

Next generation DNA sequencing methods to identify forest invasive alien fungal species present in imported live plant material

Jean A. BERUBE

Canadian Forest Service, Natural Resources Canada, CANADA

An early warning method based on a random sampling of asymptomatic woody live plant material imported into Canada was used to detect potential alien fungal pests. In the last 3 years we received 150 asymptomatic sample lots representing 99 exotic host tree species collected by Canadian Food Inspection Agency (CFIA) inspectors from the province of Quebec. Samples were analyzed by cloning and sequencing the PCR amplified fungal nuclear ribosomal internal transcribed spacer (ITS) DNA naturally present in plant tissues. From 1845 fungal clones obtained, 267 fungal operational taxonomic units (OTUs) were found, of which 148 can be considered alien fungal species introduced in Canada. By clustering and phylogenetic profiling methods, 11 fungal OTUs were categorised as having a potential for a moderate impact on Canadian forests, 29 OTUs with a low impact and 18 OTUs could not be assessed given the limited genetic information available. Alien fungal introductions with the potential to affect Canadian forests were found at a significant frequency (8.5 %) of the sampling units (the clones). At least 21 % of the CFIA samples had an OTU with a low to moderate potential impact on Canadian forests, 5 % of the samples had an OTU with an impossible-to-evaluate potential impact and 74 % of the samples were exempt of fungal OTU that could have a potential impact. Furthermore, we found on average 11.3 fungal species (pathogenic and non-pathogenic included) per sample lots. These results will be compared with 454 pyrosequencing data obtained from fungi present urban trees.

Corresponding Author:

Jean A. BERUBE

Canadian Forest Service, Natural Resources Canada

Ste-Foy, Qc, Canada G1V 4C7

e-mail: berube@cfl.forestry.ca