PROPAGATION, COSTS AND SYSTEMS

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Before speaking about propagation, costs and systems, it might be well to define certain terminology which shall be used frequently. We will begin with what is meant when we refer to "propagation," and categorize the different types of "propagators" we will be talking about.

Some people would say that propagation is merely "putting roots on cuttings"; but more correctly, it entails the entire process from start to the finished liner. For example, a juniper cutting is really not finished in propagation until it is potted in a pint container. Similarly, the direct stuck pachysandra, or any other groundcover in flats, is not finished in propagation until the cuttings are rooted and are sufficiently established to sell.

We talk about being a propagator, and about all propagators doing the same thing. However, we are not the same, and we are doing the same thing only to a point, and within very different parameters. Propagators can be divided into three groups:

1) Commercial propagators
2) Horticultural propagators
3) Scientific propagators

The goal for the commercial propagator is to propagate plants in large quantities and at the lowest possible cost. Often he has a very specific upper limit beyond which his cost must not go. If the costs go above that limit, then that particular operation is not generating enough net profit and it is not worth doing. It must be improved or scrapped. If another commercial propagator can provide you with liners cheaper than you can grow them yourself, you should buy them and propagate something else at which you are proficient. Commercial propagation is, in other words, business.

The goal for the horticultural propagator is to propagate a certain limited quantity of a plant. This can often be as many as possible of a specific cultivar. The cost of the end product is of much less concern for the horticultural propagator than for the commercial propagator. The important thing is not cost but to get a certain plant propagated. The horticultural propagator would usually work in botanic gardens, arboreta, schools, and similar institutions. Sometimes though, the commercial propa-

gator will switch and become a horticultural propagator when he obtains a new plant and needs to produce as many as possible, as fast as possible.

The goal for the scientific propagator is to develop new methods of propagation, such as tissue culture. Even though he also must work within certain budget limits, the cost of the end product is not of concern. The important thing is to make the system work. Later the commercial propagator will worry about the cost.

The best way to approach commercial propagation is to look at it as a manufacturing process. We can learn a lot from our friends in manufacturing — we are not nearly as unique as we may think we are.

PROPAGATION SYSTEMS

In order to do any kind of mass production, we must develop and build a system. Mass production of uniform units can be done as a continuous process, such as the gasoline flowing out of a refinery, or it can be done as a batch process, such as molding 100,000 2-gal. plastic pots, and then switching to 1-gal. pots. Often what the commercial propagator does fits well into the batch process definition, such as when he makes 50,000 juniper cuttings and sticks them. However, when a propagator sticks pachysandra in June and ends in August we could more properly call it a continuous batch process. The commercial propagator will normally develop a basic system, then derive variants of this for different crops. You can propagate broadleaf shrubs and conifers in the same facility, just as you can make cars and pickup trucks on the same production line. You just need to change and adjust a few things.

What is in a system then? All of the following would be parts of a system to produce 3 in. pachysandra plants:

1) Facility: Quonset greenhouses with shadecloth cover
   Mist line
   Mist controls
   Drainage
2) Field-made cuttings
3) Fungicide dip
4) Cooler
5) Hormone
6) Soil mix
7) Flats with 24 3-in. pot cells
8) Flat filling
9) Direct sticking, 2 cuttings per pot
10) Transportation to quonset greenhouses
11) Misting
12) Rooting
13) Hardening off
14) Fertilizing
15) Pruning
16) Finished pachysandra ground cover

You may vary some of these parts a bit in your system, just as Chrysler assembles cars a bit differently than General Motors. This particular system will propagate many other plants than just pachysandra. As we shall see in a bit, we can propagate many crops in a very few systems.

A somewhat different system would be the following for propagation of conifers. Again, this system could propagate other crops.

1) Facility:
   Quonset greenhouse with double plastic
   Sand benches in ground
   Hot water pipes under bench
   Mist system
   Mist controls
   Drainage
   Boiler
2) Field-made cuttings
3) Fungicide dip
4) Cooler
5) Disinfection of sand beds
6) Hormone
7) Stick in sand beds
8) Misting
9) Heat
10) Rooting
11) Fertilize
12) Harden-off
13) Dig rooted cuttings
14) Soil mix
15) Pint pots and flats
16) Pot in pints
17) Place in quonset greenhouses with shade cloth
18) Irrigate
19) Harden off
20) Fertilize
21) Grow
22) Prune
23) Grow
24) Finished liner

Even small changes in such an intricate system can affect many parts and final success. Therefore, changes should never be made at random, but only after sufficient testing has shown the effects of the changes. We need consistency and predictability. We get that in an organized system with specific identifiable segments. That is, when we can start pinpointing costs.

COSTS

An efficient and well functioning propagation system is only halfway to our goal as commercial propagators. Our goal is to make a net profit on each unit we propagate. To achieve that we need to develop a system to keep an account of the costs during propagation. A standard manufacturing cost accounting system can easily be adapted to work for us. Again, we are not nearly as unique as we think we are.

In cost accounting we talk about direct cost and indirect cost. For a propagation grower situation, direct cost would be: labor, plants, materials.

Indirect cost, or what we often call overhead, would be anything we can not fit into the three direct categories. This theory is all well and good, but how do we implement it? Three things must be done:

1) The plants propagated must be divided into *crops*.

2) A method of *collecting data* must be developed.

3) A system for *processing the data* must be developed.

Crops. In order to limit record keeping it is advisable to divide production into crops. Crops would be groups of plants with production similarities from a cost standpoint and would be considered the same.

A crop is really a batch in the production process. Therefore, it is also tied to a year. Examples would be: 3-in pachysandra 84, 2-in. *Euonymus fortunei* 'Colorata' 84, conifer cuttings 84, and deciduous cuttings 84.

The way you divide your production into crops will depend on your operation. There are no set rules. But the aim is to get all your different plants into a limited number of groups or, as we call them, crops. All costs incurred are then allocated into these crops.

Collection of data. Collection of data must be done both in the propagation area and in the office. In the propagation area only two documents are used:

1) Labor time ticket.

2) Production reports.

Each worker will write daily on his time ticket what job he did. At the end of the week before turning in the time ticket his foreman will crop code the entries on the time tickets. Daily the foreman or manager will keep a record of his production on production sheets, which are turned into the office weekly.

This is all that is needed from the propagation area, and since most of such records should be kept anyway, it is really a manageable job. The office, in the course of normal bookkeeping, collects additional needed data but, again, this is done anyway, so it is not extra burden.

Processing the data. This is where most of the extra work comes. There is no way around it — it is a lot of work. But how can we be commercial propagators and not know what our production cost is? All the data must end up on each of the crop sheets.

The unit cost at the far right is what we are after. That number is the reason for doing it all. The processing can be done manually or electronically, i.e. with a computer.

In a manual system the end of month functions for the cost accounting clerk would be the following:

1) Distribute labor from time tickets to crop sheets.

2) Based on production sheets:

— calculate overhead based on figures from general ledger and distribute on crop basis.

— from inventory cards collect monthly sales and current inventory, and post to crop sheets.

3) Calculate unit cost and post.

Electronic Data Processing (EDP). With this the function of the cost accounting clerk would be somewhat different:

1) Labor would be fed weekly from time tickets into the system and automatically flow to both crops and payroll.

2) Production from the production sheets would be fed weekly into the system and automatically go to crops and inventory.

3) Since overhead is a function of certain ledger expenses, and space used by the crop and sales, and inventory is automatically current, the monthly update of each crop sheet with its unit cost can be produced by the push of a few buttons on the computer keyboard.

It is obvious that enormous amounts of time can be saved with the EDP system. Information will also be available faster. However, it is also important to keep in mind that the end-of-month unit cost is what we are aiming for, and it is not better or worse whether it has been produced manually or electronically.

The computer of today gives the commercial propagator and grower fantastic possibilities. But he must get organized as he should be anyway. With a lot less effort and at much lower cost, we can get the information needed to make the right decisions. We must ever keep in mind that what we are doing is pretty basic production and business. We are not that unique. We must look to bigger industries and the systems and methods they have developed at great cost. We, in our little industry, would never have the resources to do the same. But we can learn from them, take their systems and adapt them to our particular business and profit greatly from it.

The selection of the right computer system is probably the most difficult and frustrating experience a small business can have today. We have been through this in our business in the

past year, going from the worst to the best. There is a right computer system for any size business today and there is a way of finding it. We went the wrong way and then the right. If any of you are looking for computers, I would be glad to share my information and experience with you.

DECIDUOUS AZALEA PROPAGATION: AN OVERVIEW OF OLD AND NEW TECHNIQUES.

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Deciduous azaleas with their vibrant flower colors should be an important plant for the landscape. However, there is a negative response to them in the nursery industry because of foliar problems. The most common cultivars, such as 'Old Gold', 'Golddust', and 'Orangeade', are highly susceptible to powdery mildew and from mid-summer on, the foliage of susceptible cultivars begin to look unattractive unless treated every 2 weeks with a fungicide.

There are other cultivars, however, such as 'Royal Lodge', and 'Visco Sepala', 'Sunset Boulevard', 'Satan', 'Crimson Tide', and 'Pink Jolly', that are not affected by powdery mildew and have attractive fall foliage. These plants would be a welcome addition to any garden and be saleable in both spring and fall. Clearly this type of cultivar should be selected for production by the commercial propagator.

To propagate deciduous azaleas by stem cuttings, we made use of a program at Knuttel Nursery that was described by H. C. Nienhuys of Roadview Farm Nursery in Gloucester, Virginia, at the 1980 meeting of the Southern Region, International Plant Propagators' Society (1). I will only describe this method briefly, including minor variations.

During late fall we leave our stock plants outside, exposed to the cold weather, so that they become completely dormant. During the third week of December, we bring these plants into a large greenhouse that is heated to approximately 40°F. We allow the plants to thaw out gradually, slowly increasing the temperature to 70°F by the beginning of March. The plants are usually in full flower by mid-March.