

19. Wang, B.S.P. 1960. The effects of stratification and incubation temperature on the germination of grand fir. MS thesis, Univ. of British Columbia, Vancouver, Canada.

LARRY KUHNS: Did you try Clorox to control the mold growth on your seeds?

CRAIG ADKINS: Abies seeds are very dirty and have many different fungal organisms on them. We tried Clorox and other surface sterilants but none of them worked. A very weak concentration of Benlate will control the fungal growth.

QUESTION BOX

The Question Box Session was convened at 9:15 a.m. with Ralph Shugert and Joerg Leiss serving as moderators.

MODERATOR LEISS: What herbicides are recommended for control of perennial weeds in containers.

MICHAEL DODGE: At White Flower Farm we believe very strongly that herbicide use in herbaceous perennials is not a good practice, because of the similarity between the weeds you are killing and the plants you are growing. Good husbandry is the answer. Prevent the weeds from growing by pasteurizing the compost and preventing weeds from growing in the beds on which the pots are standing. Weeds on the standing-out beds can be controlled by using a covering cloth or a combination of Roundup and Surflan to kill and prevent weeds. Keep the surrounding area weed-free to reduce blow-in of weed seeds.

JOERG LEISS: Fusilade does a good job on grasses.

MODERATOR LEISS: Would Surflan, applied at the recommended rate during the fall, have any adverse effect on rhododendrons or azaleas planted in the spring?

LARRY KUHNS: It should have no effect even if applied in the spring after planting at the recommended rate of 2 to 4 lb AIA.

CHARLIE PARKERSON: We use this material in an EC formulation on rhododendrons and are very satisfied with it.

MODERATOR LEISS: What herbicide would you use to control wild oats and downy brome in established evergreen and deciduous nursery stock, both pre- and post-emergence?

LARRY KUHNS: For post-emergence Poast or Fusilade can be used while for pre-emergence, Surflan in spring and Devrinol in the fall can be applied.

MODERATOR SHUGERT: What is the most economically feasible method of propagating sugar maple clones?

HARRISON FLINT: I know that they are rooting sugar maples at the Northeast Forest Experiment Station in Burlington, Vermont, by softwood cuttings.

PETER VERMEULEN: There was a paper on this by Bill Mossing.

MODERATOR SHUGERT: What are the advantages and/or disadvantages of doing hardwood evergreen cuttings in late winter (March/April) vs. November/December? How late can they be made?

CHARLIE PARKERSON: I have a paper coming out in the 1983 Proceedings (Vol. 33) and it discusses this very point. We think this is a real key. Our strongest flush of growth is the spring flush. If we make our cuttings before the buds start to swell they root and take right off.

JOHN SPARMANN: In Florida we make all our juniper cuttings in the winter months, January/February, and they take off in spring. We prefer that to summer propagation.

RON GIROUARD: In a previous paper on *Picea abies* we showed that there is a maximum rooting period in the spring (early May) with a smaller peak in the fall.

BOB GOUVEIA: We start cuttings of *Thuja*, *Taxus*, and *Juniperus* in the middle of April. The *Taxus* root in about 8 weeks but we leave them in the sand bed (on heat cables) until after the first of September. They are then transplanted. We get twice the growth compared to winter-propagated *Taxus*.

MODERATOR SHUGERT: I am having poor rooting percentages with *Syringa vulgaris* French hybrids. Can anyone help me?

CHRIS GRAHAM: At the Botanical Garden we have been rooting softwood cuttings for some time. We take our cuttings after blooming, just when the wood is turning from green to brown. We treat with No. 3 hormone powder mixed with Captan, stick them in coarse sand and peat (4:1 v/v), under intermittent mist. The rooted cuttings are left in the flats for the subsequent winter. There is tremendous variation among cultivars.

ED MEZITT: We changed our methods when we found that the white forms could not take the mist. See my paper in the Proceedings. We get about 100% rooting with our method.

PETER VERMEULEN: I would just like to support what Chris Graham said and add that water is very critical. We root

in outdoor beds and one year we had excessive rain which caused defoliation.

CARL ORNDORFF: I have reported that propagation by shoot cuttings is the hard way. The simple way is root cuttings stuck in December/January in a cool house (just above freezing). By June you have 12 to 15 in. plants. For the majority of lilac cultivars you have saleable plants in 2 years.

MODERATOR SHUGERT: When and what hormone is used for the rooting of *Arctostaphylos*? What medium is best for growing on?

JIM CROSS: I can only speak for *Arctostaphylos uva-ursi*. The harder the wood and the better drained the medium the better stands we get. Take the hardest and shortest cuttings from the center of the plant in the winter. I don't think the nature of the growing-on medium is important as long as it is well drained. I think that the severity of the changes in the environment from propagation bench to growing-on is very important. I would suggest lifting cuttings out of the propagation bench, pruning both the top and bottom, placing back in the propagation bench, and allowing them to adjust for about 2 weeks. When potting-up take a little of the propagation medium, which presumably contains some mycorrhizal fungi by that time.

BRUCE BRIGGS: To add to Jim's comments, mycorrhizae seem to be very important. You can improve rooting by grinding up rooted *Arctostaphylos* and watering it into the rooting flats.

PETER VERMEULEN: I can back up what Jim said about good drainage. We left rooted cuttings in the rooting medium too long and we lost the crop when they got too wet. We advise getting them out of the medium as soon as possible.

MIKE DODGE: We have been testing a hybrid *Arctostaphylos* from Colorado. It roots very well in the fall (October through December) using a peat/sand or peat/perlite medium with mist or in a tent. After rooting we pot them up in a pine bark, peat moss, and perlite medium (60:30:10, v/v).

MODERATOR LEISS: Our *Viburnum opulus* 'Compactum' produced from cuttings are very slow and erratic in their nursery growth. It takes 4 to 5 years to produce a decent plant. What is wrong?

CLAYTON FULLER: I think that if one watches fertility the plant would perform very nicely in a container with rapid growth. Also, you need to watch for spider mites.

MODERATOR LEISS: What, if any, work has been done with IBA in transplant gels to initiate root regeneration in difficult-to-root species?

CAMERON SMITH: We have been using Hormex No. 3 on *Dirca palustris* and get good root regeneration.

MODERATOR LEISS: I would like to know if there is any method, other than layering, that can be used to propagate filberts?

JOERG LEISS: Very soft cuttings can be rooted. Probably you will have to put your plants into the greenhouse to stimulate growth. If you wait too long the cuttings will root but the buds will fall off.

(Ed. Note — See the hot callusing grafting method for filberts developed in Oregon by Harry Lagerstedt, as described in Hartmann and Kester, 4th ed., p. 430).

MODERATOR LEISS: Has anyone micropropagated any *Acer* species? Can cultures be stored below freezing?

BRUCE BRIGGS: The problem appears to be in the production of too much callus.

DICK ZIMMERMAN: Microplant Nursery in Oregon, I believe, has done one cultivar of maple on a commercial scale. Cultures can be stored at 34 to 36°F for up to a year, as with azalea cultures.

MODERATOR SHUGERT: What is the secret to producing true-to-life variegated hostas by micropropagation? Are variegated forms produced from vegetative buds more stable than flower buds?

CHARLES HEUSER: In propagation studies with *Hosta* 'Francis Williams' we obtained three forms when vegetative buds were used. I suspect that adventitious buds were forming in tissue culture.

MICHAEL MARCOTRIGIANO: Many of the hostas are periclinal chimeras and any time that you get adventitious shoots you will lose the stability. Axillary shoots and normal divisions are the only method of propagation.

JOERG LEISS: In England they just slice the buds into 4 lengthwise sections and get very rapid propagation.

MODERATOR SHUGERT: Does tissue culture eliminate all viruses?

DICK ZIMMERMAN: No. It can be used to eliminate viruses but that technique is different.

MODERATOR SHUGERT: What experiences have nurserymen had with heat stress in containers? What can be done to prevent it?

DICK WOLFF: We had thousands of Japanese maples this summer in the open and the heat was devastating this year (1983). We went two ways: (1) cover the plants with 52% shade cloth; and (2) syringe the plants each day at 11:00 a.m. and 2:30 p.m. for about 10 minutes.

JOHN SPARMANN: We used 2 or 3 short irrigation cycles on sensitive plants to help with heat stress.

RAY BLEW: We had a problem in south New Jersey. We turned our water lines on at 10:00 a.m. and 2:00 p.m. for 10 minutes. Two other factors should be considered. (1) You can pull the containers in tight and then spread them out as they grow. (2) Use bigger liners and get them out earlier. This has been most important with us. The plants will shade themselves and eliminate most of the problems.

MODERATOR SHUGERT: Where can I purchase Wood's Rooting Compound?

RALPH SHUGERT: Contact your local agricultural supply house or Ed Wood, who is a member of the Western Region.

MODERATOR LEISS: Question for Jack Alexander. Can *Pieris* × 'Millstream' be grafted?

JACK ALEXANDER: I have had limited success grafting onto unrooted *P. japonicum* cuttings. The work was somewhat late and perhaps earlier grafting would be better.

MODERATOR LEISS: Can *Ilex verticillata* cuttings be successfully stuck in early December?

ELWIN ORTON: I have stuck cutting of *I. verticillata* × *I. serrata* hybrids, and *I. verticillata* that time of year and they root well. Double wound the cuttings and treat them with Hormodin No. 3 and use bottom heat.

MODERATOR SHUGERT: What is the difference between *Pyrus calleryana* 'Select' and 'Chanticleer'?

RALPH SHUGERT: They are the same.