

THE STATUS OF CONTAINER PLANTING PROGRAMS IN CANADA

5. ONTARIO

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Abstract.--Containerized planting stock has been used operationally in Ontario for 17 years with varying degrees of success. The program has expanded slowly and now produces 15 million seedlings annually or 18% of all stock planted on Crown lands in the province. Several types of greenhouse and container system are used; among the latter, the Japanese paperpot system is the most common. Six production centres are operated by the province, but future expansion is expected to be mainly in the private sector.

Résumé.--En Ontario, on utilise, depuis 17 ans, des plants en mottes emballées pour la plantation en plein champ, avec des taux de réussite variables. Le programme a lentement pris de l'expansion et produit maintenant 15 millions de semis par année soit 18% des semis plantés dans les terres de la Couronne dans cette province. On utilise de nombreux types de serres et de contenants, dont le plus commun est le pot en papier japonais. Actuellement, six stations de production du Ministère des Richesses Naturelles de l'Ontario fonctionnent, mais on prévoit que toute expansion future se fera principalement dans le secteur privé.

INTRODUCTION

In Ontario the planting of containerized tree seedlings was begun experimentally in the early 1960s with a process developed by McLean (1959). In this process, 1.4 x 7.6 cm white plastic tubes, commonly referred to as "Ontario tubes", were used. Seedlings were grown in temporary plastic greenhouses for 6-12 weeks (MacKinnon 1968, 1970) and were quite small when planted (approx. 5 cm tall). In 1965, despite the lack of field performance data, the tubed seedling was deemed suitable for operational use and a production target of 10 million seedlings was set for 1966 (Reese 1974). In that year 17 million seedlings were planted on Crown lands with highly varied results (MacKinnon 1968, 1970). However, plans for the program called for continued production of 20 million tubed seedlings annually to 1971, with improved production techniques. In reality, the production figures for 1970 and 1971 were much

lower, and declined to fewer than 4 million seedlings by the mid-1970s. The program met with little success in most districts and was considered successful only in two (Swastika and Fort Frances). Successes were greatest with jack pine (*Pinus banksiana* Lamb.).

In the early 1970s, dissatisfaction with seedlings grown in the "Ontario tube" and the high cost of plastic led to the development and testing of other container systems. The principal systems now in use are the Japanese paperpot and Spencer-Lemaire "Rootainers". Production and planting by the Ontario Ministry of Natural Resources (OMNR) over the period 1970-1981 are summarized in Table 1.

MANAGEMENT AND BIOLOGICAL CONSIDERATIONS

The increased proportion of containerized stock planted during the late 1970s was due to several factors related to the biological characteristics of containerized seedlings. Container-grown stock, particularly jack pine, is ideal for extending the

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Table 1. Summary of tree production and planting by OMNR in Ontario^a

Year ending 31 March	Bare-root stock		Containerized stock			
	Produced (000)	Planted (Ha)	Produced (000)	(%)	Planted (Ha)	(%)
1970	62,623	31,484 ^b	5,958	8.7	2,259	14.3
1971	68,183	32,446 ^b	4,428	6.1	3,273	9.2
1972	76,597	36,293 ^b	5,079	6.2	4,025	10.0
1973	68,161	36,067 ^c	2,862	4.0	2,442	6.3
1974	65,362	31,598 ^c	3,402	4.9	1,962	5.8
1975	59,794	29,910 ^c	3,148	5.0	2,166	6.7
1976	50,945	27,285 ^c	5,347	9.5	2,767	9.2
1977	45,981	24,165 ^c	4,292	8.5	2,005	7.7
1978	48,292	24,101 ^c	5,461	10.2	2,406	9.1
1979	52,928	25,189 ^c	5,487	9.4	2,360	8.6
1980	61,453	26,693 ^c	7,945	11.4	4,137	13.1
1981	65,360	27,147 ^c	10,497	13.8	4,934	15.4

^aDoes not include private sector or forest industry production and planting (see Table 2).

^bCrown, Agreement and Woodlands Improvement Act plantings.

^cCrown, Agreement, Woodlands Improvement Act, and other patent land plantings.

planting season after bare-root planting is completed, and can be programmed for planting into midsummer. Containerized seedlings also make the best use of valuable seed and, with precision seeding, can reduce seed requirements to 15-20% of what is required to produce the equivalent amount of bare-root stock. Although, in the past, containerization has been claimed to increase flexibility in seedling production (MacKinnon 1970) this is no longer found to be the case. Rather, we find that, with modern growing facilities, high energy costs and the trend to larger, often overwintered seedlings, flexibility in production is no longer a significant factor. Nevertheless, the amenability of containerized stock to mechanized handling throughout the production/planting cycle can be advantageous in reducing labor costs, depending on the type of container and handling system used.

It is in the planting phase that the real advantage of containerized stock becomes apparent. The increased planter productivity with containerized stock in comparison with bare-root stock, the longer planting season and the better utilization of labor over an extended period are tremendous advantages in any large planting program. On shallow and stony sites an auger or Pottiputki has a distinct advantage over the shovel used to plant conventional bare-root stock. The fact that containerized plants are planted with the container and growing medium protecting the roots is another advantage on shallow, droughty sites. With both jack pine and red

pine (*Picea resinosa* Ait.), root deformation at the time of planting can be a serious problem with bare-root stock as the root frequently develops in a single plane established by the shovel cut in the soil. There is much less chance of such root deformation with containerized stock planted with a Pottiputki.

Containerized seedlings produced today are no longer cheap, small plants grown in inexpensive plastic greenhouses. As the production system has become more sophisticated, so the demand for larger and sturdier stock has grown. Containerized planting stock produced today ranges from 500 mg to 1000 mg dry weight, several times heavier than that grown in the past. In general, production and planting prescriptions for jack pine are well established, but techniques for black spruce (*Picea mariana* [Mill.] B.S.P.) are still being refined.

CURRENT SITUATION

Containerized seedlings are grown at five OMNR production centres located in Dryden, Thunder Bay, Swastika, Thessalon and Kemptville, respectively. A sixth centre, at Orono, uses containers primarily for the vegetative propagation of special seedlots and planting stock for the provincial tree improvement program. There are also five private growers of containerized tree seedlings.

At present (1981) the total greenhouse area used for container production is 15,332 m², of which 11,936 m² (78%) is heated. Approximately 85% of the growing space is owned and operated by OMNR.

Four different container systems are currently used in Ontario. The Dryden nursery has pioneered the development and use of a continuous container production system which employs a cigarette machine modified to produce a 19 mm diameter extruded container of adjustable length. A special paper composed of synthetic and natural fibres is used to form the container. The Thunder Bay nursery uses Spencer-Lemaire "Rootainers" while, in the same region, Abitibi-Price Inc. is contracting out the production of approximately 1 million jack pine and spruce seedlings in FH 408 paperpots for planting on its freehold lands. OMNR is currently negotiating additional contracts with private growers in the Thunder Bay area to produce paper-

pot stock for use on Abitibi-Price Inc.'s Forest Management Agreement (FMA) area.

At the Swastika nursery the 19 mm diameter "Ontario tube" was phased out two seasons ago, and the entire program was given over to the production of FH 308 and FH 408 paperpots. Two small contract growers in the Swastika area also use paperpots. The Thessalon nursery uses FH 408 paperpots exclusively. The Kemptville nursery was using paperpots but has switched to Can-Am multipots both for its own (OMNR) production and for use by contract growers. The Orono nursery uses the Leach container for most of its production, as well as some FH 408 paperpots.

Current (1980) and forecast (1983) containerized seedling production (OMNR, forest industry and private sector) is summarized by species in Table 2 and by region in Table 3. Planting programs are summarized in Table 4.

Table 2. Current (1980) and proposed (1983) container production by species^a.

	Seedling production in 1980 (000)							Total
	Pj ^b	Pw	Sb	Sw	La	C	H	
Heated houses	6,162	485	3,117	57	100	591	75	10,587
Unheated houses	3,425	100	440	-	50	-	-	4,015
Total production	9,587	585	3,557	57	150	591	75	14,602
	Proposed production for 1983 (000)							Total
	Pj ^b	Pw	Sb	Sw	La	C	H	
Heated houses	10,571	1,939	6,048	520	164	851	-	20,093
Unheated houses	4,348	-	400	-	-	-	-	4,748
Total production	14,919	1,939	6,448	520	164	851	-	24,841

^aIncludes OMNR, forest industry and private sector production.

^bSpecies abbreviations: Pj - jack pine
 Pw - white pine (*Pinus strobus* L.)
 Sb - black spruce
 Sw - white spruce (*Picea glauca* [Moench] Voss)
 La - Larch (*Larix* spp.)
 C - other conifers
 H - hardwoods

Table 3. Current (1980) and proposed (1983) container production by administrative region^a

Region	Greenhouse	1980 production (000)	1983 production (000)
North-western	Heated	2,500	2,000
	Unheated	1,900	1,900
	Total	4,400	3,900
North-central ^b	Heated	1,295	4,290
	Unheated	-	350
	Total	1,295	4,640
Northern	Heated	4,009	6,453
	Unheated	537	797
	Total	4,546	7,250
North-eastern	Heated	1,809	4,971
	Unheated	1,378	1,651
	Total	3,187	6,622
Eastern	Heated	595	2,000
	Unheated	150	-
	Total	745	2,000
Central	Heated	379	379
	Unheated	50	50
	Total	429	429
Ontario total	Heated	10,587	20,093
	Unheated	4,015	4,748
	Total	14,602	24,841

^aIncludes OMNR and private sector production.

^bIncludes production by Abitibi-Price Inc. for planting on its freehold lands.

Table 4. Current (1980) and proposed (1983) planting program by principal species^a

	Area planted in 1980 (ha)							
	Pj	Pw	Sb	Sw	La	C	H	Total
Containerized stock	3,843	192	780	230	75	202	65	5,387
Bare-root stock	5,376	2,837	7,942	6,522	150	3,508	528	26,843
Total	9,219	3,029	8,722	6,752	205	3,710	593	32,230
	Proposed program for 1983 (ha)							
	Pj	Pw	Sb	Sw	La	C	H	Total
Containerized stock	6,855	1,070	2,990	269	85	456	25	11,750
Bare-root stock	7,583	3,184	10,272	6,471	157	3,915	504	32,086
Total	14,438	4,254	13,262	6,740	242	4,371	529	43,836

^aIncludes OMNR and forest industry planting.

Most greenhouses in northern Ontario produce two crops of containerized stock per year. A first crop of pine is frequently started in March or April for planting in the current season. A second crop of either pine or spruce is then started in June and is overwintered. The pine is planted in spring, while the spruce is frequently grown on and planted in July. Container stock is usually overwintered outdoors under snow cover; refrigerated storage is rarely used. Both principal species, jack pine and black spruce, may be overwintered outdoors. In 1980 approximately 70% of all containerized stock produced in the province was overwintered.

FUTURE FORECAST

The production of containerized seedlings in Ontario, after an initial flush of activity in the mid-to-late 1960s, levelled off through the 1970s (Table 1). From 1979 to 1981 production has more than doubled, reflecting a trend to increased emphasis on regeneration by both government and industry. This trend is expected to continue, as can be seen from Tables 2 to 4.

Under the new FMAs, agreement holders will be directly responsible for forest regeneration. From the first five agreements signed there are indications of a strong preference for containerized seedlings in planting programs. This preference is reflected in the 1983 production and planting forecasts (Tables 2 to 4).

A factor likely to constrain container production for the next few years is the lack of growing facilities and the lead time re-

quired to provide such facilities. For this reason the demand is expected to exceed supply for a number of years.

While OMNR will continue to expand its growing facilities, it is our policy to encourage private greenhouse involvement in the production of containerized forest planting stock. Where the existing private greenhouse capacity is inadequate, 50% capital grants are being used in association with multi-year production contracts to encourage the private sector. In 1980, approximately 15% of the provincial demand for containerized seedlings was supplied by private growers. It is our hope that in the next few years the figure can be increased to over 50%.

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