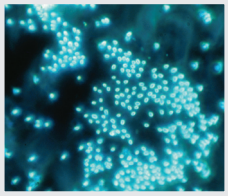
Natural Resources Canada
Ressources naturelles Canada

In Brief






from the Canadian Forest Service – Laurentian Forestry Centre

Number 3 – 2003

Comparative study of black spruce stands originating after harvest or after fire

Because careful logging around regeneration (also known as CPRS) is now the practice in Quebec, it is important to acquire knowledge on the growth and yield of the stands resulting from this cutting approach. This is what a group of researchers from the Canadian Forest Service and the Université du Québec à Chicoutimi set out to do. They described and analyzed from a comparative standpoint some 15 stands of black spruce, half of them originating from cutting and half from fires in the first part of the 20th century. They were particularly interested in the diameter structure of the stands, as this factor affects stand productivity, but they also compared the evolution of stand structure and evaluated productivity based on the height of the regeneration at the time of harvesting.

The researchers found that, even if second-growth black spruce stands had an uneven-aged structure and a well-defined hierarchy initially, they evolved in a very similar way to the fire-origin stands, albeit more slowly. In the end, however, the diameter structure of cut stands is more asymmetrical than that of virgin stands, with a larger proportion of small diameter stems.

With respect to stand productivity, the researchers found that harvest-origin black spruce stands were more productive than fire-origin ones for two reasons: their basal area was equal to or greater than that of the virgin stands and the majority of stems conserved at the time of cutting were over 1 metre tall.

For information: Jean-Martin Lussier, jean-martin.lussier@nrcan-rncan.gc.ca

Biodiversity: Preserving lichen and bryophyte communities

Photo: C. Allain

Timber harvesting in the mature and old-growth forests characterizing our landscapes poses a potential threat to some forest-dwelling plant species such as bryophytes (mosses and liverworts) and lichens.

To protect these plant communities, it is essential to identify their respective successional stages and the characteristics of the sites where they grow. Canadian Forest Service researchers, working in conjunction with colleagues in the Interuniversity Forest Ecology Research Group (GREFI) at the Université du Québec à Montreal, undertook a study in which they sampled 22 spruce–moss stands, aged 80 to over 200 years old, and evaluated the diversity and abundance of the bryophyte and lichen communities growing on the forest floor or in the tree canopy.

Upon completing this survey, the researchers made several recommendations for preserving these plant communities.

One of these involves adopting a combined landscape-level and stand-level approach to maintain habitat diversity, which is essential for preserving the diversity of bryophyte and lichen communities. The researchers noted that certain tree-dwelling lichens are more abundant on older trees and that these trees could be conserved through partial cuts.

The researchers also indicated that clearcut sites are likely to give rise to paludification (rise in the water table) more quickly than is the case with fire-disturbed sites. Consequently, if we want to emulate nature, scarification and controlled burning are techniques that should be employed in some cases to create environments favourable for the plant communities concerned.

For information: Louis De Grandpré, louis.degrandpre@nrcan-rncan.gc.ca

Photo: L. De Grandpré

This publication is part of a series that presents popularized summaries of scientific articles written in whole or in part by Laurentian Forestry Centre researchers.

Canada

In Brief
from the Canadian Forest Service – Laurentian Forestry Centre

Yellow birch more vulnerable to ice damage than previously thought

Did the major ice storm that hit southwestern Quebec in January 1998 have an impact on timber production in the affected regions? Because of the lack of research on this topic, a Canadian Forest Service researcher undertook a study in the Saint-Zacharie forest, in the Eastern Townships region of Quebec. One of his aims was to endeavour to evaluate the effect of ice damage on the growth of the main species in a sugar maple–yellow birch stand.

The condition of a stand of this type was assessed three years after the ice storm by measuring the diameter growth of the main species and comparing it with the diameter growth trends that existed prior to this major disturbance. Yellow birch is the species that suffered the greatest volume losses (32%), followed by white ash (11%). These volume losses accounted for only about 5% of the total volume of the stand—a decrease that appears relatively small compared with the losses previously reported in other studies of young sugar maple–yellow birch stands. Based on the results obtained, the researcher could not detect significant ice effects on stem diameter growth, regardless of the damage class and the species considered.

Photo: A. Carpentier

In the stand studied, the majority of sugar maple and beech stems suffered no damage or only minor damage, whereas two thirds of the yellow birch stems sustained moderate to severe damage. The study seems to show that, in a mature high forest, sugar maple and hemlock are quite resistant to ice damage, whereas yellow birch is more vulnerable than some researchers believed.

For information: Jean-Martin Lussier, jean-martin.lussier@nrcan-rncan.gc.ca

Does planting white pines under a canopy have an effect on weevil attacks?

In order to prevent or reduce the impact of weevil attacks on white pine, it is recommended that white pine trees be grown under a canopy of larger trees or companion species during the period in the species' life cycle when it is most vulnerable to attack. But what effect does this approach actually have on weevil feeding, egg laying and emergence? Some researchers with the Canadian Forest Service and the Interuniversity Forest Ecology Research Group (GREFI) at the Université du Québec à Montréal carried out a study to address these questions. They identified the relationships that existed between the forest canopy (by using basal area as an indicator) and weevil behaviour in an experimental plot containing 63 white pine about 12 years old growing under the protective cover of pioneer species in the Outaouais region.

It appears that some parameters associated with weevil behaviour, such as the intensity of feeding and egg laying, are correlated with the forest canopy, whereas others are not, including the number of pupal chambers, emergence holes and various indicators of survival. The results of this study show that growing white pines under a canopy can be a good strategy for limiting weevil populations, particularly as this allows natural enemies to have more of a controlling effect on the weevils. The small number of adults that emerge serves to check the infestation, allowing mechanical control methods to be used to good effect.

Growing white pine under protective cover is not easy to accomplish, however, and this approach appears to have an effect on stem diameter growth, among other aspects. However, the researchers believe this strategy could be very useful, given the potential control offered by natural enemies of the white pine weevil.

For information: Robert Lavallée, robert.lavallee@nrcan-rncan.gc.ca

Frost damage to seedling root systems and effects on growth

The risk of frost and damage to seedling root systems is a problem that all tree nurseries face, particularly for containerized seedlings that need to be hardened off outdoors. To gain a better understanding of the effects of frost on seedlings, researchers with the Canadian Forest Service and the Forest Biology Research Centre at Université Laval exposed black spruce, jack pine and white spruce seedlings to fall frosts, stored them in a cold room and then planted them in spring in two different types of soil, one damp and the other dry. The researchers also evaluated the extent of root damage in the seedlings in order to relate this to mortality and growth data.

Photo: F. Bigras

For black spruce and white spruce, the study results suggest that 50% or more of the root system has to undergo frost damage before there is any effect on the mortality rate. In jack pine, frost damage to 40% of the root system is the threshold beyond which an effect is seen on mortality.

The researchers also measured stomatal conductance and photosynthesis and observed that these processes decreased as the amount of damage increased. They pointed out that the reduction in growth observed depended to a great extent on the site and the prevailing environmental conditions, which differed at the two sites. They pointed out that their observations covered only one growing season and a fairly small number of seedlings.

For more information about the series:
Natural Resources Canada
Canadian Forest Service
Laurentian Forestry Centre
1055 du P.E.P.S.
P.O. Box 10380 Stn. Sainte-Foy
Quebec (Quebec) G1V 4C7
418 648-5789

cfs.nrcan.gc.ca/publications/series/read/2

 • ISSN 1925-5756