

specialize in these major areas. The survey that I mentioned of two hundred and fifty of our alumni in ornamental horticulture indicated that approximately eighty-five per cent are still employed in ornamental horticulture or a very closely allied business. Now, this would mean sales and field representative for insecticide companies, fertilizer companies, teaching of horticulture, or this type of thing. Your figures, Jolly, would be about the same I would imagine. A lot of them do stay right within the area for which they are trained. This is interesting too because we have had a few that have gone from ornamental horticulture into electronics and some of these areas. Their degree in O.H., if they go to work for Aerojet, for instance, is just as valuable to them as one in engineering as long as they've got their degree and can do the work. There is a real temptation for them to jump to another line of work where the salary might be higher, but I think most of them are in this line of business because they really enjoy it.

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## ROUNDTABLE DISCUSSIONS

CHIEF MODERATOR — DR. J. HAROLD CLARKE

### I. Greenhouse plants

MODERATOR: R. E. WEIDNER

#### SEED GERMINATION OF GREENHOUSE CROPS

WESLEY N. KEYS

*Greenhouse Manager, Bodger Seed, Ltd.*

After spending the first 36 years of my life as a dairy farmer in Fond du Lac, Wisconsin, I spent 2 years teaching in a floral design school in Denver. I then went in the florist business with one of my students in Lompoc, California. In 1949 I went to work for the Burpee Seed Co. as their Double Petunia Propagator and Greenhouse Manager. In 1956 with the onset of Red Satin Petunia I went to work for Bodger Seeds Ltd. as their manager.

If you are successful with your present method of producing good seedlings, don't change; but if you are having trouble, the first thing to do is order Manual 23 (The U. C. System for Producing Container Grown Plants) available for \$1.00 from any University of California Agriculture Station.

At Bodgers we grow about 5,000 seedling flats, 40,000 pricked off flats, plus 100,000 pots for seed production of F<sub>1</sub> petunias, F<sub>1</sub> snaps, Coleus, Impatiens and Gloxinias. In our

greenhouses we produce seed with a wholesale value of nearly \$750,000.

We use equal parts by volume of sharp fine sand (free of all clay) and peat moss (Canadian) to which we add 3 lbs. of the following fertilizer mix to each mixer ( $\frac{1}{3}$  yard) of soil:

25 lbs. Blood Meal  
59 lbs. Single Super Phosphate  
50 lbs. Dolomite  
50 lbs. Calcium Carbonate  
8 lbs. Muriate of Potash  
8 lbs. Ferto Sil (trace elements)

The soil mix is then steam sterilized for 2 hours at 180° F. Seed is planted immediately upon cooling. Such seed as petunia and snaps are planted in shallow rows without any cover and watered with a Fogg—it nozzle until the flats are thoroughly soaked and water is running from the bottom of the flats. Larger seeds are covered no deeper than the diameter of the seed. Any slow germinating seed such as primrose, pansy, delphinium, aquilegia, etc. we use a thin layer of sphagnum moss on top of the flat before planting the seed. After planting the seed we cover slightly with our regular sand peat mix. The sphagnum moss helps retain moisture much needed for uniform germination.

For very difficult seeds, we use and highly recommend a misting system over a heating cable such as we use for rooting cuttings. Our mister is set at two minutes every hour.

We germinated 4 year old primrose selections this summer under our mister and had nearly 90% germination. We also use this misting system for germinating gloxinia seed on top of sphagnum moss without any cover. This moss is sprinkled on top of our regular soil mix. We use Consan 20% (1 teaspoon to 10 gallons of water) to control algae on top of flats.

As soon as germination takes place we water our seedling flats with Plant Chem (2 lbs to 1000 gallons of water) in which is added 4 oz. of panogen drench 15. This same procedure is used every watering until plants are ready to prick off. We maintain a temperature in our seedling house of not less than 60° and never higher than 80° F. When our plants are pricked off we add 2 ounces of Superthrive to our fertilizer mix just before and after pricking off. This prevents shock to the newly pricked off plants. The second watering we add 2 lbs. of Ammonia Nitrate, 2 lbs. of muriate of potash and 1 lb. iron sulphate or, if you prefer, chelated iron. This is only if your water is a problem and you have pH problems. When we mention watering we mean a thorough leaching and then do not water again until flats are fairly dry. This also prevents any salt buildup.

You may also set up for mechanical watering using plastic pipe with the new nylon nozzles but in most cases a booster pump is necessary for sufficient pressure.

We water our entire 100,000 pot set-up with plastic tubes. We use insecticide, fertilizer and fungicide all in the same water

with 2 regular Smith Proportioners. This saves us over \$20,000 in labor a year.

You must remember we are growing plants to be set out in the field for seed production. They are planted out as soon as hardened off as a production of 500 flats a day soon uses up all existing space. These methods will have to be altered with higher phosphate and potash and less nitrogen so as to carry the plants longer to prevent them from becoming overgrown.

We do not profess to know all of the answers but these methods work well with us. We suggest that you try them and make any alterations to fit your own needs and growing conditions. In my spare time I grow potted Cyclamen and have my own strain of F<sub>1</sub> Hippeastrum Hybrid Amaryllis in both seed and bulbs.

We hope you will find our methods as beneficial to you as they have been to us. Thank you and be careful where you locate the plantings of your Philodendrons.

DR. CLARKE: What are people using around here to counteract algae? Mr. Keyes mentions using Consand. What is consand?

MR. KEYES: It is an algicide used for swimming pools. Dimethyl ethylbenzyl ammonium chloride manufactured by Consan Chemical Products, 1143 East Ten Mile Road, Madison Heights, Michigan. For tender plants we use 1 teaspoon to ten gallon water; more for hardier plants. For clay pots — we use one cup in 100 gallons to thoroughly soak. Some experimenting will have to be done as no recommendations are made for plant use. I used it for Cyclamen pots and it keeps algae off for over a year.

DR. CLARKE: There's a rhododendron breeder in New Jersey who made a practice of innoculating his seed pots with a certain species of moss which he claims is very effective in damping-off.

MR. JOLLY BATCHELLER: I remember going through Armacost Orchid House in Los Angeles and Mr. Armacost held up two seed flats in orchids. Both flats were planted the same day, the same seed pod, the same media, under the same conditions. He pointed to one and said this one is absolutely sterile and this one is contaminated. I wish I knew what it is contaminated with because the growth is twice the size of the other.

MR. SAM SPAULDING: What's this twenty thousand dollar money saving water scheme?

MR. KEYES: We developed this at Bodgers at the onset of growing Thumbelina zinnias. We won on All-American award on Thumbelina zinnias and we were short of stock seed. We had to grow seven thousand plants of Thumbelina zinnias in the greenhouse in a hurry. As you all know, zinnias watered by overhead irrigation are very subject to mildew. Well, we cut up a bunch of this tubing in short lengths and put four small tubes in flats, planted twenty-five seeds in each flat, and we produced the entire crop of Thumbelina zinnias in greenhouses and that paid for the stock seed. Then we started using it on

a hundred thousand pots of our F-1 hybrid petunias, our F-1 hybrid snaps inbreds. We purchased the spaghetti tubing from the Plexton Specialty Company, Glendale, California. It can be purchased in large lots for a dollar fifteen per thousand feet. You can get it in a smaller lots. The most economical way to buy it is in five hundred thousand foot lots. The average nursery would use five hundred thousand foot. It's the cost of extruding this plastic and the amount of plastic they extrude that sets the price. We can set this system up for eleven dollars a seventy-five foot bench. Now a seventy-five foot bench in our greenhouse would hold between three and four hundred seven inch pots. The entire cost of all the material and all the labor costs us thirty-seven hundred and fifty dollars for a hundred thousand pots. We saved the labor of twelve women doing our watering.

We use  $\frac{1}{2}$  inch lines and  $\frac{3}{4}$  inch headers. We use 200 mesh stainless steel strainers on all lines when fertilizing or, using insecticides. All may be used in the same proportioner at the same time. We cut our spaghetti tubing with a sharp razor blade on a diagonal to make it easier to insert. All spaghetti tubing must be the same length on the entire line; otherwise shorter tubes would get more water. In our watering we let as much run through the pot as stays in or thoroughly drench every time we water. This eliminates salt buildup from use of fertilizers in every watering. We use a 4-inch plastic plant label to hold the tube in the pot. We use a sharp finishing nail  $\frac{1}{10}$  inch in diameter inserted in a small piece of dowel for punching the holes for the spaghetti tubing. Tubing must be inserted as soon as hole is made as they gradually push out again.

### FOLIAGE PLANTS

RICHARD L. PLATH

*H. Plath & Sons*

*South San Francisco, California*

#### *Propagation of Foliage Plants*

To start with — all our propagating material and containers are steam sterilized.

*Propagating Material* — Olympic sand, peat moss. 50% peat moss and sand, and a modified soil containing peat moss, Colma sand (which is a very sandy loam) with a little superphosphate added.

*Propagation of Philodendron Cane* — The cane is cut up into pieces, single eyes. These are potted in Olympic sand and placed in benches with bottom heat and a temperature of 65° maintained. After the plants are placed they are then covered to a depth of about  $\frac{1}{2}$  inch with peat moss, which is kept damp at all times.

*Dieffenbachia and Chinese Evergreen* — These are cut in pieces with one eye and placed in benches with about two inches