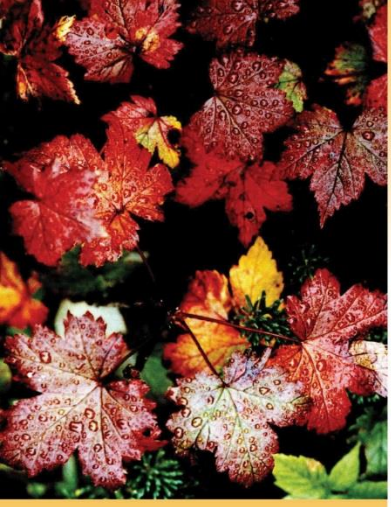

Insights

Mitigating Dothistroma – A Collaborative Journey

Canadian forests are feeling the effects of climate change, which is increasing the frequency and intensity of wildfires and droughts. It may also be affecting the behavior of forest pathogens due to the three-way interactions among the host, the pathogen, and the environment. One such pathogen is Dothistroma septosporum, the causal agent of Dothistroma needle blight.

Researchers believe climate change was this native blight's driving force in north western British Columbia, where since the early 2000s it has caused extensive damage to lodgepole pine (Pinus contorta var. latifolia) plantations and instances of mortality in mature trees. Also known as the "red band needle disease," the fungus affects over 80 species of pine and other conifers. It attacks and kills the pine tree's needles, reducing the tree's ability to photosynthesize. This pathogen primarily infects lodgepole pine in Alberta, but it can also infect jack pine (Pinus banksiana).

Figure 1. Some members of the Dothistroma Team in 2015, from left to right: Deogratias Rweyongeza, Brad Tomm, Alex Woods, Tom Hutchinson, Andy Benowicz and Tod Ramsfield. (Photo: Tod Ramsfield)

Alberta researchers detected this pathogen at the Alberta Tree Improvement and Seed Centre in 2012 and identified it later in other locations in the province. In 2013, at the request of the Province of Alberta, the Canadian Forest Service (CFS) joined researchers from the provinces of Alberta, British Columbia, and Saskatchewan, as well as the University of British Columbia, to better understand the risk and effect of Dothistroma on jack pine, and to provide solutions for this economically and ecologically important boreal forest tree. "This is a collaborative journey involving researchers from several organizations who have shared information and worked together for a common goal — to eliminate or mitigate the effect of Dothistroma from important plantations in Alberta," said Tod Ramsfield, a CFS Research Scientist, who studies forest pathology at the Northern Forestry Centre, in Edmonton, Alberta.

Insights

"For example," says Ramsfield, "Alex Woods, a research pathologist with the British Columbia Ministry of Forests, Lands, Natural Resource Operations and Rural Development, contributed his expertise on understanding the relationship of Dothistroma in relation to weather factors and climate. Woods' expertise helped our team understand the broader effect of Dothistroma in the boreal forest."

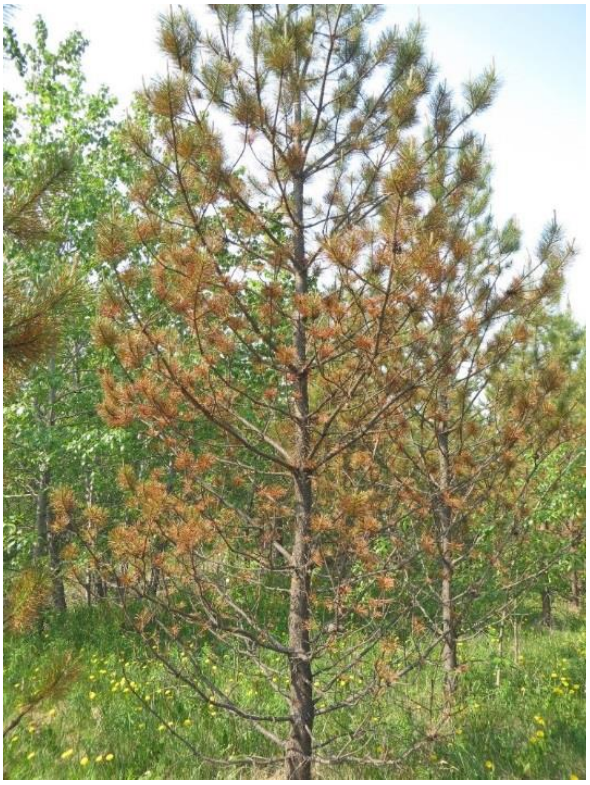

Figure 2. Lodgepole pine affected by Dothistroma needle blight. (Photo: Tod Ramsfield)

"Saskatchewan's aerial survey program staff also played a key role," adds Ramsfield. "Flying above the forest, they were able to identify suspicious stands of jack pine that might have been infected with Dothistroma. Ground truthing of these areas later confirmed that Dothistroma was not present. This greatly helped to narrow the areas where our team should focus on in the vast expanse of the boreal."

"We benefited from the CFS's advice on how to manage the pathogen," says Erica Samis, the Director of the forest health and adaptation section of Alberta Agriculture and Forestry. "Our team followed up on those management suggestions, and after treating the infected areas we were able to reduce the affected areas significantly."

"Using cultures collected from British Columbia and Alberta, our team at UBC is using genomic tools to understand the relationship between isolates collected as part of this study," said Prof. Hamelin. "Understanding the relationships between the populations will assist in future disease management."

Research into the risk of Dothistroma in the boreal forest and the potential impact on jack pine is still ongoing. The identification of this risk will provide better insights on the vulnerability of Alberta's forestland to the pathogen. The success of the project to date has been based upon the collaboration of different researchers from various levels of government and academia. The joint effort of all of these organizations to work on a forest pathogen problem is an excellent example of how multiple jurisdictions and researchers can work together for the benefit of Canada's forests.

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