Question Box

Moderator: Bruce Briggs

Question: How do you control moss and algae?

Ron Amos: I got a tip about a year ago on using vinegar. We tried some on a crop of plugs under lights in the winter and we had no problems with moss. We started taking about 18% to 20% vinegar on cloudy stays sprayed over the plants. It did a good job on the algae. When it was sunny it didn't burn the needles of the Austrian pine we were growing. We had reasonable control after several applications.

Question: What about other acids instead of vinegar?

Ron Amos: We just tried white vinegar off the shelf. We didn't try acetic acid since our algae problem was not that serious.

Verl Holden: We've used granular ferrous sulfate to good advantage over the top of 4-in. pots. We put in a hand-crank spreader and set it on about #10. That seems to work well.

Bruce Briggs: Did it last very long or did you get pretty good control?

Verl Holden: I think we got pretty good control. This was on moss.

Bill Smith: We still use iron sulfate and find it works about as well as anything available right now.

Question: Are there chemical companies trying to formulate a slow-release form of iron?

Bill Smith: Sierra Chemical Company has a slow-release iron they use in Australia because of álkaline problems there. They brought it here, but we have not gotten good results from its use.

Gary Ritchie: We had problems with moss in both our bare-root and container nursery this year, particularly on the Western hemlock seedlings which are very limp and weak. Our grower fertilized with calcium nitrate that stiffened the stem of the plants which got them up above the moss. It didn't do anything about the moss, but it helped the plants compete with the moss.

Voice: We didn't have problems with liverworts. We had problems with moss and we used the iron treatments that seemed to work at the higher concentrations. When we used diluted solutions we didn't get any control at all.

Question: What is the product that Gary Ritchie mentioned as a "binder"? What is that product and can we buy it?

Gary Ritchie: It's called JP-1 named after Jerry Pulman who was a former tissue-culture scientist at Weyerhaeuser. He invented it and we named it after him. It is an alginate-type material which you apply to the plug and then apply a hardener and it binds. We have a patent on that and we are actually working with people right now in New Zealand who are using it to transplant tissue-culture propagated radiata pine in the nurseries and are having good luck with it. If anyone is interested in pursuing that come see me and I will give your name to the person in our company who is involved with marketing that material. It's called JP-1.

Question: Did you get this idea from Holland?

Gary Ritchie: Our material came out of a brainstorming session that we had. We brought in a consultant from outside the company who put about six of us into a room for 2 days and we brainstormed this thing upside-down, inside-out and came up with that idea and it's been extremely successful.

Question: Is the planting out of large numbers of genetically identical clones a problem in forestry? Are you worried about insects or pests taking over?

Gary Ritchie: This is a common question and an interesting question coming from a group of horticulturists who live by clones themselves. Actually, we're not cloning this material. Any one seed might produce 30 plants that would be members of a clone, but then they are mixed up with a million other plants and all spread out. So, what we're producing are family level genetic variants not clonal level. Clonal forestry is not practiced in North America, but has been practiced in Japan for 500 years with Sugi, *Cryptomeria japonica,* and in China for over 1,000 years with *Cunninghamia lanceolata* very successfully. To get at the question of genetic risk with using family level materials in forestry, we're quite aware of what those risks are and we've given considerable thought to that. We have a very rigid set of rules which we obey with respect to deploying that material in the field. How many families can be used per year, how many must be planted across a certain land base, etc. and we follow those rules. We also plant this material as individual family blocks. By doing that, if problems should show up in some of these families, we recognize them immediately and get them out of the production population. Generally, another thing that is not widely understood, is that you can put together a forest plantation from family material that can be genetically more diverse than wild plantations. If you look at wild conifer populations in detail, are you terribly genetically diverse. So, they are actually in some cases broadening the genetic base of forest plantations by doing this. The bottom line is, yes, we're aware of the risk, we're dealing with it, and we do think it is very manageable and is far outweighed by the benefits of genetic improvement.

Question: Are you working toward genetic clones that root better? How did you prevent those cuttings from showing plagiotropic growth?

Gary Ritchie: For the first question, no, we are not selecting families for rootability. It's conceivable that in the future as we gain more experience there may be families in our population that do not lend themselves well to vegetative propagation and we will probably remove those from the population. Our selections are based on field performance as trees, as volume growth and stem quality. If you know how to do it, they all root quite well. The other question had to do with plagiotropic growth which is very typical in conifers that are propagated from cuttings. There are two ways around that. One is by using juvenile mother plants. Our mother plants do not age beyond 1 year. The second way around the problem is getting the rooting cuttings out of the rooting environment and planted outdoors as quickly as possible. Whether that is a light-mediated effect or whether it is a pot-binding effect or root-development effect I can't really say. What I can say is that within one year in a bare root nursery it's difficult to find one plagiotropic cutting out there whereas if you had grown that crop in containers in greenhouses virtually all would be plagiotropic.

Question: Is there any real data to show that pasteurization kills pathogenic organisms and not beneficial organisms?

Deborah Law: That was my question that I did not put my name to. Generally, many of the larger nurseries do pasteurize, but I have always been a little suspicious of this and that is why I wrote that question. I cannot see how pasteurization kills only the pathogenic organisms while not damaging the beneficial ones. My nursery does not pasteurize. I use clean products and I use ultra-clean methods and my concern has always been that under nursery situations recontamination occurs by dust or when plants go into the general growing areas.

Jeff Bohn: I can't give you any scientific data. It was just recommended. We grow native California plants which are extremely susceptible to *Pythium* and *Phytophthora* and we have had, from time to time, the steam break down and have taken a chance and that has usually resulted in more dead plants. We've stopped taking chances and don't do anything without pasteurizing anymore.

Tom Pinney: We do not pasteurize.

Steve McCulloch: In our propagation area we had a problem that we couldn't quite identify the source. It wasn't clear cut, sometimes we would see a problem, other times we wouldn't and we wondered if it was due to perhaps some bales of peat that may have been contaminated with a fungal problem called *Cylindricladium*. Ever since we started steam pasteurizing peat moss we have been able to control a very serious problem. It's expensive, but the alternatives are much more expensive.

Gary Ritchie: We pasteurize our growing mix to control soil-borne diseases and root diseases. We don't have problems with weeds in those mixes.

Robert Wright: We hope to utilize a bark mix even though we don't pasteurize it that will have sufficient aeration to not cause problems with some of the water molds caused by *Pythium* and *Phytophthora*. I don't know of anyone in the nursery industry anywhere across the southeast that produce 1-gal or larger material that do any pasteurization other than the composting or aging of pine bark which will go through a heat treatment getting to 130F sometimes and they have to turn it sufficiently to prevent that from happening and building up acids and alcohols. We probably get by with it because of the composting the bark goes through.

Todd Herrick: Harry Hoitink has done quite a bit of research on the subject of composting of barks and there's data in the literature that would suggest that there is a beneficial effect of suppression of pathogens by use of pine bark in container media. I would suggest anyone interested in this to contact Harry Hoitink. All that information is available.

Ron deFossard: I don't think we've heard anything today that answers the question. We often hear this speculation that pasteurization kills the pathogens and not the beneficials. To me, that is utterly illogical. The question is why? I did ask Ken Baker directly and he said it was true. I searched his work before I asked the question and I couldn't see one bit of evidence that was the case. I am not saying that pasteurization is not effective against all sorts of things; it's the story that goes with it that I question.

Tom Pinney: After cuttings have rooted in a rooting medium containing no peat moss is there a fertility regime that someone could suggest before the cuttings are potted?

Robert Wright: I don't think there would be any need to change the fertility program. One may have a little different cation exchange capacity than the other or one may hold a little more water than the other, but the fertility regime can probably remain the same. Peat moss can be replaced with finely ground pine or fir bark.

Question: Does anyone have experience working with witch hazel in tissue culture?

Steve McCulloch: I made a statement at an Eastern I.P.P.S. meeting when someone asked me about the difficulties with witch hazel in tissue culture. We have produced witch hazels in our lab. The trick was using more juvenile material. When we started getting scion material, grafted material from the growers we had more difficulty establishing the culture. Other members of the Hamamelidaceae family are fairly easy in tissue culture at least the ones we have worked on like *Corylopsis* and *Liquidambar*. The *Hamamelis* group generally are very slow to respond. The use of rapid re-culture or more juvenile material will help.

Ron deFossard: I have worked with them and the story is true for many of the woody species. If you want to clone a mature tree of *Eucalyptus*, you go to the very base of the tree and wound it deliberately to get adventitious buds coming out from which you can take cuttings and get them into tissue culture.

Question: Does anyone have experience rooting *Clematis 'armandi'*?

Bruce Briggs: We have done some tissue culture and found that 'Armandi' was hard to get in, but we don't have any in culture at the moment. It's amazing in the *Clematis* family that anything that has *jackmanii* in its background is quite easy to go into tissue culture; other families that are not *jackmanii* are hard.

Keith Howe: I've talked to Ernie Schuster who has been very successful at doing it. He indicated that it is a very easy plant to root single node cuttings. The trick to get it to break is to keep the nutrition level very high.

Bruce Briggs: Many years ago there were people who grew it and they did the same thing. There was a problem with them not growing after they were potted. If they kept the rooting hormones real low they would break; high hormones seem to retard the breaking of the bud.

Question: Can someone tell us more about the use of artificial snow for winter protection?

Tom Pinney: Many years ago we tried a snow making machine and came up with the same problems: it's very slow and it only lasts as long as the temperature stays below 32F. It has not been economical so we cover our crops with a type of microfoam or insulating materials instead.

Bruce Briggs: Why not just cover with sawdust?

Tom Pinney: There would be a mess to clean up. Straw has been used also, but the mess and the weeds become a problem.

Doug Justice: We used to do it when we had very clean roads, but once you have three or four years of sawdust down you mess up the roads and trucks have a difficult getting in.

Roger Hollingsworth: Several years ago we had ice and snow and a retailer put sawdust over a small area of azaleas. To clean up he brought in a street cleaner with a vacuum cleaner and vacuumed the whole area.

Bruce Briggs: Water works beautifully for frost protection, but not for cold weather protection because you can't quit. The resulting ice can get so thick that the limbs break down. There's no protection from ice itself; it's just the release of heat from the water going on it.

Jeff Bohn: I have a question regarding the recycling of nursery containers. We in southern California have tried to find someone to accept nursery containers that are used or damaged for recycling. Has anyone had success in finding someone to accept those? There are logistical problems with dirty pots and things like that.

Eric Nelson: Susanne Foster has developed the pot re-use program in Seattle and that program is working very well. Those containers that can't be reused have to be cleaned up before they can be ground and used in any recycled plastic manufacturing application. One of the opportunities that does exist is the use of that sort of mixed contaminated plastic to make plastic lumber products. The companies that are in the plastic lumber business now are tending to use very clean material. They are able to get clean regrind material from plastic manufacturers and from bottle collection programs that collect very clean material like milk jugs that can be cleaned up very easily. Once those industries are developed further they will develop the ability to use more highly contaminated material. At this time there are very few people who are able to do that and I sympathize with your frustration trying to find somebody to take it. We hope to see those industries develop. There may be people out there who are trying it, but I don't know of any at the moment.

Bruce Briggs: Why can't we get somebody to grind it and use it as a heat source?

Eric Nelson: That's a capital idea. It's likely we will see that developing here. One of the big obstacles to recover BTUs is that in order to do that you have to burn it. If you are going to burn it you have to site a plant somewhere and no one wants to have a burner in their backyard so there's a great deal of education and even some technical development work that needs to be done before we can do that.

Tom Pinney: There's a community in Wisconsin that is successfully burning old tires along with fluidized coal.

Ron Amos: One thing we have looked at is construction companies. They use a lot of plastic for covering concrete and for putting under concrete. One person from a construction company looked at our plastics and said our grade of polyethylene is better once it's been used than the grade they buy. They were very enthusiastic and took a whole truck load and they have been using it ever since. I have another load waiting for them. I think if you talk to several different construction companies they use a lot of plastic sheeting and they use it in the winter time to enclose entire buildings during winter construction. That's a good use for it, but they have to find

a way of getting rid of it after that.

Sharon Collman: I had a chance to go to Israel last winter and I think plastic is going to be a world-wide problem. They are using it there for mulch and water retention under drip systems and the plastic is being tilled into the field and it's blowing around the country. It's a significant problem that needs to be addressed.

Tom Pinney: How about grinding up the product and selling to asphalt plants?

Eric Nelson: This is what I do everyday. There are a number of things that can be put into aggregates and essentially disappear during road construction. Hundreds of thousands of tons of material will go into a road construction project. The big problem is that you build a road out of sand which you buy for $3-$4 a ton and in order to get a big pile of glass turned into something you can use in the road you will likely spend $30-$40 a ton. That cost is a lot less than the $90 a ton that you would spend on that material to put it into a sanitary landfill. Nevertheless, there is a big difference between $3 to $4 a ton and $30 a ton.

Terry Finnerty: Why not try to tie into non-profit organizations like Boy Scouts or fraternities to wash pots. This might be good public relations at the same time. The washing could be done on a donation basis or a penny a pot before the pots went to the recycling centers.