

BAPE May 8, 2006: Doug Pitt's response to question by Joseph Zayed, commissaire

Question: What is "silviculture" and how much of the different aspects of silviculture are being implemented in Ontario?

Doug Pitt: Silviculture is the theory and practice of controlling forest establishment, composition, structure, and growth to fulfill landowner objectives. Silvicultural treatments generally fall into two main categories: **reproduction** and **tending**.

Reproduction methods can be **natural**, relying on seed from overhead or adjacent trees, or **artificial**, relying on direct seeding or planting. All reproduction or regeneration methods begin with the harvest of some or all of the older trees in a stand and the creation of an environment favourable to the establishment of regeneration. In short, shade intolerant species, including jack pine and aspen are best regenerated as a single, even-aged cohort under high light conditions, such as obtained in clearcutting. Mid-tolerant species, including white spruce, white pine, and yellow birch are best regenerated as a single, even-aged cohort under moderate light conditions, such as obtained in shelterwood cutting or group selection. Shade tolerant species, including sugar maple, balsam fir, and hemlock can be regenerated under relatively low light conditions, such as obtained in single-tree or group selection, and can be managed in multiple cohorts, or an uneven-aged stands. Natural, artificial, or a combination of both types of reproduction can be used in any of the above-mentioned systems; the species involved and circumstances will dictate the best approach. Harvest method and timing can have a significant effect on the regeneration environment and is a critical, but often overlooked, first step in the regeneration process. Further manipulation of the forest floor to create a microenvironment conducive to regeneration is referred to as **scarification**, if in preparation for natural or direct seeding, or **site preparation**, if in preparation for planting. Scarification (preparation of a seed bed) is invariably achieved through mechanical means, either at the time of harvest, or as a separate operation following harvest. Site preparation is usually achieved through mechanical means, either to facilitate planter access or improve site conditions (e.g., drainage), and occasionally achieved through the use of chemical herbicides such as glyphosate (e.g., Vision®) or hexazinone (e.g., Velpar®), if competition reduction and/or site protection (from erosion and/or compaction) are principle objectives or concerns. Scarification and site preparation have been successfully achieved by burning, although high costs, liability issues, and environmental concerns are currently limiting the use of this tool.

Tending encompasses the range of silvicultural activities that take place after regeneration is established, through until the stand is ready to be replaced. Vegetation management or weed control activities aimed at reducing inter-specific competition and adjusting species composition are referred to as **release** treatments. These can include mechanical cutting (e.g., hand-held or tractor-mounted brush saws),

cutting followed by application of Myco-Tech™ Paste¹, or the use of herbicides (one of 3 registered compounds: glyphosate, 2,4-D, or triclopyr). Integrated vegetation management programs that include an array of approaches and tools to meet social, biological, economic, and environmental constraints are best. Treatments that occur later, during the sapling or pole stage of stand development, to reduce inter- and intra-specific competition and adjust species composition, are referred to as **thinnings**. Thinnings are usually conducted by cutting but, in certain circumstances, targeted herbicide applications (e.g., triclopyr (Release®)) can be used as well. Thinnings are **pre-commercial** if the stems targeted for removal are not utilized or **commercial** otherwise. In all cases, the objective of tending is to accelerate the achievement of a desired species composition, focus the growth potential of the site onto selected stems so that a desired stand structure is achieved as fast as possible, and, in cases of intensive management, to maximize production of certain products, such as saw timber, veneer, or particular structure for wildlife habitat. In intensive management, tending can also include pruning.

In a good silviculture system, one activity is not conducted independently or without consideration of another. As such, a good silviculture system involves a well-planned harvest-to-harvest sequence of careful, high-utilization logging, timed to microsite and the planned regeneration system requirements; thorough site preparation aimed at minimizing adverse site disturbance and development of competition; reproduction methods matched to microsite and future forest condition goals (e.g., species and stock selection, genetics); timely and effective vegetation management; and timely and effective density regulation. Seldom will one aspect of the silviculture system compensate for another without an associated loss in value or quality in the outcome. For example, selecting large, high quality, genetically improved nursery stock will not eliminate the need for vegetation management.

Silviculture statistics for Canada can be found at the CCFM website: http://www.nfdp.ccfm.org/compendium/silviculture/detailed_e.php. A quick comparison of the statistics for Ontario and Quebec are summarized in the table below (rounded to the nearest 1000 ha):

¹ Canada's only registered biological control tool. Based on the fungus *Chondrostereum purpureum*. Due to its high cost and low efficacy relative to herbicides, this product sees minimal use.

Silvicultural Activity	Ontario (2003)	Quebec (2003)
Harvest – clearcut and related systems	185	263
Harvest – shelterwood	5	8
Harvest – selection	5	22
Total Harvest	195	293
Scarification	5	0
Direct Seed	17	0
Site preparation – prescribed burn	0.14	0
Site preparation – mechanical	63	55
Site preparation – chemical	5	0
Site preparation – manual	7	1
Total Site Preparation	97	56
Planting	92	61
Total Regeneration	109	61
Tending – mechanical	0	11
Tending – chemical	72	0
Tending – manual	3	0
Precommercial Thinning	9	123
Total tending	84	134
Total productive forest land base	42204	53991

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