Natural Resources Canada | Ressources naturelles Canada

In Brief

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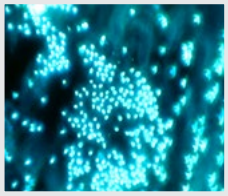


An amazing tool: the intestine of the SBW

In Canada, the spruce budworm (SBW) causes significant timber volume losses in fir and spruce stands, with negative impacts for the forest industry. Controlling this pest still presents major challenges, and scientists are looking for new, more cost-effective and eco-friendly budworm management approaches. As chemical pesticides are no longer looked upon favorably as forest pest management tools, current research efforts focus on the development of pest-specific products that target documented biological processes. The intestinal flora of these insects could be one such target.

Photo: NRCan

In this context, researchers from Laval University, Dalhousie University, and the Canadian Forest Service carried out a survey of the intestinal microflora–the microbiota–of SBW larvae. They compared a synthetic diet with two other natural diets, i.e., fir and spruce needles. A first analysis revealed that antibiotics present in a synthetic diet are not powerful enough to eliminate intestinal bacteria, while a second analysis showed that intestinal juices of larvae fed on balsam fir needles apparently inhibited bacterial growth, suggesting that the host plant may have a negative impact on budworm intestinal microflora.

These results demonstrate the importance of better understanding the effects of diet and the environment on SBW intestinal microflora in order to develop even more effective control measures.

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Dry rot *Serpula lacrymans*: a fungus that attacks buildings

Serpula lacrymans is a dry rot fungus that develops mainly in residential buildings. The wood-eating fungus causes brown rot, especially in old and damp softwood. It is observed less in Canada than in Europe, where it is considered to be the most destructive and difficult to control of all fungi found in buildings.

In carrying out this study, researchers at the Institut national de santé publique du Québec (INSPQ) and the Canadian Forest Service used data from Natural Resources Canada's mycological herbaria and culture collections and compared them with data reported from Europe and the United States.

According to studies from 2015 and 2016, the incidence of buildings infested with *Serpula lacrymans* in Canada is on the increase. Prompt intervention at the beginning of the contamination can prevent the complete destruction of the building. The following signs are strong indicators of an infestation: deformation of walls, a strong odour of fungus, brown and cracked, crumbling wood, as well as the production of fruit bodies that give off spores in the form of a tawny to reddish-brown dust.

Photo: NRCan

Restoring an affected building begins removing the source of dampness from all affected areas, and providing good ventilation and low heat. Disposal of contaminated wood must take place in accordance with regulatory standards applicable in Quebec and Canada.

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A serious threat to the black-backed woodpecker

Global biodiversity is strongly affected by climate change, especially in the northern latitudes. In fact, the recent northward expansion of nesting birds in North America's temperate zones has been attributed to climate change.

Researchers at Environment and Climate Change Canada, the University of Quebec at Rimouski, and the Canadian Forest Service's Atlantic Forestry Centre, Laurentian Forestry Centre and Northern Forestry Centre undertook to put together a realistic estimation of the cumulative effects of climate change and forest harvesting on the habitat of the black-backed woodpecker. This bird is considered to be an indicator species of the biodiversity associated with dead wood and old boreal forests. Its abundance is also linked to the wealth of other forest bird species.

In order to estimate the woodpecker's ranges, forest characteristics were simulated using the LANDIS-II forest landscape model. Results suggest significant reductions in habitat availability for the black-backed woodpecker, particularly in old coniferous stands. As a result, the potential number of nestlings could drop to 93%, representing a major threat to the population.

The challenge is to strike a balance between forest management and ecosystem services, while reducing the precariousness of future conditions under which the forest will evolve. The LANDIS-II forest landscape model has thus become a useful tool for testing future management strategies.

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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

All's well in trembling aspen country

Photo: NRCan

Trembling aspen covers a large part of North America. In boreal mixedwood forests, their presence is known to improve stand productivity and biomass, nutrient cycling, and biodiversity, while at the same time reducing the risk of fire. A better understanding of this species' influence on other ecosystem services, including soil carbon sequestration, is essential in order to better respond to the impacts of global changes.

In this review of the literature, researchers at the University of Utah and at the Canadian Forest Service examined whether trembling aspen affect storage and soil carbon stability differently from conifers. If the effect is the same, it could be extrapolated to the whole of North America.

Results show that trembling aspen does not store more carbon in the forest soil than do conifers, but their presence promotes the persistence of carbon in the soil. Indeed, several factors reveals that the soil organic carbon stock under aspen is more stable, rendering it more protected against environmental changes and soil disturbances. Therefore, this continental-scale analysis highlights that an increase in the abundance of trembling aspen in North American forests may increase the resistance and resilience of soil carbon stocks against global changes.

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Clarification on the calculation of forest cover in Canada

In their article entitled *Global Forest Change* published in the journal *Science* in 2013, researcher Hansen and his collaborators presented a global dataset on change. This study reports a net loss of 5.6% in Canada's total forest area over the period from 2000 to 2012. The calculation of a loss of 8.5% related to natural and anthropogenic disturbances is realistic. On the other hand, the gain of 2.9% appears to be low, given forest management practices in Canada that require harvested areas to be fully replanted.

Researchers at the Canadian Forest Service's Laurentian Forestry Centre and Pacific Forestry Centre set out to understand the causes of such an imbalance in Canada. Their analysis shows that the net loss of 5.6% reported by Hansen is not consistent with the data available or with the Canadian reality. Quantification of large areas tends to be skewed because losses in boreal forest cover are easier to detect than gains. Thus, the regeneration of burned forest areas in less productive regions in the north of the country is systematically excluded from the quantification of gains, since it does not get detected.

For a country with annual fire losses of more than 2 million hectares, this bias can have serious consequences. Applying a uniform methodology throughout the world is not appropriate for certain regions and can result in false conclusions that have a negative impact on a country's reputation in environmental terms. Techniques that are more sophisticated must be developed for quantifying forested areas.

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Our old northern forests isolated

The composition and configuration of the boreal mixedwood forest landscapes in northwest Quebec are modified by changes in natural and anthropogenic disturbances. The heterogeneity resulting from these modifications corresponds to the geographic variation of different elements within the landscape in space and time.

From 1985 to 2013, researchers at the University of Quebec in Abitibi-Témiscamingue and the Canadian Forest Service evaluated this heterogeneity using Landsat imagery over an area of managed boreal forest measuring 78,000 km^2. The calculation was performed for four classes of forest stands: conifer, mixed-conifer, mixed-hardwood, and hardwood.

During the evaluation period, the data collected showed that conifer stands showed the greatest decrease in their initial area (35%). Despite this, such stands dominate the mosaic, making up one-third of the study area. The results indicate further that large tracts of old-growth conifer forests have been fragmented by fire and forestry practices, producing a more heterogeneous landscape. Thus, over a period of 28 years, this landscape has become more fragmented, with islands of isolated old-growth forests that have more complex forms and fewer undisturbed areas. However, since 1995, these changes have diminished, perhaps due to a reduction in harvesting intensity, and the subsequent shift from traditional forest management to ecosystem-based management.

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