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2BILLION TREES

2 BILLION TREES SCIENCE

Research in Support of Tree Planting

NOTE 8

Strong seeds for our future trees

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PROJECT LOCATION:
Victoria, BC; Edmonton, AB; and Quebec City, QC.

Project Drivers

Seed-borne pathogens refer to microorganisms that are carried on or in seeds. Pathogens such as filamentous fungi can cause diseases that impact seedling production in nurseries, often influencing seed and seedling germination, development or mortality. Pathogens pose a challenge to reforestation and afforestation efforts. For a large tree-planting program, like the 2 Billion Trees (2BT) program, that requires an extensive production system to supply trees to plant, pathogens can play a role in shaping program success or failure. This research project will improve capacity for identifying, detecting, and mitigating seed and seedling diseases to secure the renewal of tomorrow's forests.

Project Approach

This project will examine the fungi composing the seed mycobiome (i.e., the community of microorganisms in and on seeds). Filamentous fungi is the primary cause of diseases related to seedborne pathogens. They can be pathogenic or can turn into pathogens depending on environmental conditions. However, they can also be non-pathogenic. Similar to probiotics, they can provide benefits and protective effects, including disease suppression and increased performance. This project will first identify the fungi composing the seed mycobiome of conifer seeds. Secondly, it will differentiate between the fungi that are pathogenic and those that provide protective effects. Sixty conifer seed lots, provided by stakeholders from British Columbia, Alberta and Quebec, will be subject to testing. First, the project team will use culture-based methods, fungal DNA-barcoding, and next-generation sequencing methods to assess and identify fungi in the seed mycobiome. Secondly, fungal species identified in conifers will be screened for their potential capacity to cause disease through a type of study called *in vitro* assay. Lastly, a competition trial will be used to determine the beneficial role of non-pathogenic fungi.

Anticipated Outputs and Impacts

Identification and source tracking of seed-borne pathogens will inform the relevance and benefits of current seed disinfection treatment to mitigate disease. Knowledge on the causes behind seedling diseases will provide crucial diagnostic and identification information. It will also provide information on temperature and moisture levels to be used during nursery operations to prevent disease. This research will help prevent substantial economic losses to nurseries and ensure pathogens do not jeopardize investments regarding selecting seeds for improved performance. These intended results will benefit the 2BT program by improving seedling production and enabling conditions that support the survival and growth of trees after planting.

Cat. no.: Fo4-199/2022E-PDF, ISBN: 978-0-660-45483-2

Aussi disponible en français sous le titre : Des semences robustes feront les arbres de demain.

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