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QUESTION BOX

The Southern Region Question Box was moderated by Richard Stadtherr and Jake Tinga.

JACK SIEBENTHALER: What is fly ash? Several growers are using it in their media.

JAKE TINGA: It is a slate-like waste product resulting from coal combustion and was formerly readily available.

TED RICHARDSON: Fly ash is still available from coal-burning power companies.

RICHARD VAN LANDINGHAM: Calcined clay is another product that can be used as a medium. It is manufactured by heating clay as is done with vermiculite and perlite. It is then light and sterile and is comparable to perlite.

DON CLAY: The clay is similar to Fuller's earth.

JUDSON GERMANY: We are able to buy styrofoam, which is considerably cheaper than perlite.

PETER GIRARD: It works well and is cheaper than perlite.

JAKE TINGA: It might be possible to use the waste from hot drink cup manufacturing. In addition to improving aeration I have also read a report from Germany that formaldehyde is a

break-down product, which provides some control of soil pathogens.

S.I. PATEL: We have found that a mix composed of 1 part styrofoam and 1 part peat works well. We also have used fly ash incorporated in sand as a medium.

JAKE TINGA: It is possible to use many different products as media components, including rice hulls, castor bean meal, and peanut shells. All have advantages and disadvantages.

RICHARD SCHNALL: Can cuttings be rooted in fresh pine bark? Is IBA effective in pine bark; that is, is the hormone absorbed on the bark?

FRANK POKORNY: We have rooted quite successfully in 100 percent aged bark. IBA seemed to be effective. The only problem was an initial slow-down due to large size particles. Although we made no attempt to adjust particle size, results were good for most woody plants. Wetting was no problem in aged bark.

CHARLIE PARKERSON: In order to grow a good liner we feel we need more than just bark. The soil column in liner containers is too short to provide good aeration and continued vigorous growth following rooting.

NEWT EDWARDS: Question for Peter Girard. How do you achieve almost 100 percent rooting with deciduous azaleas?

PETER GIRARD: We use a rooting medium composed of ½ Michigan peat, ¼ perlite, and ¼ sand.

We are very careful to use sterilized sand as it often contains a large number of fungi. We make cuttings as soon as shoots are 3 or 4 inches long. They are extremely soft. We remove the lower two leaves and make a ¾ inch cut on the side. We feel this extra wounding provides more area for callusing and gives better rooting. It is important to keep the plants growing; so as soon as they are rooted, cuttings are placed under lights. If they drop their leaves the first winter, plants eventually die even though they have formed good roots. In spring they are placed in number 400 pots using a medium of ⅓ Canadian peat, ⅓ Michigan peat, ⅙ perlite and ⅙ pine bark. Fertilizer and lime are included in the mix. They are liquid fed throughout this time until the following August. We may need to pinch the cuttings twice while they are in the greenhouse. Fertilizer is then withheld and watering is greatly reduced so that the plants will become dormant. As long as they are actively growing, buds will not form. We have also found that in our area (Ohio) we must discontinue the use of Osmocote by July to avoid winter damage. Our fertilizer problems have not been caused by the fertilizer itself but by our not using it prop-

erly. Osmocote gave good results when time was allowed for new growth to harden before winter.

RICHARD STADTHERR: Are you growing under continuous light?

PETER GIRARD: Lights are on 3 minutes every 15 minutes during the dark period. Plants are in 4 foot beds; and lights are 2 feet above them.

BILL CURTIS: What kind of light do you use?

PETER GIRARD: We use clear 100 watt bulbs.

GARY HUTT: Could you just light from 10 till 2 during the dark period?

PETER GIRARD: We have had the best results with the flashing light technique. As days get longer, we reduce the lighting period to 10 p.m. until 4 a.m. During short days we use the intermittent light from 6 p.m. until 6 a.m.

VIRGINIA LASSITER: What temperature do you maintain?

PETER GIRARD: 65°F is the average temperature in our greenhouses. Azaleas do not need to much heat to grow.

TED RICHARDSON: Are you using 1 percent IBA?

PETER GIRARD: Yes. We also add Truban to the IBA. We do not water the cuttings but simply put them under the mist. If the mix becomes soggy, rooting must occur above this overwet area. We like to stay on the dry side and keep the humidity high.

GARY HUTT: What other hormones might be used?

PETER GIRARD: NAA is a possibility, but our standard practice is what I have described.

JAKE TINGA: I like to grow dry in a deep medium, even 12 inches. If the column of medium is only 2 inches, cuttings are wet the entire time.

HENRY NIENHUYS: When do you take your cuttings?

PETER GIRARD: In June or earlier if we have an early season.

RICHARD STADTHERR: Do they wilt? We think results are better if we wait until the hairs on the stem start to turn brown.

PETER GIRARD: They do wilt but recover and root well. We have tried various times and find June cutting the best.

HENRY NIENHUYS: We take our cuttings in February in the greenhouse, then plant them out in May. We can then grow them outside and avoid supplemental lighting.

TED GOREAU: A question has been asked about the propagation of *Juniperus procumbens* 'Nana', dwarf Japgarden juniper.

We grow this plant. In contrast to the method used by Bill Lawson, we do strip our cuttings to the depth that they will be inserted into the medium. We feel that this gives us more uniformity in depth of sticking. We try to get our propagators to grasp the cutting just at the lower remaining leaves, stick the cutting into the medium to this depth, and firm the medium with their two fingers. August and September are good times to take cuttings, but I believe we get our best results with cuttings taken in December, January and February. We have a higher rate of success with *J. procumbens* 'Nana' than with the standard size. In summer we use Hormodin 2, (0.4 per cent IBA), and in winter, Hormodin 3, (0.8 percent IBA). Our medium consists of 1:1:1 peat, perlite, and sharp sand. We feel it is a good mix.

RICHARD VAN LANDINGHAM: We also propagate this plant. We take our cuttings in January and February. They are stripped and placed in a sandy medium. We believe that proper watering is the key to success. It seems the more we water the more problems we encounter. We water only when necessary.

TED GOREAU: I agree that water is the key. We find it is less of a problem in open beds.

CHARLES HENDERSHOTT: There has been a question concerning cold protection when propagating hollies in cold frames. The important point is to wet thoroughly everything except the plant foliage before closing the frame. This gives the added benefit of heat transfer from the soil by the condensation of moisture on the inside. If plants are in pots, it is important to have them in good contact with the soil. Remember, the point is to maintain the plants, not grow them.

RICHARD VAN LANDINGHAM: What effect does plastic on the ground have on heat transfer?

CHARLES HENDERSHOTT: It impedes heat transfer.

S.I. PATEL: How can plants in a slat house be protected? We have tried keeping them sprinkled but have run into problems when plants stay wet for a long period of time.

CHARLES HENDERSHOTT: This is a problem particularly associated with Florida where many plants are grown outside under shade. There is no simple solution. However, one thing that can be done is to place the plants on raised beds and run water in the furrows between the beds. A well-drained soil is essential.

LYNN TABER: Is it helpful to irrigate the evening before a freeze is coming?

CHARLES HENDERSHOTT: It depends on whether the freeze is a convection or radiation type. On a calm night, irriga-

tion is usually beneficial. However, on a windy night evaporation is rapid, and temperatures are lowered due to the absorption of heat during the evaporation process. If it is a windy night, do not irrigate.

STEVE WOODRUFF: Is it possible to use Ronstar in the cutting bed without damage? Also what about a preventative insecticide program?

RICHARD VAN LANDINGHAM: We are using Ronstar successfully with hollies and pyracantha propagated in a shaded poly house. We do not routinely use insecticides.

GARY HUTT: In response to a question about using pond water, I would like to say that we have encountered no problems other than clogging the mist lines.

BILL CURTIS: There may also be algae problems, which chlorine prevents.

JAKE TINGA: Algae growth is worse in white pipes.

GARY HUTT: We have painted ours black.

BILL COLBURN: Iron bacteria also cause clogging, but this organism occurs mainly in well water.

JAKE TINGA: Using pond water in the propagation area is a dangerous practice. It is a source of serious contamination by water molds.

S.I. PATEL: In regard to a question about maximum size of cuttings, I believe that family relationship affects this.

TED STEVENS: We have rooted 5 and 6 foot crape myrtle cuttings.

BILL CURTIS: It is possible to root 3 foot heel cuttings of *Magnolia grandiflora*, but it is uneconomical to do so.

TED STEVENS: I would like to know more about propagation with 100 percent humidity rather than mist.

BRYSON JAMES: Several commercial firms are using this method. I became interested because it has been my observation that most propagation problems are due to improper watering — usually overwatering. Rooting can be done in either beds or containers using a standard rooting medium. A fungicide should be included. Water cuttings in very thoroughly, then cover the structure with a milky white plastic and about 55 per cent saran shade cloth. We find that Monsanto white plastic works well. Seal the plastic and leave from 6 to 8 weeks, depending on the species being rooted. As long as moisture condenses on the inside of the plastic during the hottest part of the day, there is 100 percent relative humidity. There is no need for mist. The only problem is excessive heat buildup. It is essential to use the white poly. However, in one case we registered 118°F

and cuttings were not damaged.

Actually this is an old method. It was originally done using glass sash, which, of course, did not provide 100 percent humidity and required much more attention to ventilation and watering.

QUESTIONS FOR H.A.J. HOITINK:

RAY SELF: How does composting affect bark suppression of pathogens?

HARRY HOITINK: We have found no evidence that composting adversely affects the control of disease by the bark. On the other hand, composting can kill the *Phytophthora* that may be present in some pine trees used for bark.

I might add that many years ago farmers used crop rotation as a major method of disease control. They felt 5 percent organic material in the top soil would control most soil-borne disease problems. The organic material can do the same thing today, and there are many waste products that can be economical bark substitutes. These include sewage sludge and waste from the manufacture of dogfood or any high protein product.

The addition of one bushel of bark to the soil around dwarf apple trees has been found experimentally to reduce the incidence of collar rot, *Phytophthora cinnamomi*, and *Pythium*. Although pine bark helps control the water molds, it seems not to have the same suppressing effect on *Rhizoctonia* as hardwood bark. Most growers have prepared their media by adding peat to hardwood bark. However, *Rhizoctonia* infection increases as the percent of peat increases. Poinsettia growers can control this problem by using not more than 14 percent peat and drenching one time with Benlate. It is not necessary to use Dexon or Truban* for water molds. A bark growing medium also reduces *Fusarium* occurrence in chrysanthemums.

Although it is not necessary to compost pine bark to remove the toxic materials found in hardwood bark, composting does improve wettability and avoids nitrogen tie-up. We have also had fermentation problems with fresh bark that was packed in plastic bags for shipment. Two weeks composting may be long enough for pine bark although a much longer time is needed for hardwood bark. Composting, therefore, serves these purposes: It reduces the amount of wood present and thus helps avoid tie-up; it removes most toxins; it improves wettability; it prevents anaerobic decomposition and fermentation.

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* Benlate; benomyl (DuPont); Dexon; fenaminosulf, (Chemagro Corp.); Truban: terrazole, (Olin Matheson).

CHARLES PARKERSON: Do we get more *Phytophthora* if we add peat?

HARRY HOITINK: Not if peat content is less than 50 per cent and other materials such as perlite or styrofoam are added to lighten the mix.

PHIL BEAUMONT: What can be done if a bark pile has become acid?

HARRY HOITINK: This problem can occur in any organic material and can be difficult to solve. It has been found that 835 pounds of lime were required to neutralize a sawdust pile with a pH of 1.9. We have had hardwood bark brought to our lab with a similar pH level, and it was extremely toxic due to the presence of volatile organic products, probably alcohols. However, one grower received a load of pinebark with pH of about 3.2 that he was able to recover by leaving it for about 6 months, then turning one time.

A simpler technique than turning a pile periodically is to use a fan for aeration. It is easy to lay a drain tile in the pile and connect it to a small ⅓ hp fan set to run 5 seconds per hour.

BRYSON JAMES: Do you lose ammonia by maintaining the high pH level you suggest?

HARRY HOITINK: At about 7.6 ammonia is untied. With 4 pounds urea per cubic yard we do get free ammonia. We try to keep pH lower than 8.5 and try to maintain about 50 percent moisture since drying also promotes ammonia loss. If we windrow compost, we do not worry about high pH. However, high ammonia levels in less well-aerated situations can kill all microflora leaving a sterile bark. This delays composting until all the ammonia evaporates and microorganisms active in composting return.

RICHARD SCHNALL: How does the use of bark affect the activity of growth regulators, especially those used in propagation?

HARRY HOITINK: Both growth regulators and fungicides are absorbed by bark. It has also been found that the pH level of hardwood bark affects the activity of the growth regulators used in poinsettia growing. However, I do not have any information on the rooting hormones.

WILL WITTE: The active ingredient is ancymidol* is tied up by pine bark also, at least when the bark is fresh. However, the reaction is not consistent.

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* Ancymidol: A-Rest, (U.S. Rubber Co.).

JIM PERRY: Dr. Hoitink, could you characterize the difference between aged and composted bark?

HARRY HOITINK: At the present we really cannot as unfortunately we know very little about the chemistry of organic materials during degradation. During decomposition pH reaches neutrality — 6.8 to 7.2.

QUESTIONS FOR C.H. HENDERSHOTT:

RICHARD AMMON: Some of the nurserymen in the north are putting barrels of water in their plastic houses. Is this an effective way of storing heat?

CHARLES HENDERSHOTT: The principle behind this practice is easier to discuss if we remember that a BTU is the amount of heat required to raise the temperature of water 1°F. Eight BTU's per gallon are released each time the temperature in the barrels drops 1° because each gallon of water weighs 8 pounds. From each 50 gallon drum 400 BTU's are released per degree until the temperature reaches freezing. It is only when water at 32° changes to ice at 32°, that we can get 1,152 BTU's of heat per gallon.

TED RICHARDSON: If the vapor condensate on the inside of the greenhouse freezes, is its effectiveness changed?

CHARLES HENDERSHOTT: Yes. In the first place, heat is released as the water changes state. It will also be an even more effective barrier against radiant heat loss. Ice may also slightly reduce loss by conduction to the plastic covering.

TED RICHARDSON: Would the frozen condensate reflect the radiation to any greater extent than does water in liquid form?

CHARLES HENDERSHOTT: Probably not. It impedes transfer but probably does not reflect radiation to any great extent.

BILL ADAMS: It might be helpful for nurserymen to know that here in Florida charts are available that tell how many inches of water should be applied to protect plants under given wind conditions.

QUESTIONS FOR ROBERT HARE:

JAKE TINGA: What time of year do you girdle the trees?

ROBERT HARE: Early spring, or when the hardwoods have fully expanded leaves. We have good success in June.

DON SHADOW: Have you tried *Fagus*?

GERALD SMITH: Or southern magnolia?

ROBERT HARE: I have not tried either of these species. However, we have been quite successful with Formosan sweetgum (*Liquidambar formosana*). We have been interested in this

tree since it can provide needed fall color in our area. For the past 10 years we have been selecting for color and now have several clones that can be easily propagated by modular air layering.

I would like to reemphasize that there are two advantages to modular air layering, as compared with conventional dry girdling. These advantages can make the method commercially feasible. The first advantage is the increased rooting success obtained by using certain chemicals and maintaining moisture. The second advantage is that mist can be discontinued within a few days after removing the shoot and containerizing. The 2 minutes required, when all materials are ready, is not excessive if high percentages of rooting and survival are possible.

QUESTIONS FOR WILLIAM H. CRIBBS:

BRAD MAY: Is anyone using the Georgia and north Florida peat?

BILL CRIBBS: Yes. Some people are using it. Obtaining the peat is difficult and requires a large commercial enterprise. There are several large deposits in northern Florida, and some peat is now being used from about six of these, including one in the Lake Apopka area. This peat also makes good fuel, so growers may in the future find competition for its use for this purpose.

TED RICHARDSON: Is there any difference between peats from south and north Florida?

BILL CRIBBS: Those I have analyzed from south Florida are not significantly different if conditions of formation have been the same. Peat from a shallow bog undergoes alternate wet and dry periods. Decomposition is much more rapid, and we get inferior peat with a high salts content. By a deep bog we mean one that never completely goes dry. Peat from these is of much higher quality.

GARY HUTT: What is the pH?

BILL CRIBBS: The north Florida peats are very acid in spite of the fact that they are formed in limestone areas. I might add that nutrient content is good. Copper is the only micronutrient that must be mixed with the peat.

HARRY HOITINK: If these peats are fibrous, as are the Canadian and German peats, I believe they will make excellent growing media. The problem we have with Michigan peats, is that they are fine, and do not provide the porosity and aeration needed to control *Phytophthora* and *Pythium*.