

Thursday Afternoon, December 13, 1979

The Thursday afternoon session convened at 2:15 p.m. with Dr. Philip Carpenter serving as moderator.

**WINTER STORAGE OF BARERoot LINERS AT
SUBFREEZING TEMPERATURES**

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Why do we store plants at subfreezing temperatures? Primarily because dormancy is guaranteed, it is closer to nature, diseases are nonexistent or easy to control, and low temperature give high relative humidity. Additionally, plants grow faster initially; this is very important when hot, dry summers follow short springs. Storage at subfreezing temperatures does have some limitations. Shipping during midwinter at a moments notice is hard to do unless stock is packed accordingly and humidity must be replenished every 5 to 6 weeks.

We use the following procedures: Plants are dug in the fall or early spring when they are dormant. Sometimes the foliage is "sweated off", as with rose bushes. Botran spray is applied on roots as well as canes. Plants are then graded and bundled for storage in bins. The bins are made out of 2" x 4" lumber and placed on pallets so that cold air can pass under the bin as well as over the top since the floor gives off some heat. Plants are placed root to root and a layer of paper waste (called clarifier), obtained from a paper company, is placed between the roots. It is light-weight and nontoxic. Most important, it is not a disease carrier. This medium is wet until water can be squeezed out of it. Bundles must be limited in size so that the roots will not dry out. With roses there are 5 bushes to a bundle, while with seedlings the diameter at the root neck should be no larger than 4 to 5 inches.

We dig dwarf Alberta spruce, nested spruce, and Colorado spruce early in the spring when plants are still dormant. Extra care must be taken when packing these conifers. Plenty of space must be left between the layers. Branches should be free from packing material because they may rot at the point of freezing.

After the plants are packed they are washed down with Botran to prevent *Botrytis*. Captan and Ferbam do not seem to work too well at low temperatures. We do not use Terrachlor as it inhibits growth the following spring.

A good thermostat with a 1°F differential is a must. The temperature is set at -1.5°C (29°F) and will fluctuate between -2° and -1°C (28 and 30°F). This will hold the plants dormant. It is important to reach freezing temperatures within a few days.

Every 5 to 6 weeks, preferably on a mild day in winter, the thermostat is turned up for 24 hours so the air temperature goes to 4.5° to 10°C (40 to 50°F). At this time, plants are sprayed with Botran to replenish humidity in the air and moisture inside the branches. The temperature is then again dropped to -1.5°C (28°F).

Three to 5 days before shipping and/or planting, the temperature is raised by opening the doors or bringing in a portable heater for 24 hours to thaw out the packing medium. As soon as the medium is thawed out the temperature is dropped to 0.5° to 1°C (33° to 34°F). If plants are not immediately shipped or planted they are given a final spray with Botran. Small quantities of plants can be packed in bushels, boxes or pallet boxes so small quantities can be removed without thawing the whole cold storage.

Care must be taken to maintain humidity as high as possible. However, plants frozen in ice can become waterlogged. This is not detrimental to the plant but can be if the roots are waterlogged. This waterlogging is also bad for cuttings or scions.

In order to winter store plants at subfreezing temperatures there are certain basic requirements one must have:

1. *Air-tight insulation.* We have sprayed 2 inches of polyurethane on cement block walls.

2. *Cooling coils with automatic defrost heaters.* Defrost water is run outside until plant medium is frozen. Defrost water is then run onto storage floor. If needed, additional water is poured on the floor every 2 weeks.

3. *Thermostat with 1°F differential.* This is to insure that the temperature does not drop too low at any point. It is presumed that plants start to solidify at approximately -2°C (28°F). Lower temperatures may result in dehydration. Our storage is run by air conditioners. Circulation fans are going all the time except when automatic defrosting takes place.

We have made two observations about storage at subfreezing temperatures.

1. Arizona or California grown rosebushes, subjected to a 60 day freezing period, started much more vigorously and rapidly than others coming out of regular storage.
2. Junipers do not store well this way.

In conclusion, most nurseries should have cold storage

facilities. Plants stored at subfreezing temperatures start growth rapidly in the spring. It is the most natural, healthful way to store plants.

CONTAINER PRODUCTION OF EUONYMUS ALATA 'COMPACTA'

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Five years ago, when we decided to grow some of our *Euonymus alata* 'Compacta' in containers, we were not aware of the various problems that would arise from growing this species in containers. This report outlines some of these problems and our solutions.

We always gather our cuttings from the best growing stock in the nursery. In our area, cuttings are taken the 4th week of June. They are taken only from the most vigorously growing plants. The cuttings we make are 6 to 7 inches in length and about the diameter of a lead pencil. They are put in bundles of 25 in the field as they are made, and held together with an elastic band. They then are brought into the propagating work area where the bottom 2 or 3 sets of leaves are removed. We do not recut the cuttings; thus reducing the labor in the work area. We never remove any part on the terminal growth, because we feel that natural self-branching is sufficient. We also find that it checks the growth of the plant later on in its growth cycle. The cuttings are then placed 100 to a flat in coarse perlite. We use no hormone or fungicide dip on our cuttings. We have tried auxins in the past and found no beneficial effect from them. The cuttings are placed in our propagating frames using Mist 100 nozzles and a Mist-O-Matic scale.

As soon as a sufficient root system has developed (8 to 9 weeks) the cuttings are removed from the propagating frame. Around the first week of September they are potted into a Nu-pot with a soilless potting mix. We are presently using Pro-Mix BX. The potted cuttings are grown on in the fall until freeze-up time. The plants are fed with Peters 20-19-18 every 10 to 14 days at 3 ppm until they defoliate, when they are put in a minimum -2°C (28°F) cold storage house.

Around the first of April the following year, the plants are removed from cold storage and set outside before any bud development occurs. Sometimes, because of weather conditions, we do see some bud swell, but this seems to have no effect when the plant is placed outside.