



New indicators of the impact of biomass harvesting in the boreal forest

Indicators must be developed in order to track the long-term effects of the removal of residual biomass (forest harvesting residues) on litter-dwelling insects. Working in collaboration with colleagues from the Université du Québec à Montréal and the Field Museum of Natural History in Chicago, a research team from the Canadian Forest Service targeted 10 species of rove beetles commonly found in the boreal forest that have significant impacts on the transformation of harvesting residues.

The rove beetle, a reliable indicator

Rove beetles have proven to be reliable indicators of the impact of forest disturbances. They are easy to sample and majority of them may be identify to species. There are about 1700 recorded species of rove beetles in Canada and they are sensitive to environmental disturbances. Rove beetles also occupy many microhabitats in the forest ecosystem.

Tell me what you eat...

One reliable way to assess the impact of disturbances on the biodiversity of litter-dwelling insects in boreal forests is to study their eating habits in regards to disturbances. For example, in a recent study conducted after whole-tree cutting in a balsam fir forest, certain species of rove beetles were negatively impacted by the subsequent removal of biomass, while the population of other species increased.



Photo: NRCan

A novel approach

In the past, most information regarding rove beetle feeding habits was gathered by observing the insects in the field or in the laboratory. Although direct observation makes it possible to identify the dietary preferences of the insects being studied, it does not constitute proof

beyond a reasonable doubt of the link between the insect and its food source.

In order to select insects that could be used as reliable indicators, researchers analyzed, for the first time with rove beetles, the contents of their digestive tract in order to deduce their feeding habits.



Photos: NRCan

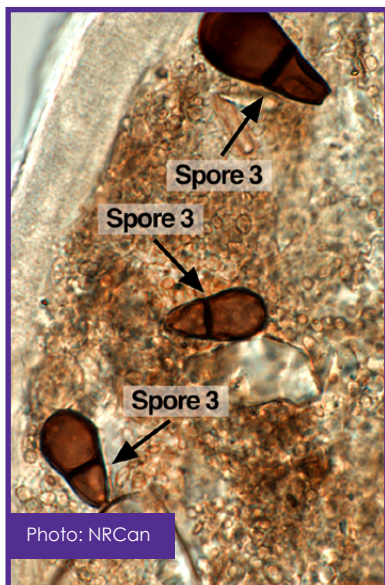


Photo: NRCan

The content of the rove beetles' digestive tracks.

A varied diet

Most of the insects studied had fungi in their guts, as different spores and mostly yeasts, which only develop in the presence of wood. Fungi were identified by comparing their DNA with that of known fungi found in DNA libraries. Researchers also found different species of bacteria in the contents of the rove beetles' digestive tract.

Yeasts were found in greater number because they are opportunistic and can establish colonies in various environments, such as the soil, decomposing wood and small berries. They are also an important part of the diet of fungus-feeding insects.

Researchers also detected spores from at least seven species of fungi in the digestive tracts of six of the species studied. The absence of spores among the four remaining

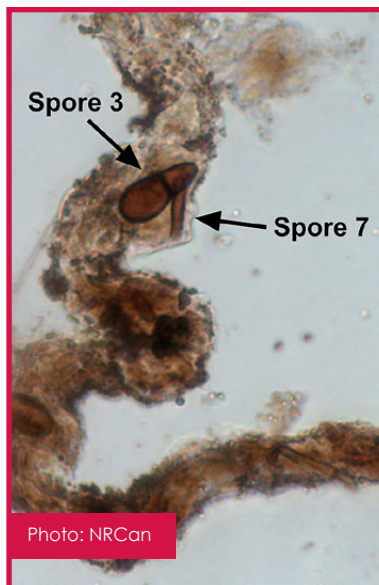


Photo: NRCan

species could indicate that they do not feed on fungal spores or that they are unable to find spores in the environment following the disturbance.

What happens after biomass harvesting?

The rove beetles studied as part of this research react differently to biomass harvesting. Certain species are absent after the disturbance since their food source has been removed. Other species are found in greater numbers, as their food source becomes more abundant after the disturbance. There are also others whose population remains the same after the disturbance.

By studying the feeding habits of rove beetles, researchers can determine the impacts of biomass harvesting on these insects. The results suggest that the dominant species of rove beetles feed on fungi that can be

associated or not with dead wood. The removal of harvesting residues can be detrimental to certain insects, not only because it suppresses their food sources, but also because site conditions change after litter harvesting.

Simplifying indicator selection

This study led to the development of a new quick and cost-friendly method to identify the roles of insects in the forest ecosystem as indicators of the effects of biomass harvesting. The study of the contents of insects' digestive tract could replace certain long-term studies in the field regarding interactions between insects and their environment. With this new technique, researchers can measure the impacts on forest biodiversity of forest practices such as biomass harvesting with greater speed, reliability and precision. This work will contribute to improving forest management practices in order to reduce the impacts of biomass harvesting.



Photo: NRCan

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