Natural Resources Canada
Ressources naturelles Canada

2BILLION TREES

2 BILLION TREES SCIENCE

Research in Support of Tree Planting

NOTE 18

Planting the right trees in the right places in forests and in cities: Adaptability of red oak to climate change

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CFS CENTER:
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PROJECT LOCATION:
Eastern Canada

Project Drivers

Natural and urban forests are part of the solution to reduce and manage climate change risks through the ecosystem services they provide, from carbon sequestration to wood production and cultural services such as human health benefits. However, climate change is affecting the distribution of forest species and forest composition with significant impacts on forest health and productivity. Genomic data provide critical information that can help us identify genetically diverse seed sources adapted to current and future climates, enabling us to plant trees that are adapted and resilient to climate change. This 2 Billion Trees (2BT) program funded research project will develop tools to assess the genetic diversity and population connectivity within the red oak's range to delineate genetic groups and identify key environmental factors that have shaped species diversity. This knowledge will facilitate the identification of seed sources adapted to future climates.

Project Approach

The project's goal is to determine the geographical origin of the trees by investigating the genetic diversity of red oak throughout its natural range in North America and comparing the genetic diversity of urban trees with those in natural stands. More than 800 tree leaf samples were collected from natural stands. The project's urban phase is currently being carried out in Quebec City, Montreal, and Ottawa/Gatineau, where leaf samples will be collected with the help of collaborators. DNA will then be extracted from the harvested leaf material and sequenced, and a reference database containing the genetic information from each sampled individual will be created.

Anticipated Outputs and Impacts

The data obtained from this project is crucial for the development of informed reforestation and planting plans, as well as to produce genetically diverse and resilient seedlings. This will increase the chances of planting success (tree survival and longevity) and contribute to the desired carbon sequestration outcomes of the 2 Billion Trees program. The project will benefit public and private nurseries, as well as cities wanting to adapt to climate change. The urban component of this project will enable city managers to make informed and sustainable planning decisions that benefit citizens and the environment.

Cat. no.: Fo3-6/18-2023E-PDF, ISBN: 978-0-660-69044-5

ussi disponible en français sous le titre : *Planter le bon arbre au bon endroit en forêt et en ville : le chêne rouge pour s'adapter aux changements climatiques.*.