cess the following seasons. It can be done in early spring or in August depending upon soil conditions.

Seed and Propagation Beds

1. Fertilizing stopped by August 20th. Three pounds of Kapco in 100 gallons of water used about every 10 days.
2. Lath shades removed from the propagation beds on Labor Day — give or take a week according to the season.
3. Irrigation of the irrigated beds stopped about Labor Day unless dry weather prevails; then it is applied as needed.
4. Greenhouse mist propagated softwood cuttings hardened off before removal.
5. Mist on outdoor propagation beds shut off gradually when cuttings are rooted.

MODERATOR GALLE: Now we are going to the Midwest to Iowa, and Mr. George Rose will present that.

HARDENING PLANT MATERIALS FOR THE WINTER WITH SPECIAL REFERENCE TO MIDWEST CONDITIONS

GEORGE ROSE
Henry Field Seed and Nursery Company
Shenandoah, Iowa

Midwest winter conditions are very difficult on plant material, because of the frequent, very rapid changes in temperature and humidity. Many plants, which are hardier in much colder climates, often come to grief in midwest areas because of freeze damage to unripened tissues, caused by early freezes and by the usual lack of a snowblanket to keep the temperatures and humidity surrounding the plants from fluctuating widely.

Narrow-Leaf Evergreens

My talk will not cover field grown narrow leaf evergreens, as we do not handle this material at the Henry Field Seed and Nursery Company.

We do not produce container evergreens grown in soil or the other common mixtures either, but the common winter preparation procedure with this material in our area is to pull the evergreens together in tight groups and mulch heavily around the edges of the groups with shingletow or hay. This is the way container evergreens are wintered at Plumfield Nurseries and they very seldom experience any winter damage. No particular hardening off procedures are practiced.

To produce material that is merchandiseable for our mail order business, we have, over the years, developed a method of growing narrow-leaf evergreens in containers of light weight growing medium, composed of ground sphagnum moss to which about 10% peat is added. The peat is used to retain the slow release nitrogen fertilizers, either Uramite or Borden #38, which are added to the potting media

at the time of planting. These potted plants have additional foliar feeding as needed through the growing season. We have used several different fertilizers and a formula somewhere around 10-15-5 seems very satisfactory.

It has been our practice to stop all fertilizing with the event of the first frost. Actually, from late summer on the fertilizer feedings are reduced, as continual soil testing always indicates a slower usage of fertilizer after the actual growing period is over.

As is commonly understood, evergreens need to go into winter season with the growing media in a moist condition, therefore watering is continued right up until the time the ground freezes, although as the air cools and the usual fall rains occur, it is usually not necessary to water very often, from early October on.

After two or three severe freezes, usually about the end of October, the container grown evergreens, which are in outside frames, are enclosed in polyethylene tents. This was not a new idea with us as Dr. Chadwick at Ohio State developed this method of winter protection some time ago. Two mil poly seems sufficiently strong for this purpose. Racks are left over the evergreens to reduce the heat from the sun and the whole frame is enclosed in the poly tent. To prevent snow damage it is better to put a ridge pole of 2 x 2's or pipe down the center of the frame and lay the poly over this, tacking it tightly to the frame sides and ends.

We find it very necessary to see that the poly enclosure is airtight as far as possible, in that, where openings have occurred, plants in the immediate vicinity of the openings have been very badly burned during the winter. This undoubtedly is due to de-hydration caused by dry air and low temperatures.

Should there be a long spell of unseasonably warm weather in the winter, it might be necessary to open the ends of the frame to allow a circulation of air to cut down the heat inside the frame, but we have never experienced this particular problem and have allowed our poly tents to be tightly closed throughout the winter.

It is best to leave the poly tent over the frames in the spring until extreme cold weather has passed — then the determination of how long the poly is to remain over the frame is based upon the condition that you want the plant to be in, as you offer it for sale. In the mail order business, a dormant evergreen handles much better than one with new soft growth on it and therefore we find it best to remove the poly tent after the most severe weather is over, to keep the plants dormant as long as possible. Possibly for road-side or over-the-counter sale, the tent should be left on, to act as a greenhouse to produce early growth on the plants, thus improving their appearance. It must be borne in mind however, that once the plants have been forced into growth, a late severe freeze will be very likely to kill all the new growth and spoil the plants for sale for the season.

We have also produced a limited line of container grown deciduous material produced in the same light weight media. One item we have produced successfully, although the sales for it so far have not been exciting, has been some of the red berried Cotoneasters.

These have grown very well in the light weight media and we have wintered them in the same manner as the narrow leaf evergreens without the least bit of trouble. We have also produced good plants of the evergreening *Euonymous* varieties and of *Mahonia,* using these same wintering methods.

The Winter Protection Of Deciduous Field Stock

Due to the sudden and often extreme changes of temperature and humidity, which occur during the winter in the Shenandoah area. young, nursery grown, deciduous stock is very subject to winter damage. Every attempt possible must be made to harden up the stock as early in the fall as is possible. Therefore, with most deciduous stock, no fertilizing is done after early July and cultivating is usually discontinued in September.

By mid October, it is necessary to dig the tender stock and that which has a tendency to be tender as young plants in the nursery row. With us these varieties include *Caryopteris, Deutzia, Buddleia, Althea,* Crape Myrtle if grown, Boston Ivy and Silver Lace Vine — there are probably many other plants in the same tender category, but of those we handle, the above are the varieties most subject to early freeze damage.

With the *Buddleia,* we immediately trim them to one cane and store. On the rest of the material the leaves are sweat off and the plants are then put in refrigerated storages as usual.

The remainder of the deciduous material is dug as soon as freezes take off the leaves. We have the same trouble with some of the Privet and Chinese Elm that other sections do, in that, these plants lose their leaves about the last of all and therefore are the last varieties to be dug. They include Ibolium and Amoor River Privet and Chinese Elm, particularly seedling Chinese Elm.

We do not use chemical defoliants on any nursery stock. Our experience with test lots of stock chemically defoliated, has been that it does not store, or keep as well as other stock.

On years that our storage has been crowded, we have heeled in apples and plums, Chinese Elm, Willows, Pin Oaks and Hybrid Elm. My own personal opinion is, that Willows and Pin Oak properly heeled in, come through the winter better outside than with inside storage, even refrigerated storage. In fact, our experience has been that most nursery stock heeled in properly comes through very well in outside heel beds, if it enters the winter in a well ripened condition.

MODERATOR GALLE: Thank you, Mr. Rose.

We are now moving on to the Winter Protection of Late-Propagated Plant Materials. We have a change in speakers. Mr. Hans Hess, Hess Nurseries, will be the speaker in place of Mr. Fisher.