

# NURSERY PRACTICES AND RESEARCH IN ONTARIO

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*Watt, K.E. 2002. Nursery Practices and Research in Ontario. In: Dumroese, R.K.; Riley, L.E.; Landis, T.D., technical coordinators. National Proceedings: Forest and Conservation Nursery Associations-1999, 2000, and 2001. Proceedings RMRS-P-24. Ogden, UT.. USDA Forest Service, Rocky Mountain Research Station: 149-151. Available at: <http://www.fcnet.org/proceedings/2000/watt.pdf>*

## **Abstract**

A brief history of nursery production of forest tree seedlings in Ontario is presented. The industry dates back to 1904, when the first nursery in the province was established. From 1922 to 1958, eleven additional nurseries were built, the majority of which were situated in northern Ontario. Although the original experiments with containerized seedlings were conducted in 1965, it took more than 15 years for this type of production to become operational. In 1981, the provincial government provided funding for the establishment of private tree seedling nurseries. Today, there are 34 private nurseries in production in the province. Only four of the original government nurseries remain in operation as private enterprises. Containerized seedlings now comprise 80% of all seedling production in Ontario. Trends and developments in species, stock types, greenhouse structures and container types are presented. Seed sources and overwintering considerations are also outlined. Ongoing research in the province, through LUSTR Co-operative is described.

LUSTR Co-op is a non-profit tree seedling research co-operative, providing research and development services to the seedling industry. The Co-op was incorporated in 1993 and since that time, has expanded to include members from nurseries, forest products companies, allied supply companies, silvicultural contractors, research organizations and colleges and universities.

The mandate and research programme of LUSTR Co-op will be presented. Current and future research trends in Ontario will be discussed.

## **Key Words**

Bareroot nursery, container nursery, LUSTR, stocktypes, containers, tree seedling research

Ontario occupies an area of 1.1 million km<sup>2</sup> (413,000 mil) in central Canada and is the second largest province in the country. Seventy-four percent of the land base is forested; 91% of the forest is owned by the province and the remaining 9% is privately owned. As such, management of forest resources has traditionally been the responsibility of the provincial government. Nursery production of tree seedlings for the purpose of reforestation in Ontario dates back to 1904, when the first tree nursery was established at the Ontario Agriculture College in Guelph. In 1908, this nursery was moved to St. Williams where it became the first provincial government seedling nursery.

The First and Second World Wars decreased seedling production but, following both wars, the industry boomed. In the early 1920s, two additional government nurseries were established in southern Ontario. In 1946, the government built two more nurseries, and between 1955 and 1958, six additional nurseries were established in northern Ontario. Up until this point, all seedlings produced had been bareroot stock. By 1960, annual production was up to 50 million bareroot seedlings. In 1965, production of the first containerized seedlings was attempted in what were known as "Ontario tubes." These tube seedlings did not flourish, due in part to lack of interest and expertise. By 1972, production of

Ontario tubes had decreased to an all time low of 2.9 million seedlings.

However, two major problems in production of bareroot seedlings resulted in the resurgence of containerized stock in the 1970s. These were low germination and survival rates and the development of multiple leaders, especially in black spruce, known as "cabbage heading." It was found that the production of containerized stock in the controlled environment of a greenhouse could alleviate both problems.

The container stock was produced in paper pots and Spencer-Lemaire Root Trainers® in an effort to find a method that would either biodegrade after planting or produce a root plug. By 1979, production of container stock had increased to 7.9 million seedlings.

In 1981, the provincial government put out a tender for interested individuals to establish private container tree nurseries. The government guaranteed contracts for the first three to five years of operation. By 1986, production had reached the level of 69.4 million bareroot seedlings and 7.6 million container seedlings.

Today, there are 34 private nurseries in operation, which produce all of the seedlings required for the province's reforestation effort. The province plants approximately 100 million seedlings each year, 90 million of which are containerized. Four of the former provincial nurseries still produce tree seedlings under private or township ownership. The remaining eight nurseries are closed.

The provincial government no longer produces seedlings or is responsible for reforestation. This responsibility has been given to the forest products companies, which have long-term agreements with the government. The government has taken on a regulatory and monitoring role.

The private nurseries have undergone many changes since the early years of the 1980s. Most complexes are now either free standing or gutter connected, poly-covered greenhouses. Seedlings are grown in a wide variety of containers, including BCC Sideslits®, Beaver Plastics Styroblocks®, IPL Multipots®, jiffy pellets®, Panth Starpots®, or Spencer Lemaire Roottrainers®. The stock is grown to meet diverse site demands, from

tiny miniplugs on shallow soils to large, bareroot replacements for competitive sites.

Some of the growers overwinter their stock outside under snow cover. This is the system that has been used since the early days of container production. Many of the growers, however, prefer to store their seedlings in cold storage units over the winter in order to have better control over storage and thawing temperatures. In this system, seedlings are extracted from the containers in autumn and stored in plastic-lined boxes or totes.

The nursery production systems are a mixture of automated and manual. Filling, sowing, and some extraction machines are used. However, large numbers of seasonal staff are often required to complete the filling and sowing lines, fill the houses, and extract the crop for storage. Each nursery boasts unique combinations of equipment and people, from very high-tech nutrient injection systems to hand-thinning crews.

This extremely innovative industry requires research and development to support its activities. As part of the government's restructuring, it is no longer involved in tree seedling research. In an effort to bridge this gap, some far-sighted growers came together in the early 1990s to form a research group, known as LUSTR Co-operative, Inc. The organization was incorporated as a nonprofit group in 1993.

Since that time, the group has expanded to include membership from not only nurseries but also from forest products companies, supply companies, silvicultural contractors, research organizations, colleges, and universities. The coop's mandate is to determine research priorities and conduct trials; provide technology transfer and support services, act as a communication liaison for the forest seedling industry and partners, and create other opportunities for growth.

In the past five years, LUSTR Co-operative has explored many areas of interest to its members. Trials have been done using mycorrhizae to better prepare seedlings for shallow, stressful, or competitive sites. Development of different stock types, especially larger stock as a bareroot replacement, has been investigated, through transplanting or utilizing large container types. Some work has been done on thawing regimes to determine optimal temperatures and thawing rates for seedlings in order to improve delivery times

without impacting seedling physiology. Lately, work has begun on hybrid poplar clones in an effort to produce shorter rotation crops.

All of this work is geared toward three major initiatives: improved seedling quality, just-in-time delivery, and increased growth and yield. In addition to these areas, the co-op has recently been exploring seed and stock certification options and tree improvement opportunities.

LUSTR Co-operative provides technology transfer to its members in a number of different ways. "From Seed to Forest" is the quarterly newsletter of the co-op, and it contains research results, conference summaries, upcoming meetings, and information on new initiatives. Two workshops

are held each year to bring the members together and to present topics of interest. A website is maintained at <http://flash.lakeheadu.ca/~lustr/>. Literature reviews and personal, on-site visits are done regularly and upon request.

As an organization, LUSTR Co-operative's future focus will be on increasing support from the forest industry and expanding partnerships. From there, the co-op will continue to initiate new, timely research projects and provide pertinent technology transfer. The on-going promotion of LUSTR Co-operative is imperative, as we remain the only Ontario organization focused on tree seedling research.