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In Brief

from the Canadian Forest Service – Laurentian Forestry Centre

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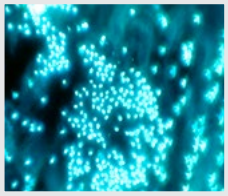


Lichens affect tree growth

In this study, researchers from the Université du Québec en Abitibi-Témiscamingue and the Canadian Forest Service examined the effects of ground vegetation composition on tree fine root biomass for the very first time. This element is used as an indicator of changes in tree physiology.

Their work had two objectives. The first was to determine, for open and closed stands, the relationship between the type of ground vegetation, fine root biomass, forest cover opening, and available nutrients. The second was to determine the effects of lichen and sphagnum removal on fine root biomass and the availability of soil nutrients.

Photo: UQAM

In light of the results obtained, researchers concluded that lichens, unlike sphagnum, affect tree growth through their direct effects on soil nutrients. In the boreal forest, the presence of canopy gaps is associated with that of lichen in dry areas populated with jack pine, or with the presence of sphagnum in damp areas where black spruce grows. The researchers determined that there was a link between ground vegetation composition and the maintenance of these canopy gaps.

This additional element should be taken into account when planning silvicultural interventions in order to maintain site productivity, especially by promoting rapid regeneration in damp areas prone to paludification (peat formation) and in dry areas prone to transformation into lichen tundra.

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Clay Belt: reducing paludification to promote regeneration growth

In this article, researchers from the ministère des Forêts, de la Faune et des Parcs du Québec, the Université du Québec en Abitibi-Témiscamingue, the Université du Québec à Montréal, Université Laval, and the Canadian Forest Service studied the effects of certain silvicultural methods (clearcutting, cutting with protection of regeneration and soils (CPRS), prescribed burning) and forest fires on regeneration growth in black spruce stands prone to paludification in the Clay Belt of northeastern Ontario and northwestern Quebec. To do so, the researchers used data from four studies carried out in these regions.

The results of this synthesis indicate that management strategies aimed at promoting regeneration growth in forests prone to paludification should focus on reducing the thickness of the soil's organic layer through soil mechanical disturbance or prescribed burning.

The researchers suggest that forest managers use management strategies that involve disturbing the different layers of soil. Clearcutting followed by prescribed burning should be privileged over CPRS. However, in certain provinces (including Quebec), clearcutting is now prohibited. In such cases, it is recommended that CPRS be followed by major mechanical soil preparation work so as to reduce the thickness of the different soil layers and mix them together.

Paludification is a natural process by which the layer of organic matter on the ground continuously thickens. Among other repercussions, tree growth progressively decreases as the layer of organic matter thickens.

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Spruce budworm: parasitoids show no preference for a specific larval stage

Spruce budworm (SBW) is a major defoliator of coniferous forests in North America. Larval parasitism plays an important role in the control of SBW populations. Composition of the parasitoid community of SBW varies considerably with the density of its populations.

Photo: NRCan

Researchers from the University of Toronto and the Canadian Forest Service conducted field experiments at Armagh and Petit-lac-à-l'Épaule, as well as in the laboratory, to describe the seasonal pattern of *Tranosema rostrale*, a parasitoid of SBW larva, and to study whether this pattern could be explained by the interaction of this parasitoid with other species of parasitoids or by the SBW's larval stages.

The results of this study show that the seasonal pattern of SBW parasitism is partly attributable to the seasonal abundance of the parasitoid Tranosema rostrale as well as to the possible competition between *Tranosema rostrale* and another parasitoid, *Elachertus cacoeciae*, and not to the preference of *Tranosema rostrale* for a specific larval stage of the SBW.

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Salvage logging after fire: protecting forests with a high conservation value

Burned forests result in a loss of revenue for the lumber industry, especially due to attacks by wood-boring insects that proliferate after fire. This is why salvage logging is increasingly being carried out before the wood deteriorates. However, these salvage operations are carried out without taking into account their impact on the biodiversity associated with recently burned forests. In order to reduce the impact of salvage logging on biodiversity within burned forests, researchers from Université Laval, the Université du Québec à Chicoutimi, and the Canadian Forest Service identified forests with a high conservation value for insect species that are the most at risk. In the eastern portion of the boreal forest, these forests comprise large-diameter jack pine or black spruce trees that are lightly to moderately burned.

Photo: NRCan

With the intent of maintaining biodiversity, the researchers recommend preserving of a strip of burned trees on the periphery of burned forests or around unburned patches that are preserved. These transition zones provide a rich habitat for biodiversity, especially for insect species that benefit from burned forests to increase their population before returning to green forests, where they maintain themselves at low density until the next fire.

Such recommendations could affect forest management practices, and modifications to salvage logging planning activities may be required.

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More fires = more open stands

Fire is the main disturbance in the boreal forest. It is a source of renewal and evolution for its forest stands. Variability in fire regimes creates a diversified forest mosaic by altering stand composition, structure and productivity. In eastern Canada, the spruce-moss bioclimatic domain consists of pure black spruce stands, mixed stands of spruce, jack pine or high-density fir, and lichen tundra (transition open stands, with a lichen cover of 40%).

The goal of this research was to assess whether the degree to which the forest canopy is open varies over time or whether it balances itself out with the current fire regime in the spruce-moss domain.

Using a landscape-scale simulation model, researchers from Université Laval and the Canadian Forest Service showed that vegetation responds quickly to changes in the fire regime. When the annual burn rate is high, there is a significant increase in open stands in the boreal forest. This increase could also be explained by fire frequency and regional climate. The increase in forest fires over the past two decades has led to a greater abundance of open stands. Forest managers should take this information into account when planning forestry activities.

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Burned area affects forest composition in the boreal forest

This study demonstrates how the composition of eastern North American boreal forests is more heavily influenced by the size of fires than by their frequency for a given territory. Researchers from the ministère des Forêts, de la Faune et des Parcs du Québec, the Université du Québec en Abitibi-Témiscamingue, Université Laval, the Université du Québec à Montréal, the Université de Montpellier, and the Canadian Forest Service studied boreal forest dynamics using data dating as far back as the early Holocene (last 10,000 years). They observed that past interactions between fire and vegetation have influenced the present-day structure of eastern North American boreal forests. This research shows that variations in fire dynamics over the long term explain most aspects of vegetation development in these forests. The adaptation of tree species to fire may also have played an important role in forest composition.

The expected climate change could mean an increase in forest fires, which could increase the occurrence of large fires in the boreal forest. Researchers believe that this increase could have significant impacts on the dynamics of forest vegetation over the next decades.

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