

ED KINSEY: 4 lbs active ingredient per acre.

CARL BAUER: Question for Harry Hopperton: When do you cut trees back to encourage development of a head?

HARRY HOPPERTON: We do not cut them back. Most of our customers want a 10 foot trunk.

JAKE TINGA: Question for Harry Hoitink. Would you comment on composting hardwood bark.

HARRY HOITINK: Composting is important in crops such as bedding plants where time is critical. Composted bark is more uniform. Most fresh barks inhibit the growth of certain pathogens. In fact, hardwood bark helps control *Rhizoctonia*, although pine bark does not. Composting reduces this ability. However, hardwood barks usually contain toxins, which make it necessary to compost. The Southeast is fortunate, as pine bark is readily available, does not contain these toxins, and therefore does not require composting.

QUESTION BOX

LES CLAY: I would like to know more about icing plants for winter protection.

JAKE TINGA: Dr. Charles Hendershott, who is now at the University of Georgia, made his fame on studying freezing and thawing in plants. He prevented freezing in several crops of Florida oranges. When water freezes, it releases a tremendous number of calories. This is called heat of fusion. When liquid water is put on from an irrigation system and it freezes on impact, heat is released. I prefer to say cold is absorbed. As long as liquid water is put on, temperature will stay right at 32°F. If the water is turned off and ice forms, that ice will go to 31°, 30°, 29° and on down. When the temperature drops as far as 15 degrees below freezing, it is very difficult to put the water on fast enough to keep the temperature at 32°. I have iced out a field and saved that field just by turning on the irrigation. It must be turned on before freezing starts and left on until after all the ice is melted. Do not turn it off after everything is iced down.

BOB McCARTNEY: What about anti-dessicants?

JAKE TINGA: I have used anti-dessicants. Timing is very critical as they tend to flake off; thus, they must be applied repeatedly. My experience has indicated they are not reliable.

GARY HUTT: I tried microfoam last year for overwintering and had fairly good luck with it. I was wondering if anyone here has used microfoam and if so, how he used it?

JAKE TINGA: Microfoam is bubbly plastic foam material ¼ inch thick.

FRANK HOGAN: I have three rolls, but I haven't put it out

yet in North Carolina. I hope to do so and hope to have the same luck you did last year, Gary.

WILL WITTE: A nursery in North Carolina lost containerized material valued at about 6 or 7 thousand dollars one winter. They began using microfoam and did not lose a single plant. Their method was to pick out the tender plants and bunch them in beds about 5 feet wide with railroad tie edges. They left small plants with a good head standing but laid down the taller plants. All plants were watered thoroughly, then sprayed with a fungicide. Beds were covered with weak plastic from an old greenhouse, microfoam was put down, then another layer of poly was put on top. They put it on in December and left it until early spring.

BOB McCARTNEY: Two years ago in Williamsburg I used microfoam as a covering for a plastic greenhouse, which was a modified cold frame about 50 feet long and only about 6 feet wide. We used it to store tender container plants such as palms and citrus. Temperature did not go below freezing even with no artificial heat at all. However, with just plastic protection the temperature did go below freezing. We ventilated the structure on hot days. One problem with the microfoam is that it becomes brittle and degrades during hot weather in late winter. It can easily become shredded and scattered all over the nursery.

JIM SABO: Work at Ohio State indicates that it should be put on as late as possible and off as early as possible to prevent heat build-up. Microfoam is now available 6 feet wide, 250 feet long and $\frac{1}{4}$ or $\frac{1}{8}$ inch thickness. The cost is \$90 to \$100.

GARY HUTT: One nurseryman has been able to use it for 4 years by removing it and storing it in the dark.

JAKE TINGA: We believe it is easier and more economical to throw it away. It costs to take it up, it costs to roll it up, it costs to store it. The next year it is a weaker product that may not be dependable. I would consider it an annual expense. Remove it and dispose of it before it scatters.

BOB LOGNER: I would agree with Gary Hutt that microfoam can be reused. Another possibility is to put it through a shredder and substitute it for perlite in the mix. It is becoming increasingly important to be cost conscious.

GARY HUTT: We use black plastic for weed control. Last year was the first year that we used microfoam, and we did not take up the black plastic. If you cover the plants with microfoam and leave the black plastic there, it is important to make sure that there is no standing water anytime. We had a few low spot areas underneath the microfoam where the water accumulated, and the plants in these areas were subject to rot.

We did not use any fungicide. If the foliage was dry and the black plastic on the ground was dry, we had no problems.

BILL COLBURN: I would like to know if anyone has a procedure for germination of *Nandina domestica* seed? We tried it in Florida some years ago and had variable results. We suspect it has a cold requirement. Can anyone tell me what the requirements are?

HUNTER BOULO: We have success by scattering the seed in a flat of 80:20 bark:sand mix, with seed covered about ¼ inch. We put the flats in poly covered houses where the temperature is around 35°F. We plant in November.

JUDSON GERMANY: We collect all the seeds we can find in the fall and store them dry at room temperature. We sow *Nandina* in June in vermiculite and perlite, about ½ inch deep. We put the flats in the greenhouse or under the shade of trees. Usually by October we get seedlings. I think you could plant them anytime from the time you collect on up to June.

BOB McCARTNEY: We are not raising *Nandina* to sell commercially, but we have many *Nandinas* in our landscape program at Williamsburg. We mulch *Nandina* with pine bark very heavily, and it stays mulched all winter. In the summer the berries fall into the pine bark and germinate. By fall the mulch is full of seedlings. That is what they do in nature.

BOB BOCH: Years ago we sowed in outdoor seedbeds in the fall, but they did not come up until the following year.

DR. STADTHERR: We tried them in Baton Rouge. We collected them around December and planted without any stratification. I think you don't have to stratify them. However, our germination was about 1 or 2 percent at the most. It may be that there is an afterripening period after the seed is collected. There may be an immature embryo.

JUDD GERMANY: It is important to remove the pulp promptly.

DICK STADTHERR: We did that.

JIM CAGLE: I believe that the cold requirement is essential.

WARREN SNEAD: For many years we have been growing some *Nandina* from seed. We have planted in the spring, but they do not come up until fall.

RONALD COPELAND: I am interested in seed propagation of calleryana pear, *Pyrus calleryana*. Is it too late to collect seed in December?

BRYAN NELSON: We have collected in January and February. We then cleaned the seeds, stratified them in moist sand

for 60 to 90 days, then planted them in a warm greenhouse under mist in a peat:sand:perlite mix.

NICHOLAS HAND: We have collected in December then stratified for 45 to 50 days before planting in sawdust in outdoor beds. We obtained good germination.

DICK STADTHERR: We have cleaned the pear seeds by allowing them to ferment in water at room temperature, then running through a blender with the blades covered or removed. A wire screen can be used to break the outer seed coat.

WILEY ROACH: I am interested in the palm that is prevalent here in Charleston. Does anyone know the name?

BOB McCARTNEY: It is *Sabal palmetto*. This palm is found from the Charleston area to Florida and along the Gulf Coast to Pensacola. It is hardy up to Virginia Beach area. The smaller dwarf form found all through the swamps is *Sabal minor*.

DICK STADTHERR. What is the hardiest palm?

BOB McCARTNEY: I might be able to answer that. We grow 6 species of palms, and *Sabal palmetto* is not the hardiest. I think that a mature plant with a full crown of foliage will withstand 10°F above freezing for a short period. The hardiest palm that grows upright is probably *Trachycarpus fortunei*, windmill palm. *Washingtonia* is another good hardy palm. The Phoenix palm is hardy to Charleston.

BOB LOGNER: What can be done to prevent bark splitting of *Indica azaleas*?

JAKE TINGA: Grow a hundred miles farther south!

BOB COSGROVE: It happens in Orlando, Florida, too, possibly because the plant does not become dormant.

DICK STADTHERR: This splitting occurs when there have been no cool temperatures preceding a sudden freeze. Plants have had no chance to go into their rest period, or become acclimated. Under these conditions they freeze very, very easily. They may freeze just a few degrees below freezing, whereas later in the winter they can take much lower temperatures. If plants are still growing rapidly, the water content in their cells is very high and freezing occurs intracellularly. The last portion that goes into rest is the base of the plant. Water content is high, solute content is low. They freeze easily and expand, which causes a longitudinal split.

CHARLES PARKERSON: One nurseryman on the east shore of Virginia is using Offshoot-O to help harden the plants. It seems successful.

DICK MARSHALL: I know his procedure. He is spraying one year old plants with Offshoot-O (methyl octanoate and

methyl decanoate) about the middle of September. These have been planted out in May, and he sprays in September to help them through the winter.

DICK STADTHERR: We have done just a very little of this also. I feel that Offshoot-O and similar compounds tend to delay the bud action on the top and stop growth. This, then, may trigger a change into rest period. We use a 3 to 5 percent concentration. The smaller cuttings are the ones that go into their rest period slower than older plants. Cultivars also differ in their response to low temperature.

PHIL BEAUMONT: I have read about atrinal (di Kegulac-sodium) in reports from England. I also understand it is being used experimentally at North Carolina State University to regulate branching on azaleas. Can it be obtained commercially?

RICHARD SMALL: No, it is not released yet. It has been approved for use on azaleas and probably will be available in the spring.

CHARLES PARKERSON: Last year at a symposium in Columbus, Ohio the theory was presented that when a plant starts going into dormancy the lethal temperature begins to drop and continues to do so. However, after just one day of extreme heat that temperature will rise very rapidly, and it then takes about two weeks for it to get back down again. The reason I was so concerned about it is that we use clear plastic in our houses, thus building up heat in the day. Actually what we might be doing very rapidly is turning around this hardening process. We might actually be making the plants winterkill at a higher temperature even with the poly.

JUDD GERMANY: I have noticed in the past freeze damage that occurred only in one spot down close to the base of the plant might callus and heal and the plant eventually recover. It would be interesting to see if wrapping with budding strips or vinyl tape would improve the chance of healing.

TED GOREAU: Can anyone give me a simple method for calculating air space or pore space in potting mix?

BILL DAUGHTRY: We cut the bottom off of a gallon plastic milk jug, turn it upside down, and put a screen over the hole in the bottom (originally the top). The screen is inside the jug so that the screw cap can remain in place. We then measure off 3000 milliliters on the jug and mark this line. We fill to the line with mix and slowly add water until it is saturated. We allow it to stand for two hours, carefully remove excess water from the top, remove the bottom cap and drain remaining water into some other container. The percent pore space can be calculated

by measuring the water drained from the bottom and dividing by 3000. We like to have 20 percent.

CHARLES PARKERSON: Question for Brad May. I want to know about your juniper production.

BRAD MAY: We begin sticking *Ilex* in the middle of July. As soon as we finish, we begin with junipers. We stick juniper cuttings in a mixture of peat:perlite:sand in approximately equal amounts. We add either 3 pounds per cubic yard Scotts 31-5-3 or 8½ pounds per cubic yard Osmocote 18-6-12. We stick the cuttings in square cups, then put the cups in flats. The mist is on about 7½ seconds every 7½ minutes. We do not use hormones. We have found that we get better rooting if we strip the cuttings. We also cut back tops. We use 30 percent shade but do not put on poly until we need it for winter protection, usually in October. The only time we heat a house is for the azaleas when it gets below 25°F. We then keep the heat at 35°F. We are not pushing for any winter growth.

RICHARD AMMON: Is any hybridizer interested in developing a hardy azalea with a good color? We find 'Karens' is hardy, but the color is not good.

TOM DODD: We are doing some hybridizing.

JIM SABO: Pete Girard, Girard Nurseries, Geneva, Ohio, has also worked with them.

HARRY HOITINK: The PJM rhododendron is called an azalea, but there are no really hardy azaleas up north.

RICHARD STADTHERR: Azaleas that tolerate high pH would also be valuable. Breeding should be done in the location where they will be grown in order to subject the new cultivars to the selective pressures of that environment.

JAKE TINGA: I would like to hear more about the use of both hardwood and pine barks, and the effects of composting in each case.

HARRY HOITINK: The South is fortunate to have pinebark. This bark is 90 to 95 percent lignin and only 5 to 10 percent cellulose. Spruce contains 20 percent and oak 25 to 30 percent cellulose. Other hardwood barks are even higher. The cellulose breaks down into sugar, which provides an ideal carbon source for microorganisms that, in turn, deplete the supply of available nitrogen. This is one of the reasons it is not possible to grow in fresh hardwood bark. Both pine and fir bark have a higher content of lignin and lower content of cellulose. This difference makes it possible to grow in fresh pine and fir barks. Harvest and debarking methods are changing also. In Ohio we are now getting 60 percent instead of 20 percent cellulose. As the composition changes, the bark loses air space and becomes hyd-

rophilic leading to root rot. Some barks also contain toxic materials and will need to be composted for this reason.

HUNTER BOULO: We are using 80:20 bark:sand and are composting because of heat and the high potassium level.

HARRY HOITINK: It is probably best to stock pile in pots and keep moist. Wettability is often a problem.

HARRY HOITINK: One grower in our area (Ohio) adds 4 lbs urea and 1 lb triple superphosphate per cubic yard plus 50 percent water by weight. He puts the bark in windrows and turns every 2 or 3 weeks if he plans to use it in 3 or 4 months. If it can be left a year, turning is not necessary. It is important to avoid an anaerobic condition as the pH can then become as low as 1.9. It is, therefore, important to choose a well-drained site for composting.