Natural Resources Canada | Ressources naturelles Canada

In Brief

from the Canadian Forest Service – Laurentian Forestry Centre

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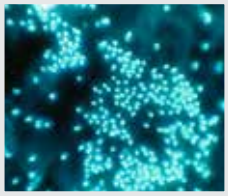


Large piles of cutting residues favour flowering plants

Numerous studies have been carried out relative to the quantities of cutting residues to be left on site to ensure sustainable biomass harvesting. However, there have not been many studies thus far on the impact of the distribution of these residues.

Photo: NRCan

In this study, researchers at the Université du Québec à Montréal, the ministère des Forêts, de la Faune et des Parcs du Québec and the Canadian Forest Service demonstrated that the placement of cutting residues into large piles in the logged area creates an area of a few metres wide around the piles where the soil is more fertile (higher nitrogen and phosphorus content) and where the light is more abundant.

These conditions promote the growth of plants and the early production of flowers and fruit. The presence of residues in piles may therefore have a beneficial effect on pollinating insects and fruit eating mammals. This effect should be taken into consideration in the case of sites with a reduced presence of flowering, berry producing plants.

For information: David Paré, david.pare@rncan-nrcan.gc.ca

Terrestrial ecosystems influence climate projections

A better understanding of how terrestrial ecosystems affect the climate system improves our ability to predict future climate in the context of climate change. The flow of water vapour generated by evapotranspiration is one of the dominant mechanisms of energy exchange between forests and the atmosphere, but this process is still poorly defined in models.

In this study, the researchers used the FLUXNET global network to gather, among other data, evapotranspiration measurements obtained in natural ecosystems of the sub-boreal, boreal and arctic regions of the planet. The data, collected from 65 sites, represent different types of forests as well as tundra, wetlands and natural grasslands.

The data were analyzed in order to better assess how evapotranspiration reacts to changes in ecosystem properties and climate, and to more effectively quantify the influence of the roughness of the contact surface between vegetation and the atmosphere as a key factor in the differentiation between ecosystems of the same climatic region. Roughness refers to the unevenness of a surface compared with another surface (e.g., forests have an uneven surface compared with a lake, which has an even surface).

These advances give us a better understanding of the feedback loop between climate and vegetation and should result in the influence of terrestrial ecosystems on climate change projections being taken into account to a greater extent.

For information: Pierre Bernier, pierre.bernier@rncan-nrcan.gc.ca

Eastern white cedar responds well to partial cutting

Eastern white cedar is a species of high commercial and ecological value, but its numbers have been declining since the mid 19th century. It is therefore important to obtain a better understanding of the species' response to forest management practices. To do so, researchers at Université Laval, the Association des communes forestières de France, the Université du Québec en Abitibi–Témiscamingue and the Canadian Forest Service studied eight partially cut mixed stands on two sites located in the Outaouais and Laurentian regions, in western Quebec.

The two sites consisted mostly of eastern white cedar and yellow birch. The first site, covering 29 hectares, also contained fir, white spruce, red maple and sugar maple, while the second site, covering 35 hectares, also contained hemlock trees, but no sugar maples.

Photo: Catherine Larouche

The researchers demonstrated that eastern white cedar trees in these stands usually maintained a good growth rate 20 years after logging. However, this response varied depending on the size of the eastern white cedar trees as well as stand age and composition. Consequently, it was found that a high percentage of other conifers in the stand can have an adverse effect on eastern white cedar growth.

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

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

A method for assessing the vulnerability of stands to fire

Various environmental factors influence stand productivity, including the period of the year when temperatures are conducive to growth, as well as altitude and surface soil composition.

Photo: NRCan

Researchers at the ministère des Forêts, de la Faune et des Parcs du Québec, Université Laval and the Canadian Forest Service have developed an innovative method for assessing the vulnerability of a region's stands to forest fire. This vulnerability takes stand productivity and burn rates into account at the same time.

The burn rate corresponds to the average percentage of the area that is burned every year. In the case of the study area, located between the 49th and 53rd parallels of northern latitude in Quebec, the researchers estimate that the areas where productivity is good to average are vulnerable to fire when the fire cycle is less than 300 years.

Although in this study the method was applied to Quebec's boreal forest, it could be used in several regions of Canada.

For information: Sylvie Gauthier, sylvie.gauthier@rncan-nrcan.gc.ca

Better mechanical properties found in post fire black spruce

In the boreal forest of eastern Canada, 60% of stands consist of trees of varying ages because of the long intervals between fires. This forest dynamic creates an irregular structure associated with slower growth.

In this study, researchers at Université Laval and the Canadian Forest Service examined the effect of stand structure on the mechanical properties of defect free black spruce wood. Samples were collected from a total of 128 trees in regular and irregular stands located across Quebec. Models were then developed for each type of stand. These models describe variations in the elasticity and rupture modules based on cambial age and the width of annual growth rings.

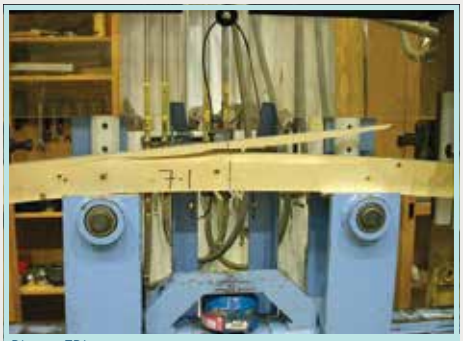

Photo: FPInnovations

The researchers noted that the wood mechanical properties of black spruce trees in post fire stands (regular structure) were superior to those of black spruce trees growing in stands made up of trees of varying ages (irregular structure). They also noticed that the mechanical properties were related to a significant degree to cambial age and, to a lesser degree, to growth ring width. In the samples from regular structure stands, the elasticity module and the rupture module values were higher, and these are characteristics sought after by the sawn lumber industry.

For information: Isabelle Duchesne, isabelle.duchesne@rncan-nrcan.gc.ca

In the boreal forest, the stimulating effect of fire is short lived

In the boreal forest, fire has a significant impact on biodiversity and productivity. Fire changes the structure and composition of forests and increases soil fertility. In this study, researchers at Université Laval and the Canadian Forest Service assessed how boreal forest productivity changes after fire over a 2,000 year time period.

The researchers observed a decrease in forest productivity in some ecosystems where there was a long interval between fires. This decrease was often accompanied by a thickening of the organic layer.

They also noticed that the beneficial effect of fire became less pronounced on well drained sites after a short period of about 60 years. After that period, tree productivity, soil fertility and temperature, and thickening of the organic layer seemed to stabilize. The researchers concluded that the stimulating effect of fire on tree growth is of short duration and that the absence of fire does not necessarily result in unproductive stands.

For information: David Paré, david.pare@rncan-nrcan.gc.ca

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
Québec, QC G1V 4C7
418 648-5789

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