



Annosus Root and Butt Rot: Innovating for Disease Prevention

You are in a pine forest and you see red needles, a sign of crown mortality. At your feet, nearby, a stump lies amid dead or dying trees. You also observe fruiting bodies of fungi at the root collar of the stump or neighbouring trees. A little further on, you notice decline and circular gaps in which all of the pines look dead. What you could have before you is a stand affected by annosus root and butt rot.

1989: first record of annosus root and butt rot in Quebec

Annosus root and butt rot enters a pine stand by colonizing one or more freshly cut stumps. The disease then spreads through healthy roots that come into contact with those of an infected stump. This radial spread is estimated at 1 metre per year.

The causal fungus of annosus root and butt rot, *Heterobasidion irregulare*, produces spores year-round, although more abundantly in the fall. The wind disperses the spores over dozens of kilometres, so well that within 5 years from now, the disease could reach the boreal forest. When these spores land on a fresh pine stump, they germinate and develop.

Very few competing fungal species colonize a stump during the first 2 weeks after a tree is felled, thus giving this pathogen free reign. It is very difficult to eradicate

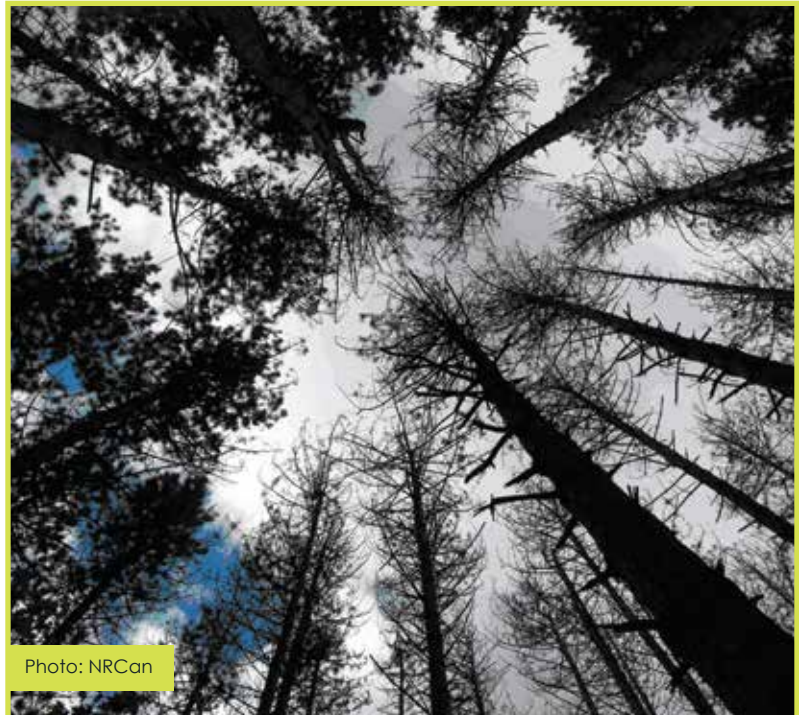


Photo: NRCan

annosus root and butt rot once it becomes established in a stand, because the fungus can persist in the roots for decades.

Canadian Forest Service (CFS) researchers set their sights on this disease, and have successfully developed methods to protect pines, this pathogen's preferred host species.



Photo: NRCan

Plantations: manna for annosus root and butt rot

In Quebec, approximately 1 million red pines are planted each year. Establishing a plantation is a process that involves several steps, from land preparation all the way to tree harvesting. Among silvicultural operations, thinning creates a new ecological niche: tree stumps. These stumps can be colonized by *H. irregulare*, which then persists in the plantation for several decades. If annosus root and butt rot is present in a plantation, these silvicultural operations can exacerbate problems associated with the disease.

Since the spread of this disease is greater in late summer and in the fall, thinning operations should be carried out in the winter, when the stumps are covered with snow. Otherwise, cutting performed in summer and fall must be coupled with stump treatment.



Photo: NRCan



Photo: NRCan

2014: product registration

When silvicultural operations have been performed in plantations infected by annosus root and butt rot, the freshly cut stumps must be treated with a biocontrol agent. The company Lallemand Plant Care, in collaboration with Université Laval and researchers from the CFS, has registered a new biocontrol product with the Pest Management Regulatory Agency: Rotstop C. This product is a powder containing spores of the fungus *Phlebiopsis gigantea*, which block the colonization of treated stumps by the causal fungus of annosus root and butt rot without causing damage to the tree. Application of this product in solution form immediately after felling is recommended.

The spores of *Phlebiopsis gigantea* used in Rotstop C are of Canadian origin, and are therefore more resistant to our environmental conditions and better adapted to the host. Marketed by Bioforest, this solution can be sprayed manually,



Efficiency test of *P. gigantea*. Photo: NRCan

or the process can be automated by means of a distributor attached to the tree feller.

Useful links

<http://tidcf.nrcan.gc.ca/en/diseases/factsheet/19>

<http://cfs.nrcan.gc.ca/pubwarehouse/pdfs/34241.pdf>

<http://www.exoticpests.gc.ca/control-details/disease/7>

<http://verdera.fi/en/products/forestry/rotstop/>

For more information, please contact:

Gaston Laflamme

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

Telephone: 418-648-4149

Fax: 418-648-5849

E-mail: gaston.laflamme@nrcan.gc.ca