Direct Sticking Through Plastic©

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INTRODUCTION

I attended my first I.P.P.S. conference in September 1994. I had recently started a small nursery specializing in native plants. Knowing successful propagation would be crucial to its growth and success, I wanted to gain some insight. The conference was held in Costa Mesa, California. The trip was entertaining for my family and very informative for me. The greatest single impression that remains to this day is how friendly and willing to share the people were. Over the years, I have benefited from the information made available by the members of the I.P.P.S. When I was asked to present, I wasn't sure I would have anything sufficiently scientific or new to offer. Upon reflection I realized that it is often tried-and-true methods and ideas that have value and have helped us continue to grow our business. This is our 15th year in business, and as is true of many small business owners, I find myself caught up in the pragmatic aspects of growing the business — staff, sales, development, and expansion. There never seems to be much time for detailed analysis or rigorous experimentation. Empirical study has its merits, though, so I decided to base my presentation on our recent trials involving field propagation of some native plants from hardwood cuttings using plastic mulch. Success of the trials would be determined by whether gains could be accomplished in the following three areas: improved ability to supply our niche market, controlling of costs, and reduction in the use of chemicals.

Our market is native plants, especially those for use in commercial landscapes, habitat and wetland restoration, stream rehabilitation, mitigation, highways, parks, and schools. The sites our plants are delivered to are often lacking irrigation and sometimes have difficult access so size and weight of plant material can be a factor, conditions can be extreme, and there is often no follow up or maintenance. Success depends on planting large, vigorous plants capable of surviving these harsh conditions. Since plantings are often government mandated, there often is no acknowledged advantage by the owner. Financial or aesthetic gratification is not gained so there is little initiative on the part of the owner to ensure success, other than to satisfy government requirements. Additionally, the budget is limited so contractors want the least expensive plant with the lowest planting cost and highest planting success.

NURSERY SITE DESCRIPTION

Peels Nurseries Ltd. is located 15 km east of Mission, British Columbia, on the north side of the Fraser Valley. Our coastal climate is characterized by warm summers, mild winters, and a long frost-free growing season. It is one of Canada's mildest, a Zone 8.

In the Spring 2002, we uncovered a sandy loam area at the edge of our container yard. The soils in this area are fluvial deposits, which are generally sands and gravels. This site has a deposit of sandy loam with some stones and is 0.5–0.75 m deep on top of gravel. The field is generally flat with a 1.5% cross slope. The field was used for grazing prior to nursery use and consequently the weed seed load is considerable. During the summer we alternately sprayed glyphosate and tilled to gain some weed control. By the winter we planted some tree species, hoping that over the next 2-year period we could gain better control over the weeds. By the end of 2004, we were still encountering on-going weed problems. A better control was required. Short of sterilization, the next best alternative seemed to be plastic mulch.

BED PREPARATION AND CUTTINGS

In winter 2005, we went ahead with a plan to cultivate 1-m-wide raised beds and to cover these with 4-mil black polyethylene 1.5 m wide. The field was initially ploughed and disced to loosen the soil. The beds were then formed with a rototiller. The plastic was laid by hand and secured with soil at its edges. The path between the beds was mulched with 5–8 cm of sawdust.

The cuttings we chose were all easy-to-root native species, which were high-demand items for us. Species included *Salix*, *Rubus*, *Spiraea*, *Symphoricarpos*, *Ribes*, *Rosa*, *Populus*, and *Cornus*. The cutting sources were generally from our stock of potted material or stock plants, but occasionally some cuttings were wild collected. In general, we have good results with collected material provided the plants are disease free and vigorous. The cuttings are taken in January and February. The cuttings are 15–20 cm in length and 0.5–1.0 cm in a diameter. This year we had a cold snap in the latter half of February, so sticking was held off until March. The cuttings were drenched in Captan 80 WDG at 12 g per 5 L and stored under 15 cm of sawdust. When the weather warmed, two people working on opposite sides of the bed dipped and struck the cuttings directly through the plastic (Fig. 1). We used a 15-cm wide board with notches each 15 cm to provide a 15 × 15-cm spacing. Most species were dipped 1 cm in 0.4% IBA except for the willows, which received a 0.1% IBA treatment.

Figure 1. Cuttings in plastic: Spring 2006.

Figure 2. Cutting Bed: September 2006.

The only problem we encountered with the plastic mulch was with wind. In the first week after sticking, a particularly strong wind loosened several sheets of plastic and they billowed up over the cuttings. We quickly removed the cuttings, repositioned the plastic and using nails secured the sheets again. The cuttings were re-stuck, without substantial loss. Once the plants had rooted, wind was no longer an issue.

MAINTENANCE AND HARVESTING

By May, most species had rooted well. At that time we fertilized with 19N–5P–8K (9-month slow release) at a rate of $22.5\ kg \cdot 1000\ m^{-2}$. This was broadcast by hand over the plastic.

In July and August we irrigated weekly with a moveable irrigation gun applying approximately 1–2 cm of water per setting. Both water and nutrients appeared to be evenly distributed, as all plant growth was relatively uniform in height and colour. We did not shear or top any plant material since excess height would be next year's propagation material.

Of course, the best part was the minor attention we now had to pay to weed control. The plastic and sawdust mulches were doing their job. Minor weeds in the paths were pulled out at 3–4 week intervals, and the periphery was sprayed with glyphosate.

The results from 2005 encouraged me to expand our field hardwood production to 36 beds and to experiment with some plugs through plastic as well. In 2005, I did not record plant height, but they were very similar to the 2006 (Table 2, Fig. 1). Table 1 shows the plants stuck in 2005 and our percent success with each type. Table 2 shows plant numbers and varieties for 2006 with height achieved as of the end of September.

Table 1. Hardwood cuttings 2005.

No. of Beds	Root	Species	Struck (no.)	Grown (no.)	Success (%)
3	2	*Rubus spectabilis*	3240	1991	61
4	2	*Cornus sericea*	4320	3020	69
2	1	*Salix sitchensis*	2160	1871	86
2	2	*Physocarpus capitatus*	2162	1402	64
1	2	*Spirea douglasii*	1080	882	81
1	2	*Symphoricarpos albus*	1080	512	47
1	2	*Lonicera involucrata*	1080	795	75

Table 2. Field hardwood cuttings 2006.

Bed No.	Species	Date	Sept. height (inches)	Cuttings (no.)
1–5	*Cornus sericea*	13 Feb	30–36	5400
6–7	*Rosa nutkana*	13 Feb	18–24	2160
8–9	*Salix sitchensis*	13 Feb	48–60	2160
10	*Salix hookeriana*	14 Feb	48–60	1080
11–12	*Ribes sanguineum*	14 Feb	18–24	2160
13–19	*Rubus spectabilis*	1 Mar	18–24	6480
20–22	*Salix scouleriana*	2 Mar	60–72	2160
23	*Lonicera involucrata*	2 Mar	48–60	1080
24–26	*Physocarpus capitatus*	3 Mar	36–48	3240
27–29	*Spirea douglasii*	3 Mar	24–36	3240
30–32	*Symphoricarpos albus*	3 Mar	18–24	3240
33	*Populus tricocarpa*	6 Mar	60–90	1080
34–36	*Rubus parviflorus*	6 Mar	18–30	3240

Harvesting the 2005 crop occurred in January 2006. The process of digging, grading, and bundling was done by hand in the field. The plastic by that time had be-come brittle and came away from the plants easily without damaging the plants. The result was very large, sturdy plants, which were sold to projects in progress at the time and potted to #2 pot or #3 pot for spring sales. Root development was good, and when the plants were topped at grading, these tops were trimmed to be used as propagation material in the new beds for 2006.

RESULTS AND COMPARISONS

We are now at the end of the 2006 growing season. For both years the top growth exceeded my expectations. As Table 2 shows we saw up to 8 ft of growth on some species. Color was good, branching was adequate, and height was excellent. Our success rate with each plant type appears to be acceptable, ranging from 47% to 86% in 2005. In 2006 we appear to have approximately the same success level, except for the *Rubus parviflorus*, which is extremely low at approximately 25% rooting. We probably won't repeat this item, relying rather on seed production.

We took the balance of our hardwood cuttings that were not used in the field and stuck all of the 2006 species in 38s. We also stuck *R. spectabilis*, *Salix sitchensis*, *S. hookeriana*, and *S. scouleriana* in #1 pots. These items all rooted at approximately the same rate as the field cuttings. The plug trays, though, quickly outgrew their root volume and required shearing in mid-summer to 20–25 cm tall, as did the #1 pot material, which was sheared at 0.4–0.5 m tall. The field material, on the other hand, continued to grow.

CONCLUSION

The driving force behind these trials was threefold: first, to boost our hardwood production utilizing a resource we had; second, to produce cheaper and quicker the products our customers require; third, to do this in an environmentally sustainable manner.

Utilizing this corner of the nursery for bare-root production has had a number of positive results. Primarily, it has boosted our production of some high-demand products. The 1525 m^2 area produced approximately 27,500 large plants. Space utilization is comparable to a #2 pot growing system, which would use 1630 m^2 to grow the equivalent number of plants, yet we gain many #5 pot size plants from this system. Additionally, it produces enough vegetative material to re-stick all beds for the next year. In conjunction with our plug production, we now have a better range of plant sizes and better flexibility to deal with accommodating new projects as they come on line.

The second concern was cost. When we total all our costs for labor, machinery, and materials to till, prepare, make cuttings, stick them, and maintain the field, the cost is equal to market value for an equivalent bare-root plant. Consequently, I am anticipating that with practice and automation, we can reduce the cost.

The third concern was environmental. As a company involved in environmental enhancement, I would like to believe that not only can we profit from environmental efforts, but also we can walk the walk. Our use of weed control chemicals has dropped dramatically, replaced by mulches and minimal hand weeding. In the spring, the plastic appears to reduce evaporation and improves heat retention and allows the plants to accelerate growth. In the summer, the plastic is shaded by the plants and has less influence on soil temperature. So far, it does not appear to inhibit nutrient or moisture flow. I believe compared to container systems, we use less fertilizer, water, fungicides, and herbicides.

Overall I am very pleased with the system, because it appears to achieve each of our goals. The trial was a success since we made use of a fallow piece of property and produced some high-demand plants. In the future we can further develop and improve the system by introducing some automation and expanding the taxa propagated, while also hopefully improving environmentally by finding a facility that can recycle the plastic.