Project Overview

The forest products industry contributes $20 to $30 billion per year to Canada's gross domestic product (GDP) but its economic prosperity is dwindling. Changing environments, pressure to conserve forest lands, and demand for sustainable forest management call for new approaches to extract value and obtain benefits from Canada's forests. Genomic sciences can accelerate the development of novel tools and information that will help forest managers adapt to these changes. The SMarTForests project will develop tools to enhance forest health and productivity and to increase the value recovered from forest plantations.

In Canada, spruce trees are a prime target to generate both environmental and economic benefits from genomics. They account for 58% of the 650 million tree seedlings planted each year, covering 2,164 km2 of reforested land per year. The SMarTForests project will leverage the power of genomics to develop diagnostic markers based on DNA, metabolites and proteins to advance breeding in Canada's major spruce species. Marker systems are aimed at identifying trees and seedlings with improved growth, wood properties, and insect resistance. They will be used in an approach called Marker Aided Selection (MAS). Estimates are that MAS could increase annual wood yield by 1.5 million cubic meters per year over the long term if applied to only 20% of Canada's white spruce plantations. This gain translates into a potential GDP increase of $300 million. Methods like MAS help to concentrate wood production on a smaller land area and allow for more forest land to be set aside for conservation.

The SMarTForests project brings together genome scientists, forest geneticists, tree biologists and end-users from Arborea [Link to Arborea's Web site] and Treenomix [Link to Treenomix's Web site]. These groups are joining forces so that applied spruce genomics research in Canada will be highly integrated and efficient. This team will be in a strong position to break new ground in conifer genome sequencing and represent Canada in international initiatives. The active participation of forestry end-users from tree breeding programs will help to focus MAS development on practical needs and maximize the power of existing resource. Integrated impact analyses (GE3LS research) will deliver an unprecedented understanding of the economic, socio-economic and legal issues of implementing MAS for forestry in Canada.

Research Activities:

- [GE3LS = Genomics and Society](#)
- [Sequencing White Spruce](#)
- [Tree Breeding Tools for Growth and Wood Quality](#)
- [Biomarkers and Genetic Markers for Insect Resistance](#)

Overview of the SMarTForest research program and technology transfer goals. The project will make use of extensive genomic resources from Arborea and Treenomix projects. We will develop marker systems to enable more efficient and effective selections for tree breeding, with the participation of major end users.