SYSTEM OF PRODUCING BUDDED CONTAINER-GROWN RHODODENDRONS FROM CUTTING TO TRAILER

RICHARD VANDERBILT
The Conard-Pyle Co.
West Grove, Penna.

Stock plants are the basis of the crop. I feel that more predictable results may be obtained, if a separate block of rhododendrons distinct from the saleable crop is maintained for use as mother plants. Stock plants need a certain amount of studied neglect if the cuttings from them are to root strongly and quickly.

All of our rhododendron stock plants are grown in bushel baskets. We feed every other time we water until the first of July. We discontinue feeding stock plants from this time on.

In the middle of July stock plants will be budding up heavily. We remove the flower buds to produce another growth. Our cuttings will be either single second growths or multiple first and second growths if the cutting originated from a branch that was not cut the previous year. Cuttings are made in September, treated with a combination of IBA, Phygon and Boric Acid in talc. After twelve weeks they are lifted and potted into 1-quart Polytainers. This potting is a variance for us. *Formerly, we benched the cuttings in peat moss.* We found that cutting them out of the peat moss prior to canning did have a definite slowing effect on the development of the plants.

We use a potting mix of peat moss—Perlite 50-50. No limestone or superphosphate is used in the mix at this time as the cuttings seem to resent these additions. We water in Dieldrin at the rate of 4 lbs. actual material per acre plus Geigy Chelate NaFe at the rate of 2 ounces per hundred square feet after potting. The potted cuttings will receive one feeding of 20-20-20 at the rate of 4 ounces to 100 gallons of water at this time. This is enough feed until they begin active growth. The potted cuttings are kept in a greenhouse under 40 degrees night temperature, and as cool as possible during the day, for 20 days. The temperature is then raised to 65 degrees and supplemental cyclic lighting is given six minutes out of every half-hour from 8 p.m. till 4 a.m. Minimum intensity should be 20 foot candles at the darkest spot.

Another feeding of four ounces 20-20-20 to 100 gallons of water is given when soil tests indicate a nitrate level under 7 or 8 parts per million. In practice this works out to one feeding a month at this very low dosage. This is an extremely low level and safe if not used too often. It is suprisingly easy to build up an excess of nitrogen during the dark months of February, March and April. Later in the spring, soil tests frequently indicate that this feeding be increased to once every two weeks.

After the 15th of May the young liners are ready for shift-

ing into a larger container, in the field. Farm wagons, loaded with the potting mix, are tractor pulled along the bed where the plants are to be placed. Canning is done on the wagons. The plants are placed immediately in a shaded quonset house. This is our quonset type overwintering structure and the plants will remain here the entire summer and winter. The houses have been covered with 4-mil white opaque polyethylene in which we have made 5″ - 6″ circular holes to allow the heat to escape. Over a 4 to 5 week period the number of holes are gradually increased and at the end of 5 weeks the plants are in full sun. Any variety that gets sunsick will be kept shaded.

Selection of the container and of the soil mix are very interrelated. Drainage in the soil mix within the container is just as critical as it is in bed or field culture.

The soil mix in the container behaves differently from the same mix under field conditions. It will tend to be less well-drained because of the limited depth of the container. More water stays in the lower portion of the container because it is such a limited column of soil.

We are after a mix so well-drained that there is not enough excess water available to allow the growth and development of the rhododendron root rot fungus, *Phytopthora cinnamomi.* In practice the lighter the mix and the more air in it, in relation to water, the less root rot there will be.

The soil mix we use is 50% peat and 50% coarse sand. Disease problems aside, any ratio up to and including 100% peat does a good job. The higher the peat level, however, the greater the danger of *Phytopthora.*

The canning mix is modified by the addition of:

10 lbs. Dolomitic limestone
3 lbs. Hi-Calcium limestone
10 lbs. Pulverized 0-20-0

Notice that we are applying very heavy amounts of limestone and superphosphate to the canning mix. Available phosphorous in the soil is the single most important key to early, heavy budding of rhododendrons. The limitation of available phosphorous is the chief cause for rhododendrons failing to bud.

Poor rhododendron budding in young stock or only sporadic budding, used to be almost a universal phenomenon. This is easily understood when we look at the behavior of phosphorous in soils. Phosphorous tends to be most soluble when the pH of the soil approaches 6.5 - 7. and practically insoluble at a low pH such as 3.8 - 4.5. At the lower pH the soluble phosphorous reacts with iron and aluminum. These elements become available in abundance at these low pH levels, and combine with the phosphorous to form totally unavailable iron phosphate and aluminum phosphate.

To make enough phosphorous available to produce heavy bud set is very difficult at a low pH, because of the iron and aluminum acting to lock it up.

A rhododendron growing at a pH of 6.5 - 7. normally looks quite sad. True, phosphorous is available, but iron is now totally unavailable within the plant. Result: Chlorosis and Death. Frederick Street, of England, has a couplet about this in his catalog:

"A rhododendron set in lime,
Looks like a curate doing time."

Chelated iron is the material that allows us to keep both phosphorous an iron available to the rhododendron.

While we can grow rhododendrons at a very high pH, we do not want the pH any higher than necessary to insure heavy bud set. The danger of *Phytopthora* will increase as the pH is raised. A compromise level is pH 5.5 - 5.8. The limestone rates indicated earlier will put the pH in this range if a very acid sphagnum peat moss is used—pH 4.0.

This initial application of phosphorous is further bolstered by the fertilizer ratio we use in our feeding program. We use a material with a ratio 9-45-15. It was actually formulated as a "plant starter" for seedling transplants. We start feeding with this as soon as the plants are canned. We make a stock solution of 1 lb. to 1 gallon of water. This stock solution is proportioned out at the rate of 1 gallon to 200 gallons of water. This feeding is given every other irrigation. We continue feeding at this rate until August 15th. It is then lowered to one-half this rate. The following spring we start feeding as soon as the plants need water at the higher rate mentioned. The rate is lowered again on the 15th of August of the second year to the lower level.

Dieldrin is applied again as soon as the plants have been canned. Four pounds actual material per acre.

Geigy NaFe is applied at this time. Two ounces per 100 square feet. The NaFe is applied again, at the same rate, the following spring. The Dieldrin and the NaFe are applied through our proportioners.

The type of container also determines how a given mix will behave. A metal or plastic container with holes in the bottom will not allow as much drying out or aeration as the same container made of woven wooden strips.

A mix that has roots thoroughly dispersed throughout it will keep the entire soil area at a lower and more even moisture level than the same mix with only 10% of it penetrated by roots. This means that overpotting can be a real danger because of disease build-up in the unused soil that stays wetter.

We feel that a lerio 2-gallon container is too small for two growing seasons. We have found that we get practically double the plant size if we shift the one-year 2-gallon into a 5-gallon lerio can for its second season. However, if we place the liner into a 5-gallon container the first year, we run into root rot problem. This shifting from 2's to 5's soon becomes a massive job when there are large quantities involved. We have

noticed that when we use bushel baskets for growing our stock plants that *Phytopthora* is never a problem, regardless of plant size. My supposition is that this is because of the tremendous increase of air into the mix; it then follows that there must be less free water to breed and spread the disease. The basket also keeps the soil cooler than does a metal can and this also decreases the chance of *Phytopthora.*

We are going to can our rhododendron liners into a 1-quarter bushel basket. While only two gallons liquid measure, it is the equivalent of three trade gallons. This will allow us to get our desired size in two years without shifting and without the disease problem of an oversize solid container.

Pinching of the plants began in the greenhouses and is continued the entire first summer.

Second year care is feeding and watering. Budding will start in early July of the second year. 100% budding may be expected with this system.

Our spray program, which was done weekly in the greenhouse, is reduced to once every 3 weeks in the open. The choice of spray materials is vast. We use and find safe, DDT, Diazinon, Parzate and Kelthane. While there is some overlap here, we find that this combination does a fine job on mites, all leaf spot fungi and most all insects except for leaf roller. For this we use, Thiodan by itself.

We have found monthly applications of Dexon to pay their way in greatly reducing the incidence of *Phytopthora.* There seems to be some controversy about whether this material works. We feel that it is very useful as a preventative, but it is not as a cure.

Winter protection is provided by covering the quonsets, in which the plants have been growing, with 4-mil white polyethylene.

We have found a system of order filling that works smoothly for us. Our containers are pulled by customer order and placed on pallets that are on a farm wagon. A wagon holds eight 4 ft. x 4 ft. pallets. Each pallet has a 12-inch garden label placed in one can showing the trailer load number and the stop number. After loading the wagons are pulled to the loading dock, and the pallets removed by forklift. They are placed on the floor of the shed by trailer load number and stop number, as shown by the 12″ label in each pallet. These numbers are the guide and key to the whole loading operation. It is necessary to have the material for any trailer all pulled before the loading of that trailer begins. The loading on the trailer is done by a small forklift. It picks up the pallets sequentially and carries them directly into the trailer. They are checked and then stacked or decked depending on the type of load.

MODERATOR TUKEY: Thank you very much, Dick, for a very interesting paper. Our next speaker will speak on the subject of "Bench Grafting Black Walnuts". The speaker is Mr. Albert Ferguson.