point the longer the cold treatment the more growth you would get, not only in number of plants breaking but in the amount of growth that would occur. Up to about 659 hours you would get an increase in growth, depending upon hours of cold, but beyond that there was no additional benefit. He used a number of plants and all of them did not require the cold treatment; some of them required only defoliation. So there are all sorts of combinations and you cannot take what occurs with one plant and apply it directly to another.

If there are no other comments, we have come to the end of the questions and both Charlie and I thank you for your participation in it.