STUDY OF COST AND PRODUCTION IN PROPAGATION AT MAY NURSERY

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May Nursery
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May Nursery began operations in September, 1971, with the purchase of 14 three gallon *Pittosporum tobira* 'Wheeler's Dwarf' to be used for stock plants. After we built our first propagating houses, we immediately saw the need to cut production cost. We went from a house constructed of cedar with a concrete foundation, to a galvanized pipe quonset type house, then to a larger PVC framed house. We use ½ to 1 inch heavy PVC strapped on to a fence post. We strap a 45 degree angle PVC guard to the post and slide it over a galvanized support. We space the PVC supports somewhat closer than galvanized ones. There are five galvanized purlins — one down the middle and two on each side. The houses hold up well except in severe storms such as tornadoes.

The houses were first used as winter storage for the plants, which were propagated either in trays or in the ground and then transplanted into 3 inch round cups. One of the biggest savings we made was to eliminate the step of propagating in trays on the ground and go straight to the 3 inch cup for propagation. This made it necessary to install mist systems with solenoid valves in every house. The entire operation of potting from trays to 3 inch cups, or one and two gallon containers was thus eliminated. We also found we had cut the mortality rate to near zero. Once the plants are rooted in the 3 inch cup, 95 percent or better will be sold, barring human error or weather conditions, because once rooted, the plant and root systems are never disturbed.

Our propagating shade areas changed as much as our houses. The first shade area had an all galvanized pipe mist line that could be folded in and out for propagation and moving equipment and plants. In the second shade area the folding pipes were eliminated but the straight galvanized pipes were retained. The next change was to substitute PVC pipes for the galvanized ones. Later we found we could cut cost by using risers with sprinklers.

When we decided to abandon the tray for the 3 inch cup, we ran into the problem of economically filling the cups and placing them in the houses for sticking the cuttings. The mix used for all plants, except azaleas, consisted of equal parts peat, sand and perlite combined with 8 pounds of Osmocote 18-6-12, or 3 pounds of Scotts, 31-5-6 per cubic yard. We omit the slow

release fertilizer for azaleas. We tried several methods before we were satisfied with this operation. First, we tried using a wagon, filling it with empty cups, shoveling mix into the cups, traying up the containers, carrying them into the house, taking them out of the trays and placing them on the tables. When it came time for the plants to be potted, they had to be trayed up again to be carried to the potting barn. The filling part was on piece work, paying 1 cent per cup. We found that this operation was slow and costly. We have changed this procedure in order to reduce man hours used both when filling the cups and when potting. We have been able to eliminate work of two people by using plastic trays with 2¼ inch square cups. We use about 7 people to fill the cups. The cups, trays and mix are at the house. The trays filled with cups are put on the wagon and the mix is shoveled in. They are then put in the house, and this operation is finished. Another crew sticks the cuttings the same day or the day following.

Once the trays are filled with cups and mix, they remain that way until they are potted. It is no longer necessary to tray up, take the cups out and place them on the table, then tray up again when the time comes to pot. We now pay ½ cent per cup instead of 1 cent. The key to success with this procedure is to have a high percentage of cuttings that root. If trays are sent to the barn with a low number of plants rooted, a bottleneck is created in the potting operation.

After we move the filled cups into the house, we try to get the mix damp but not soggy. We have found that last year's or this year's spring wood is the best for cuttings. We use the "snap theory" for determining proper maturity of growth on broad-leaved plants and just down into the brown wood on narrow-leaved plants. The length of the cutting is 3 inches to 3½ inches; the bases are stripped for wounding purposes. We cut the tops on junipers and large-leaf broad-leaved plants but not on small-leaf broad-leaved plants. We have fewer disease problems on the non-cut leaves.

We use no rooting hormones on any cuttings. The main reason is that we found 75 percent of our cuttings were rooting above the powder dip line. After talking with people at Bush Ranch, Thomasville, Georgia, and Ten Oaks Nursery and Gardens, Clarksville, Maryland, I decided to experiment on each cultivar. I found 90 to 100 percent rooting on those without hormones compared to the usual 70 to 85 percent rooting with hormones. The next year, we decided not to use hormones and got excellent results. We have eliminated not only the expense of the hormones but also the time and labor in applying them.

All cuttings are stuck on piece work, paying 1 cent per cut-

ting. Workers get their cuttings, prepare them, and stick them as a group. To insure top production all week, we work or pay on a day by day basis. For example, pay per hour based on group performance using the piece work rate was $2.40 on Monday, $2.80 on Tuesday, $2.90 on Wednesday, $2.60 on Thursday, and $3.00 on Friday. As a result, the workers were paid an average hourly rate of $2.75 for that week. They know that one bad day can readily affect the hard work of a good day. By using this method, we have very few slow days, and workers receive slightly more than present minimum wage. We use seven women and they can easily stick 1¼ million cuttings eight months out of the year. The number varies from 6 to 10 thousand per day, depending on the cultivar. In fact, we now have people that are sticking a total of 25,000 cuttings a day. We try to have the cuttings all rooted by winter, except for the junipers.

We propagate some species from seed. When we use seed that we can handle, we plant it in cups and place it in propagation areas that dry out due to poor mist coverage. Other smaller seeds, such as those of pampas grass, *Cortaderia selloana*, are sown in flats.

We spray those areas under mist with fungicide twice a week except during the winter months. We use Bravo, Benlate, Kocide, and Dithane M-45; however, we use Bravo twice as often as we use the others. Insecticides are used sparingly until the plants have rooted and the mist is cut off. We then spray these areas with insecticide once a week.

One of the most important pieces of equipment we have is a natural gas generator. If there is a failure of the mist control power source, the generator will automatically cut on. This reduces the chance of emergencies during the weekends and on holidays. However, no equipment can be taken for granted; we still have people on duty during these periods.

When rooted cuttings are ready to be potted, they are taken to the potting barn or directly to the field. We are just now getting into field potting and are finding that more plants can be potted in the field with fewer man hours. Field potting also cuts our piece work rate 1 cent per one gallon and 2 cents per two gallons, which is a savings of $10,000 per million one gallon containers and $10,000 per half million two gallons. Also, by cutting the man-hours, we can continue to expand our operation without expanding our labor force. When potting in the barn, we pot 9 to 11 thousand 1-gallon pots per day at 4½ cents per pot. With 2 gallons, we pot 5 to 7 thousand pots per day at 5½ cents per pot, using twenty people. In field potting, we have a straight rate of 3½ cents for both 1 and 2 gallons. Sixteen

people do 12 to 14 thousand per day regardless of whether they are potting one or two gallon containers.

Our potting mix is bark, sand and peat. After the bark is prepared, fertilizer, fungicides and insecticides are added before mixing. Before taking to the field, plants are placed on the wagons and misted by driving the wagons under an overhead sprinkler.

We are firm believers in heavy pruning. Each plant is pruned approximately three to five times, depending on the cultivar, from propagation to the saleable stage. We feel that this gives us quality plants that are more easily moved in highly competitive markets. We use electric and hand clippers. If plants have been bunched, we use a portable generator and electric clippers. When they have been spaced out, we use hand clippers.

Plants are spaced out after they develop a strong root system and the heads begin to crowd each other. We feel this procedure produces a better plant because of the growing room provided. The plants are easier to prune, fertilize and treat with herbicides. The only disadvantage is that not as many plants can be placed in a given area when spaced. However, we would rather sacrifice space than quality.

We use several types of herbicides on our nursery. Roundup and Surflan are used during warm and dry periods, while Paraquat is used in the winter or during the wet seasons. We also use Pramitol around and in our propagating area. However, these herbicides are used primarily in ditches around the beds and around the perimeter of the nursery to stop weed seeds from developing and spreading. In containers, we have tried Lasso on an experimental basis, but have found that it was not compatible with the plant. It gave good weed control but hurt the quality. Ronstar, at 4 pounds active ingredient per acre, is now used. It is not as effective as Lasso for weed control but is relatively satisfactory and gives a better quality plant.[1]

This past summer, we had more problems with weeds in our propagation area than any other year. We had never used a herbicide in this area before, so I began running tests on herbicides at different stages of propagation. We used the same rate here as we did in the fields. The different stages used in the test

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[1] Common and chemical names for herbicides: Roundup = glyphosate, N-(phosphonomethyl) glycine; Surflan = oryzalin, 3,5-dinitro-N^4, N^4-dipropylsulfanilamide; Paraquat = paraquat, 1 1′-dimethyl-4, 4′-bipyridinium; Pramitol = prometon, 2,4-bis(isopropyl amino)-6-methoxy-s-triazine; Lasso = alachlor, Zchloro = 2′, 6′, 6′-diethyl-N-(methoxymethyl)-acetanalide; Ronstar = oxadiazon, 2-tert-butyl-4-(2, 4-dichloro-5-isopropoxyphenol)-delta 2,-1,3,4-oxadiazoline-5-one.

were as follows: (1) one week before cuttings were stuck in mix, (2) the day that cuttings were stuck, (3) one week after they were stuck, (4) when cuttings began to root or callus, (5) after they had rooted and mist was cut off, and (6) after the pot was rootbound. I was very surprised to find that I got the same results regardless of when I put out the herbicide. All cuttings rooted with the normal 10 percent or less mortality.

We feel that the safest time to put the herbicide out is 7 to 10 days after the mist has been cut off, which gives plants time to adjust to the absence of the mist. The area is weeded just prior to application.

COST OF LINER PRODUCTION AT CARTWRIGHT NURSERIES

EDSEL YAGER

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We are all familiar with the increased costs in the production of nursery stock. Labor is our largest production expense. This fact has prompted us to try new techniques in liner production. As an example we found that if we reduced our labor force by 10 people, we could maintain our expenses at the same level as operating costs increased. Using the smaller work force did not allow us to increase productivity but did help us to maintain our production costs rather than increase them. Following is a description of our liner production system.

First of all, we use sand as a rooting medium because we can obtain this material within 15 minutes after we have ordered it. We use a mixture of 50 percent sphagnum and 50 percent Michigan peat for a potting mix. The liners are potted in rose pots and bedded in our lath house with about ¼ to ½ inch of sand over the top. The sand helps to keep them from freezing out of the pot and also helps to hold moisture. These liners are grown here for one year and then planted or sold. During this period good cultural practices are followed. Plants are weeded, treated with insecticides, fertilized about twice with a foliar fertilizer, and given any other needed attention.

The itemized per unit cost of the liner production operation is as follows:

Sticking cuttings	$ 0.01	Soil for potting	0.01
Potting	0.015	Maintenance and repairs	0.01
Weeding	0.01	Pots	0.01
Fertilizer	0.02	Bed preparation	0.02