

the heat certainly would be. We do not attempt to keep the plants under these conditions very long. Most of them are in the greenhouse for only a short time but with rhododendrons this is a rather expensive production.

HANS HESS: Have you used this "pill", that we've heard about, in your production and if so, what results have you had?

JOHN MCGUIRE: We have used the Agriform Plant Tablet; the results depend a lot on the irrigation program used in growing the plants. Our containers are getting $\frac{3}{4}$ " to 1" of water per day and under this irrigation regime the tablets run out about early August. If you want to push the plants you would have to give them a shot of fertilizer at this time, but I don't — under our conditions I stop them right there. The best results we've had with slow-release fertilizers has been with MagAmp, with Osmocote running next.

MODERATOR PINNEY: Thank you again, John. We're going to have to move on now. Our next speaker will talk on "Mechanization at Medford Nursery". I am not personally acquainted with his nursery operation but I understand he is doing an excellent job and it is my pleasure at this time to introduce Mr. Earl Robinson to you.

MECHANIZATION AT MEDFORD NURSERY

EARL H. ROBINSON
Medford Nursery, Inc.
Medford, New Jersey

I would like to speak to you on mechanization at our nursery in five main categories: 1) Propagation, 2) Greenhouse Growing, 3) Field Growing, 4) Over-wintering and 5) Shipping.

PROPAGATION

Most of the plants we grow are produced from cuttings although we have grafts and a little seed production. Our cuttings are prepared in the customary way with one exception; that is, they are prepared in the "Propagation Room" and are stuck in the flats there in assembly line fashion. Approximately 100 cuttings are placed per flat. The hormone treatment varies with the plant and the timing of cutting. We wound our cuttings and after the cuttings are stuck, the flats are watered down with Aqua-Gro and Morsodren. The flats are then accumulated on racked carts and held there for moving to the propagating houses.

After being moved to the "Propagation House" on carts, they remain there until rooting is initiated. As soon as the cuttings are rooted, the flats are moved to the "Hardening-Off House", where the cuttings finish rooting and are hardened-off by hand syringing only.

The main point then is that standard units (flats) of plants are moved mechanically (on carts) to keep our two propagating houses full at all times with a new crop every four to eight weeks. By this rotation of cuttings we are able to keep our propagation area to a minimum and yet keep our output high for the space used.

Our propagation and growing houses are all on one level — no stairs or ramps — so that carts can be used throughout. All aisles are 42 inches wide to accommodate carts or conveyors.

GREENHOUSE GROWING

Our azalea, *Ilex*, *Cotoneaster*, and *Pyracantha* are ready for potting some time in November or early December. We do most of our liner potting with the Quik-Pak machine and Royer's elevator and storage bin combination. One thing we have found is that it is necessary to standardize as much of the operation as possible. The pH of the potting medium, pot size, and root ball should be standard. When we have deviations from the established standard, there are problems and slow downs.

After the plants are potted, they are assembled in flats and moved to a growing house. They are moved by four-tiered carts to the greenhouse benches, the benches being a standard width to accommodate the flats. The growing houses have two layers of benches giving us double capacity. The lower layers, in some instances, are used for growing with fluorescent tubes. This is still on an experimental basis. The day-length remains at 13 hours and this area is used for low light intensity crops. Each greenhouse is heated by a propane gas-fired hot air heater and cooling is by Acme fan jet tube ventilation. By mid-May the plants are ready for field planting.

FIELD GROWING

This operation begins with the field layout and the efficient use of space as well as efficiently moving plants in or out of the field. Our field layout allows for future expansion but still enables us to use conveyor wagons and conveyors in the field.

Let us go back to the actual potting and follow through our procedure. Our soil mix is the U. C. mix and is prepared by a manure spreader, (Dick Vanderbilt's "patent"). It really works quite well. We have chosen to follow the "stationary potting" idea rather than a mobile field unit. We have tried both methods and feel it is more economical to pot one-gallon and two-gallon containers in one location having the soil mix, containers, mulch, and plants near at hand and move the finished plant to the field. We have also found that it is more feasible to recontainer; that is, move a one-or two-gallon plant to a five-gallon container in the field because of the weight and the bulk of handling the finished plant. Most of our help are women.

We have incorporated the Royer Soil Handling System with our potting machine. The potting machine used for one and two-gallon containering was made by a local machine shop. The main thing this machine does is set and maintain a constant pace, as well as firming the soil and centering the plant.

After the pot leaves the potting machine and moves down a belt, the plant is inserted and firmed, then mulched with sugar cane. At this point the plants are accumulated in small pallets (6 two-gallon plants to a pallet) and stored on conveyors or moved directly onto conveyORIZED wagons and moved to the field. The wagons are so built that they self-feed the pallets of plants by gravity to the man unloading. The flats are switched to another set of conveyors that store the plants for the man setting them out in the beds. By handling the plants in this manner, we have eliminated handling individual containers two times — once loading the wagon and once unloading and at the same time have kept fewer pieces of equipment tied up waiting to be loaded and unloaded. We are also keeping down the number of hands required at any one location.

In the actual field growing, we are going to the Chapin's "spaghetti" watering system as well as using proportioners to meter-in the fertilizer while watering. We are using two types of proportioners: 1) The Cameron "M", made in England — cost approximately \$75 — and 2) The MP2, made in California — cost about \$30. Both have their advantages.

After the plants are grown and are salable, moving them out in quantity is accomplished in the same manner as putting the plants into the beds — with conveyors.

OVER-WINTERING

In our part of the country, over-wintering is a major consideration for the container grower. Although it is not terribly costly per plant the initial outlay can become an expensive item.

Our structure is rather simple yet has answered our problem of over-wintering. A 24-inch piece of one-inch pipe is pre-drilled 6 inches from one end with a 3/16-inch hole. These pipes are driven into the ground 4 ft. apart with an air hammer. Then 1 x 4 boards are nailed onto one-inch pipe. Next 1/2-inch galvanized pipe 21 ft. long is bent on a form and inserted into the one-inch pipe. We use stainless steel wire for the ridge, put ends in place, and cover with white poly. Saran tie-down strips are used to keep the poly from pounding. The only real mechanization in this phase is the air hammer which really does a terrific job for us. A four-man crew can hammer in 3100 one-inch pipes in 2 days with a little luck.

SHIPPING

For most of the industry the shipping is seasonal and concentrated in a relatively short period of time — at a time when labor is needed elsewhere. We have devoted a great deal of

time researching, experimenting, and discussing with numerous growers our mechanization (and perhaps automation) of the entire shipping operation. Palletizing will definitely play an important part in this handling. We do feel our finished product will be unique and I will be most pleased at a later date to explain this entire phase of our operation.

In summarizing then — our idea is to eliminate hand labor wherever feasible. It may be hard to believe, but employee resistance to mechanization and automation is one of the bigger problems, especially with older employees. One of the phases we are working on now is to psychologically prepare our people for these changes, which will make their work easier and less costly for us. This can only be done through standardization and using as many machines or systems as is practical.

MODERATOR PINNEY: I'm sure all of you were as interested in this talk as I was and I'm sure Mr. Robinson will be having some visitors at his nursery in the near future. We are a little behind schedule and will not have any questions this time. Our next speaker is Dick Bosley. Dick has helped us in our nursery operations many times and it's a real pleasure to ask him to speak to us now.

WATER — FRIEND OR FOE?

RICHARD W. BOSLEY

*Bosley Nursery
Mentor, Ohio*

My paper will probably be one of the shortest ever given but I feel the message it contains can be very important to you.

At the Bosley Nursery we have been propagating a similar line of plant material under mist with the same water source for a number of years. We have never had as high a rooting percentage as others in this Society profess to achieve but then we didn't always tend to believe some of the figures we heard. In the 1968 summer and fall propagation season our results were even worse and it prompted us to have the mist water checked for agricultural suitability. We found the total soluble salt content to be moderately high for mist propagation of azaleas and rhododendrons. What was even more damaging was that the concentrations of both sodium and chloride were high for these sensitive crops.

The choice became: 1) find a new source of a better quality water; 2) install de-mineralizing equipment; or 3) stop growing those crops. We chose to install city water which is of much better quality. The results are that the crops no longer show the high salt type of injury and the rooting stands are now of an order equal to or higher than those which others boast about.