Putting Roots on Plants Economically

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My talk today will describe how we looked back into the past and took those things which were applicable to our situation and formulated a method to put roots on plants as cheaply as possible.

The situation I referred to is that Four Season Nursery and Landscape is a first generation nursery. As with most young people, we were full of enthusiasm, lots of energy, and very little money. But where there is a will there is a way.

We started out strictly as a landscape company with a $10,000 loan, no equipment, and no land—a typical start for a nursery business. At that time, 1972 to be exact, there was a scarcity of good quality plant material for our landscape jobs. Well it didn't take us long to decide that maybe we should grow some of that material.

Not having any real propagating experience, I went seeking information. I first called a college roommate who was in the nursery business. He gave me a lot of ideas and encouragement. One of the things he said was keep the acronym "K.I.S.S." in mind. What in the world is K.I.S.S.? Well for those of you that were in the armed forces knows what that means—KEEP IT SIMPLE STUPID! I hope he wasn't referring to my intelligence, but keeping that acronym in mind has saved me a lot of aggravation and money.

The next thing I did was go to a library and scan all the proceedings of the International Plant Propagator meetings. This was an immense source of information.

To make a long story short, we leased some land until 1980, at which time we bought 20 acres. Having just bought the land, we again had very little money. Visions of a high-tech propagation house died very fast. I had to design a propagation system that would put roots on plants, but do it in an inexpensive manner. This lead me to doing strictly summer propagation in a home-built greenhouse.

First I will tell you about which plants propagate well in summer for us. Then I will get into the kind of structure we use.

We root all of our broadleaf evergreens in the summer. Rhododendrons are the first of the broadleaf to be stuck. Timing is very important. We don't want to stick them too early because of the possibility of rot and we don't want to wait too long because the ambient night temperature would not be high enough to maintain rooting. We take the cutting right after the first spring growth has hardened off. In our area, this is approximately the third week of June. We continue to take the cuttings until all taxa are completed. We may get into a situation where the second growth begins. If that occurs, we remove all of the second growth. All of the large-leaved broadleaf evergreens are stuck in a bench under mist set at 15 sec every 30 min but more if the temperature is extremely high and the sun bright.

Azaleas and other small-leaved broadleaf evergreens that root fast are stuck in flats and put outside under the shade of tall trees. We found that if we stuck them along with the slower-rooting large broadleaf cuttings, they became infected with a fungus and rotted.

About 5 years ago, we started doing softwood deciduous shrub cuttings. These cuttings are taken as soon as the new growth hardens off. This is generally in late

May or June. If the cuttings are taken at this time, rooting takes approximately 2 to 3 weeks. The cuttings are stuck in 3-1/2-in. pots, two to a pot, and placed under mist. We do them in these pots because we feel that disturbing the roots in the early stage of development in some of these species is detrimental. There is a large window of time in which you can take most deciduous shrubs. This year, we weren't able to take our deciduous cutting until the first week of September. Most species rooted quite well, although taking much longer to root than if taken in June.

A good reference for doing cuttings is a book by Dirr and Heuser entitled *The Reference Manual of Woody Plant Propagation: From Seed to Tissue Culture.*

We take the cuttings early in the morning to get a highly turgid cutting. All cuttings are dipped in a 5-min fungicide bath and then rinsed very thoroughly to remove any of the pesticide. The cuttings are then prepared for the bench or flat depending on the species.

We felt that it was important that the large broadleaf cuttings be rooted in a deep bench where drainage would be good and roots would have room to develop. It was also important that these plants not be allowed to freeze that first winter. As I mentioned before, cost was also a very important consideration.

Keeping all of these factors in mind, we designed a greenhouse with deep benches and a heating system that would keep the cuttings above freezing that first winter. It was far from perfect but it did the job then and it is still doing it today. We used raised benches so we could have a spot for our just-rooted flats of small-leaved broadleaf evergreens. In essence, we were getting twice the bang for the buck. This 14 ft × 96 ft house can root approximately 30,000 large-leaved broadleaf evergreens per year and overwinter another 30,000 to 40,000 cuttings in flats under the benches.

In the springtime the clear overwintering plastic is taken off the house and replaced with older plastic in which holes have been cut both in the sides and top to promote ventilation. A shade cloth is placed on top of the plastic to provide about 50% shading. After removal of the cuttings, any leftover rooting medium is removed and the house is disinfected with Clorox. A rooting medium of coarse perlite and peat (1 : 1, v/v) is used.

As I noted earlier, our small-leaved broadleaf evergreens are propagated in flats under trees. As a matter of fact, I got this idea from a man who worked for Jim Wells in New Jersey. I went to this gentleman's house looking for some plants and noticed all of these flats of azaleas under some rather large oak trees. I asked him what he was doing and he told me this was his azalea propagation facility. I asked him where his mist system was and he laughed at me and said I go out there 3 to 4 times a day and hit them with a hand held mister on the end of a hose. That was a cheap propagating facility so I tried it at my place with a few modifications and it worked splendidly. It just goes to show that we are still feeling Jim Wells' influence today in the nursery industry, directly and indirectly. Thank you Jim Wells for all you have done.

Just so you don't think we are still in the dark ages, in the last year we have put up two heated greenhouses with state-of-the-art heating and ventilating systems. With a biotherm heating system in the floor we can propagate just about any time of year. Right now we are using the houses to cut a year off the production time needed to produce a marketable azalea.

In September we take the rooted cutting from the flat and put it into a 4-in. pot and place it into a heated house. We try and develop a substantial root system by the end

of November. In December we lower the night time temperature to approximately 40F and let it go to 70F during the day. In the middle of March the nighttime temperature is raised to 55F and top growth starts. In May we will have a plant ready to go into a 3-gal container.

In conclusion, the point I wish to make today is that you don't have to have a high-tech facility to propagate successfully. A lot of money is not necessary to get started. All that is necessary to get started is spirit, determination, and the ability to observe what others have successfully done in the past.

Research Update on Tissue Proliferation

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INTRODUCTION

This paper is intended to update the I.P.P.S. membership on a condition, known as tissue proliferation (TP), which affects a number of rhododendron cultivars. It would be impossible to summarize all the information on TP in this brief forum. The reader is directed to have in hand any or all of the articles listed at the end of this paper, in particular that by Linderman (1993).

Tissue proliferation refers to a gall-like growth usually found at the base of the main stem on certain cultivars of*Rhododendron*, primarily, though not exclusively, when they are propagated from tissue culture. These galls range from 5 to 20 mm in diameter, usually are loosely attached, covered by a rough spongy rind, and may or may not produce small, spindly, short-lived shoots. TP typically shows up in the second or third growing season out of propagation (e.g., from a tissue culture microcutting) and galls may wither each winter only to regrow the following year. TP appears not to be contagious, and only rarely are all the plants in a block affected. Plants possessing TP may grow slower or be more disease-prone, but more often are healthy and vigorous.

Tissue proliferation was first observed in the 1980s, and attracted widespread attention in the early 1990s when growers started seeing large numbers of galled plants and some nurseries lost or destroyed a lot of plants. Adverse publicity brought the issue to the fore, and soon groups of scientists met in the northwest (1991), the northeast (1992), and Ohio (1993) to discuss TP.

CAUSES OF TISSUE PROLIFERATION

Is it a Disease? When first encountered, TP was thought to be crown gall, caused by *Agrobacterium tumefaciens*. Thankfully, early work detailed a number of differences between TP and crown gall, including shoot production on TP galls, the woody nature of the TP gall, and the inability to spread TP by co-cultivation, or inoculation of healthy plants with gall pieces or extracts. Numerous studies since have attempted to isolate pathogenic forms of*Agrobacterium* from TP tissues, to no avail. Indeed there is some doubt if rhododendrons ever get crown gall. Attempts to infect rhododendrons with pathogenic *Agrobacterium* from other plants has been unsuccessful, as have attempts to implicate other gall-forming diseases. As time