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Branching Out

from the Canadian Forest Service - Laurentian Forestry Centre

Forest Biomass: Resource Assessment Tools

How much biomass is contained in the branches, trunk, foliage and bark of a tree or in a stand? How many nutrients does this biomass contain? Researchers from the Canadian Forest Service (CFS) have developed on-line calculation tools to answer these questions.

Development of the forest bioenergy industry requires estimates of available biomass that are as accurate as possible, as well as methods to assess the sustainability of high-performance, transparent practices that can be applied over large areas. To this end, calculation tools developed by CFS researchers make it possible to rapidly estimate biomass quantities and nutrient content for any site in Canada. The results can be obtained at the tree or stand scale.

A matter of scale

At the tree scale, a calculation tool that has been available for a few years can be used to estimate the dry mass of the entire aerial portion of a tree or of its components (trunk, foliage, branches and bark) based on its diameter at breast height (DBH – at 1.3 m from the ground), or its DBH and height. These equations were developed using a national database of measurements taken on thousands of trees sampled across Canada, representing 41 indigenous forest species. They can therefore be applied in all of Canada's forest regions, although they are not suitable for open or urban areas because the trees have a more spread-out form.

At the stand scale, a new calculation tool now makes it possible to quantify biomass by species and by component, using the basal area of the stand and of the species deemed of interest in the stand.


Photo: NRCan

Lastly, for biomass estimates at the tree and stand scale, the calculator can now be used to obtain an estimate of nutrient content (nitrogen, phosphorus, potassium, calcium, and magnesium) in different parts of the tree (trunk, foliage, branches, and bark) for the 30 most abundant tree species in Canada. For other species, or if the species is unknown, estimates can also be produced. The calculation tool also provides relevant uncertainties for estimates produced at the stand scale.

Valuable tools

The results generated by these calculation tools can be used to determine a stand's potential for the production of traditional or non-traditional forest products, such as biomass production for energy purposes. The accuracy of these estimates is important for investment considerations in this energy sector.

These calculation tools also serve to build carbon and nutrient budgets based on different harvesting methods. Because they make it possible to estimate the amount of nutrients exported off-site during harvesting for any stand in Canada, these calculation tools will contribute to the establishment of sustainable practices that are consistent from one region to the next.

Using this new knowledge related to the sustainability of forest practices will contribute to the environmental reputation of the forest biomass industry and to improving its access to markets.

To access these calculation tools: *https://apps-scf-cfs.rncan.gc.ca/calc/en/calculateur-calculator*

For more information, please contact:
Pierre Bernier or **David Paré**
Natural Resources Canada
Canadian Forest Service
Laurentian Forestry Centre
1055 du P.E.P.S. P.O. Box 10380, Stn. Sainte-Foy
Quebec City, Quebec G1V 4C7
Phone: 418-648-4524 / 418-648-7598
Fax: 418-648-5849
E-mail: pierre.bernier@nrcan.gc.ca / david.pare@nrcan.gc.ca
Website: cfs.nrcan.gc.ca

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