Stock Type Trends In British Columbia: A Nursery Forester's Perspective

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Abstract - The general preferences for container stock in B.C. and bareroot in PNW Washington and Oregon largely reflect differences in species, site and soil conditions, and, therefore, planting difficulty. In the two regions, the history of and the urgency for the development of biologically cost-effective container systems (as an alternative to bareroot stock production) also had a major impact on current trends and stock type uses.

INTRODUCTION

At first glance, explaining stock type trends in British Columbia and clarifying differences between B.C. and the Pacific Northwest United States would appear to be a rather easy assignment. Simply take account of the trials, developments and operational experience that led to the adoption of current stock types and, voila, the reasons for changes and current practices will become crystal clear.

However, stock type preferences are generally not solely based on performance, but reflect consideration of many other criteria. These include logistics and costs of planting, seedling costs, the time period between ordering and delivery, delivery assurance, other operational and costs factors, and biases towards one stock type or another.

PAST EXPERIENCE

Trials, which were intended to compare the performance of bareroot and container-grown stock, frequently ignored the effects of differences in seedling physiology, dormancy, age, and size between those stock types. A recently published annotated bibliography on the "Comparative Performance of Bareroot and Container-Grown Seedlings" (Menes et al. 1996) leads to the same conclusion. On balance, seedling size rather than other stock type differences was probably the overriding factor that influenced stock performance, reported in the 213 references in the Menes review.

STOCK TYPES IN BRITISH COLUMBIA AND THE PACIFIC NORTHWEST UNITED STATES

The ratio of annual production of bareroot to container stock in the PNW United States, specifically Washington and Oregon, is about 150 million bareroot versus approximately 50 million container seedlings, or a ratio of about 3:1. Douglas-fir is the significantly dominant species in the region.

In British Columbia, on the other hand, that same ratio is about 1:22, or less than 10 million for bareroot and transplants and about 220 million for container-grown stock. Douglas-fir comprises only 7 percent of the total production. White spruce and lodgepole pine dominate at about 30 to 35 percent each, with the balance being accountable to a large number of other

species.

The conversion from bareroot to container stock in B.C. is remarkable in that it has been so complete and has occurred so rapidly during a period of about 25 years. As a result of the almost total reliance on container stock, experienced bareroot nursery managers have become a rare breed in B.C., and *Homo sapiens* var. b.r. has been placed on the endangered species list.

THE DIVERSITY OF B.C.'S FORESTS

British Columbia has five distinct physiographic regions. comprising 14 bio-geoclimatic sub-zones, accounting for a large variety of climates and soils, and a significant number (20+) of commercial forest species.

Unlike Washington and Oregon, only a very small portion of B.C.'s seedling requirements consists of coastal Douglas-fir, which is very suited to production as bareroot stock.

Perhaps, with the exception of lodgepole pine, which can be produced as bareroot in a very limited number of B.C. locations, the production of other major species, especially white and Engelmann spruce, western and mountain hemlock, *Abies* spp., western red and yellow cedar, and western larch is more reliable and cost-effective in containers than it is as bareroot stock. Seedling survival has significantly improved during the last decade, as noted in Figure 1. It is noteworthy that improved plantation survival coincided with the increasing reliance on container stock. Planting productivity and costs of container stock are also more favourable relative to bareroot stock.

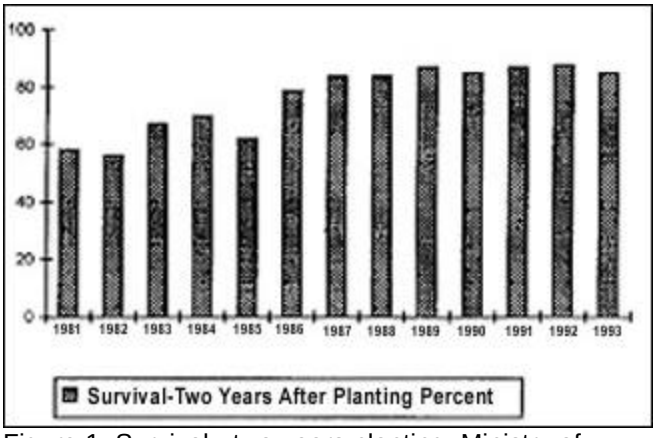


Figure 1. Survival - two years planting. Ministry of Forests program only. (Source: R. Brown - Ministry of Forests).

FOREST LAND OWNERSHIP

Most of the forest land in British Columbia, in excess of 95 percent, is in public ownership, viz. the land is owned by the Province. Consequently, much of what is done in reforestation reflects the consequences of public ownership and policies. This includes, for example, centralized seed registration and distribution, prescriptions and/or guidelines for acceptable species and stock types, and stocking densities, and free-to-grow standards. The recent introduction of the Forest Practices Code has added several other regeneration performance standards, some of which are having negative impact on the forest industry and nursery sectors.

HISTORY OF FOREST SEEDLING PRODUCTION IN BRITISH COLUMBIA

Forest nurseries in British Columbia had their origin in a small research nursery, operating in Victoria from 1927 until 1933. The first operational nursery was developed by the Provincial Government near Vancouver, B.C. in the early 1930s. A further ten forest nurseries were developed and put into operation by the Province during the next half century.

Until the early 1970s, bareroot culture was the principal method of forest seedling production. With the introduction of the "BC/CFS Styroblock System" in 1970, container-grown stock gradually and almost totally replaced bareroot stock, during the next 25 years.

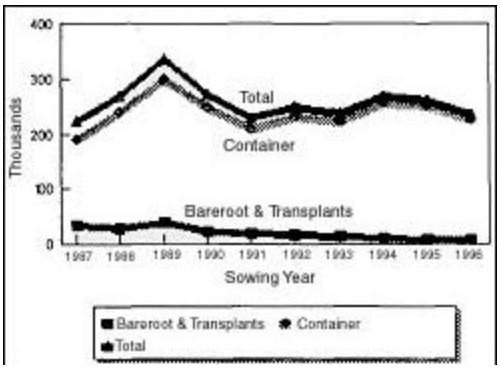
Following the recommendations of a Royal Commission, a private sector forest nursery program was established in B.C. in 1981. In 1987, the Government of B.C. undertook privatization initiatives that would dramatically alter reforestation practices in the province. Firstly, financial and operational responsibility for reforestation of current logging was transferred to the forest industry in 1987. Secondly, the Government sold eight of the provincial forest nurseries in 1988. Our company, Pacific Regeneration Technologies Inc. (PRT), was incorporated by the employees for the purchase and operation of six of those nurseries.

These 1987 and 1988 Government initiatives quickly removed the constraint that had artificially held down the demand for container stock, as a result of limited ability for capital spending by Government departments. With the new policies, for lands logged after October 1, 1987, industry foresters had the freedom to work with nurseries of their choice, and, within certain guidelines, purchase the stock that they deemed appropriate to meet the Provincial standards. The B.C. forest nursery industry responded by accelerated and increased development of the required container seedling production infra-structure.

THE FOREST PRACTICES CODE

In 1994/95, the B.C. Government put into effect the Forest Practices Code, which sets out, among other things, reforestation requirements, targets, standards, and time lines. The impacts of the Code have had serious consequences for our forest industry customers in terms of costs and competitiveness. Although there was little disagreement about the need for the previously existing "free-to-grow" standards, the introduction of additional regeneration performance requirements through "adjacency" or "green-up" rules has severely restricted access to timber in adjacent cutblocks. That restriction, together with bureaucratic delays in the issuing of cutting permits, is starting to affect current seedling demand.

In terms of numbers, seedling demand has been relatively stable during the last decade (Figure 2). However, to meet the increasing performance requirements, and in an effort to ensure that they do not have to retreat areas, foresters have frequently resorted to higher planting densities and larger stock grown in larger containers. To date, therefore, the forest container nursery sector has experienced an increase in growing space requirements, as a result of the almost complete abandonment of bareroot and a



continuing increase in the size of container stock.

Figure 2. B.C. Seedling volume by stock type - 1987 through 1996.

CONTAINER SEEDLING SYSTEMS DEVELOPMENT

Development of container seedling nursery systems has followed significantly different strategies in various geographic areas. These varying approaches usually emphasized either biology, or engineering and technology, or costs, or capital intensive methods.

In B.C., it was recognized that container seedlings did not provide a "silver bullet", and that container seedling size and quality were paramount in generating satisfactory plantation performance, as they are for bareroot. This was especially true for species such as white and Engelmann spruce and western hemlock, for which field performance of bareroot plantations was frequently unsatisfactory. Consequently, in the early phases of development, heavy emphasis was placed on the biology of container seedling production.

In other Canadian jurisdictions and in Scandinavia, the primary focus was on the mass-production of relatively "small" seedlings through cropping regimes that attempted the production of more than one crop per facility per year. In Sweden, in some cases, huge capital investments have been made in the growing facilities, necessitating the production of more than one crop per year.

It is my observation that in parts of the PNW U.S. earlier (1970s, 1980s) efforts to develop container seedlings technology sometimes emphasized engineering and equipment development at the expense of the biological aspects of container seedling production. Also, the predominance of Douglas-fir and the success of bareroot planting with that species significantly reduced the urgency of developing the full potential of container seedling techniques. Such an approach to container systems development was not altogether surprising, perhaps.

CONCLUSION

The very significant reliance on container-grown stock rather than on bareroot or transplant stock in B.C. reflects:

* The relatively minor role of Douglas-fir;
* The limited suitability of bareroot production to most of B.C.'s major commercial species;
* The province's difficult, mostly glacial soils;
* Superior planting productivity of container stock;
* Shorter time frames, greater flexibility, and improved delivery assurance with container stock;
* Most importantly, significantly improved field performance through the use of container stock.

In view of the impending limitations on the use of fumigants in bareroot practice, and the increasing ability to produce "larger" stock in larger containers in a cost-effective manner, it is probable that the use of container stock in the PNW U.S. will gradually increase.

Ultimately, in both B.C. and the PNW, the market rather than the current availability of particular products will efficiently and effectively exercise discipline in determining stock type preferences.

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