

GERALD SMITH: Has anyone had any experience with irrometers?

CHARLIE PARKERSON: I was reading what Mr. Flemmer at Princeton nursery had said. He puts them around selected indicator plant material and calibrates them that way. Mr. Hill of the D. Hill Nursery had tried them in 1952 and he didn't like them at all. Fred has used the bake-o-lite blocks on field stock and had very good results with them.

EARL ROBINSON: Were you referring to these electronic probes? I've had experience with a hand probe in New Jersey where I've stuck it in a glass of pure water and it read about 10% wet. After putting some table salt in the water it read 100% wet. Apparently it is based on conductivity and you might have to use relative comparisons under similar watering procedures to get any value from them.

BOB WRIGHT: Tensiometers and blocks were developed for use in field soils. The large pore spaces of container media interfere with their proper function.

BRYSON JAMES: Jake Tinga suggested a long time ago, and Charlie mentioned it again, use an indicator plant. A bean is a good one; it wilts quickly and can be easily removed.

## QUESTION BOX

Bryson L. James, Moderator

1. What effect does the use of systemics have on the rooting of cuttings? — (systemic insecticides, fungicides)

CHARLIE PARKERSON: We use Meta Systox-R and Benlate with success on Japanese holly and Junipers.

BRYSON JAMES: As far as effects on rooting of cuttings, has anyone experience with this? I know that work done at N.C. State a number of years ago showed no effect of materials sprayed on the foliage on rooting of cuttings; I've done some work on this and had similar results.

VOICE: Does this hold true with Benlate and Truban used on soils to prevent fungus diseases? I've heard some greenhouse operators say that these will affect rooting when used in soils.

BOB WRIGHT: With herbicides, we found no effect on cuttings unless the stock plants were damaged.

MIKE McCALL: We use Banrot on all our cuttings and don't see any bad effects from it.

2. Describe the best method to root *Nandina domestica* 'purplea' (dwarf).

RICHARD TAYLOR: We've rooted winter (February) cuttings similar to juniper cuttings very easily.

ED KENZIE (Knoxville): We root it about any time of the year if we can get the new growth (clean soft wood); treat with a light hormone and root in a flat of peat and perlite. We wash our cuttings in a Captan-Benlate mix (July & September) and put them under intermittent mist with no bottom heat. We wound it slightly but don't strip the leaves back any.

3. How important is the pH of the medium for rooting cuttings? Does anyone know the pH of their medium?

WYLIE ROACH: I use composted oak bark with a pH of 7.25 for propagation; we add a little sulfur to bring it down to 6.5.

BILL COLBURN: I'd be careful with that sulfur if I were you; it will burn if it's not well aged. We use peat, sand and cypress sawdust with a pH of about 6.0.

VOICE: Aren't we trying to get all our plants to put roots on as they grow? Wouldn't it make sense to root plants in the same compost in which you want them to grow?

VOICE: All I want to do is get roots on the cuttings. We've tried all kinds of media and we've come back to a basic mixture of German peat and perlite 1:1, v:v.

VOICE: John, we've rooted azalea cuttings in sand at pH 7 and as long as you move them as soon as they're ready, I believe you can root cuttings in many different kinds of media. We use 50% Canadian peat; 25% sand and 25% perlite for all our cuttings.

BRYSON JAMES: This agrees with other research I've read; as long as you move the cuttings soon after they're rooted, pH is of little consequence.

LANNY NEEL: pH is a primary factor in regulating ion availability in the soil, and if there are no rootings, then ion uptake is non-selective and occurs through the cut end of the stem. The cutting basically relies upon nutrient reserves it contains when it is taken from the plant.

4. What are some effective ways of protecting canned stock from freezes below 15°F?

CHARLIE PARKERSON: We're using 7½ oz burlap put over the top of our plants. We think that wind desiccation plays a large role in freeze damage and we want to protect the tops of the plants. We make it up in 20 × 50 foot strips and treat the outside edges with copper naphthenate. We jam the plants and

we cover a couple hundred thousand 1-gallon containers in a day. Rain goes through it and we've had 8 inches of snow on it. It lasts at least 6 or 7 years. We take it off the latter part of March. We store it dry but it is very flammable.

VOICE: We jam our containers into plastic quonset huts to try to prevent wind dessication in central Oklahoma. The temperature inside is not much different than outside; we average around a 17 mph wind and can get down to around 0°F at mid-winter.

VOICE: We cover our field-grown azaleas with 50% saran. It's not how cold it gets, but it's how quick it gets cold and how quick it thaws. Quick temperature changes are bad for our plants.

LANNY NEEL: In mid-winter the low sun angle allows vertical container surfaces and tree trunks to warm up rapidly, which may be a factor in winter kill of such exposed surfaces.

VOICE: We don't want the early morning sun to hit our plants and raise them from 15° to 34°F in an hour or so, so we place our saran to shade our plants from the early morning sun.

DICK MARSHALL: Does anyone have an opinion on what height the shade material should be above the plants?

BILL CURTIS: At the Chicago meeting a speaker stated that the heat comes from the ground and the lower the roof the more heat would be trapped within.

BILL COLBURN: We recently started raising foliage plants in Central Florida and we have to build houses in the winter, too. At a nearby nursery they built their houses 20-25 feet high and they maintain that this keeps the heat in. They are in a cold area and I know they have gotten outside temperatures in the 20's, but they have never yet had to heat their houses.

VOICE: When you are building a greenhouse and determining the heating requirements, you measure the outside surface area; the more surface exposed to the weather, the more heat you have to have.

5. What effect might the water content of a plant have in protecting it from below freezing temperatures? If a plant is wet before the cold comes, does that coating of ice do more good than if it's dry beforehand?

DICK MARSHALL: I don't know if there's a significant difference, because we haven't ever let our plants get very dry in the fall; I'm not aware that this would make any difference.

BOB WRIGHT: Recently we put some azaleas in some dessicator chambers at various humidities and let them equilibrate before subjecting them to cold and, to a certain extent, reducing the moisture content of the plant resulted in reducing freezing

points for the plant tissues and thus imparted some protection. One of the major causes of freeze injury comes from the fact that the roots freeze and cannot supply the shoots with moisture when they thaw and lose water.

DICK STADTHERR: Most roots do not have the ability to harden like shoots and if they freeze, damage occurs. Sawdust and jamming help to conserve heat around the roots.

6. What effect does watering plants before a hard freeze (15°F) have on preventing root damage, and how long can a saturated root ball resist damage? Do you water before the temperature drops below freezing, not water at all, or turn on the water after the freeze?

JIM MERCHANT: If you turn the water on before the freeze you will insulate the plant from damage.

DICK MARSHALL: We do not use irrigation for cold protection in mid-winter, but only in the fall and spring, our plants are hardy by mid-winter. You ask if we would turn the water on after the temperature got to 15°F. If we waited until then, the water in our risers would be frozen solid and we would have to thaw them out individually. We grow no container stock, only field grown material.

7. What good preservative is safe to use on wood for planter boxes or around plants?

VOICE: Wolmanized wood or copper naphthenate. PCP is volatile and will cause damage.

VOICE: We've had damage to cuttings in a propagating structure from wolmanized wood, but not to rooted cuttings.

8. How do you measure Cation Exchange Capacity (C.E.C.)?

BRYSON JAMES: You saturate the soil with a given cation and then you use a different cation to replace the first and measure the amount of the second ion taken up.

LANNY NEEL: Work done in Florida on C.E.C. with peat and sand showed that a 50/50 mix of sand and peat had as much C.E.C. per 6 inch pot as did a pot of pure peat because the peat was so light relative to the peat-sand mix. C.E.C. is traditionally measured in terms of millequivalents per 100 grams, and 100 grams of dry peat occupies a much larger volume than does a 50:50 mix of peat and sand.

9. Is anyone using filtration to eliminate weed seeds?

VOICE: Rainbird water filters are used for filtering trickle irrigation water; that will take weed seeds out.

10. Is there a cheap way of filtering pond water to get herbicides or insecticides out?

VOICE: Activated charcoal is about the only way.

CHARLIE PARKERSON: We're more concerned about distributing pathogens than chemicals.

BRYSON JAMES: The dilution factor in a reasonable sized pond ought to take care of most materials; clays on the bottom absorb a lot of material too.

CHARLIE PARKERSON: If you are worried about a hazardous material, don't use it. The EPA is going to take away long residual materials so we won't have to worry about that aspect soon.

11. In research results distributed by Dr. Self, it was stated that Banrot at 4 to 6 oz/yd<sup>3</sup> has stimulated azalea growth, presumably by suppressing *Rhizoctonia*. Does anyone have any comments on this?

BOB LAMBE: Banrot will suppress *Rhizoctonia*, *Pythium* and *Phytophthora* at the registered rate of 8 oz/100 gallons. There is a difference between the methyl-carbamate in Banrot and Benlate, even though they have similar activity. We have found the former to cause some toxicity in poinsettias, so I don't think you can interchange Banrot with a mixture of Benlate and Truban or Dexon; you will have to be more careful with Banrot. I myself have not observed any phytotoxicity with Banrot in azaleas.

VOICE: Then you would recommend a mixture containing Benlate over Banrot?

DR. LAMBE: Yes, I would, although it is going to require very thorough mixing to incorporate a wettable powder with a soil mix.

BRYSON JAMES: Bob, do Truban and other related soil drenches actually kill soil-borne fungi or do they just contain them temporarily?

DR. LAMBE: Truban is more active than Dexon. Both are suggested as a protectant. The main advantage of Truban over Dexon is that Truban will persist longer in the soil, with the minimum recommended time between Truban applications being 4 weeks, compared to every 10-14 days for Dexon. Neither is much of a systemic. Although Truban has a longer residual life in the soil, and it can cause more phytotoxicity problems than Dexon because of this longer life, neither will eradicate the fungi; they protect the plants.

12. Are there nurserymen propagating plants in greenhouses where humidity is maintained around the plants with fog nozzles? If so, what are the pros and cons of this method?

CHARLIE PARKERSON: We ran an experiment with Dan Milbocker using two fog generators in a house on 30,000 azaleas (it's in the Plant Propagator's Proceedings). Our problem

came with heat; our fans would come on and blow out the humidity. We tried some cuttings during the late winter and had the humidity high during the day, but at night we were using a dry heat, and we didn't get any rooting. Sidney Meadows uses a moist heat at night and that's what makes him successful at this. Misting plants leaches nutrients out of them; fogging doesn't. If a way could be found to keep the heat down in the warmer parts of the year, fogging would be the best way.

JOHN MACHEN: We tried a compressed air nozzle and water to make a fog. We got fantastic results with Japanese maple in May; however, in June we couldn't keep the temperature down and we lost the next crop.

13. When do you collect seeds from Live oaks? When do you sow them? And how do you stratify them?

VOICE: The best time is when the acorns fall; plant them immediately. Live oaks don't need a stratification period.

14. Has anyone eliminated peat moss altogether from their regular potting mix?

BRYSON JAMES: Most people have gotten away from peat.

VOICES (consensus): Most people have been using pine bark or composted hardwood bark, although some growers around Mobile, Alabama, are still using some peat.

BILL CURTIS: When fir bark dries out you have a difficult time wetting it.

BRYSON JAMES: The same thing happens with peat. Three parts pine bark and one part sand is an excellent mix.

15. A question was raised about plants on the job which were grown in very porous mixture. Discussion revealed that peat in the medium was helpful in keeping some water holding capacity around the roots, but that the most important thing was to water the root ball itself every day until the plant was established in the surrounding soil. Comment: We've got to remember the ultimate consumer of our product and try to give the consumer a product which will survive and grow on the job.

DICK AMMON: We grow the plant from a cutting all the way through to the landscape plant on the job, and we use composted hardwood bark and sand. We've never had any problems with this except with *Ilex* when it becomes rootbound. If we tear the roots apart we can get around this somewhat. We don't just dig a hole and stuff the plant in it; we prepare the site carefully. The big secret is not to let the plants get root-bound.

BILL CURTIS: We use 1/3 each of peat, bark and sand; I'm going to raise the price rather than cut back on peat. How do you feed your plants, Dick Ammon?

DICK AMMON: We use a granular fertilizer with our bark mix which contains a slow release form of N, and have had good results. We like to compost our oak bark mix for at least 6 months; we take soluble salt readings on it before we use it and if salts are high we leach it further.

CHARLIE PARKERSON: A good compost mix contains many different fungi; we have heard about mycorrhizae from previous speakers and I believe that this will be the next wave of the future. We will be adding fungal cultures to our soil mixes to help our plants get established and grow better.