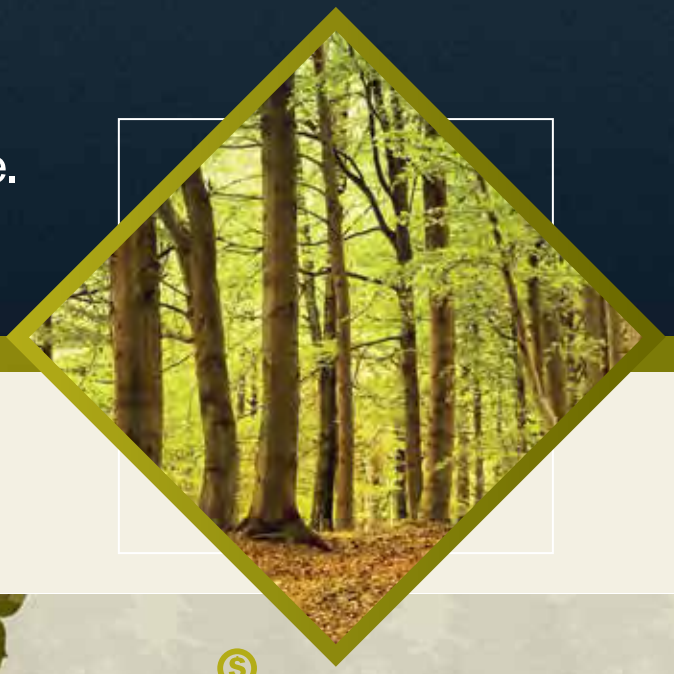
GENOMICS FOR FORESTRY

Genomics is making Canada's forest sector more profitable and sustainable.



GENOMICS: The science that aims to decipher and understand the entire genetic information of an organism.

FORESTS:
Essential to the Canadian economy*

$57.1
BILLION IN REVENUES

593,200
DIRECT AND INDIRECT EMPLOYMENT

$24
BILLION TO GDP (1.9% SHARE OF GDP)

192
FOREST DEPENDENT COMMUNITIES

$26.4
BILLION TOTAL WOOD PRODUCTS EXPORTS

* Data from Statistics Canada, 2012

GenomeCanada GenomeBritishColumbia GenomeAlberta GenomePrairie OntarioGenomicsInstitute GenomeQuébec GenomeAtlantic

CHALLENGES FACING CANADA'S FOREST SECTOR TODAY

JOB LOSSES AND MILL CLOSURES DUE TO MARKET FORCES

Decline in demand for wood products. Emerging low-cost competitors in some areas.

ENVIRONMENTAL CHALLENGES

More frequent and severe insect and disease outbreaks, wildfire, droughts, and storms leading to changing regulations, new protected areas, and limits on harvest levels.

INSECT PESTS

Mountain pine beetle in Western Canada, and spruce budworm and emerald ash borer in the East, have destroyed large forest areas, with devastating economic and environmental impacts.

PUBLIC FOREST POLICY

Vast majority of Canadian forest is publicly owned. Regulation and policy directives create a financial burden and disincentive for long-term investments by private sector.

GROWTH CYCLE

Hard to illustrate short-term economic benefits of forestry research due to forest growth cycle of 40 to 120 years.

GENOMICS

An emerging solution for more productive and healthy forests

GENOMICS IS HELPING TO:

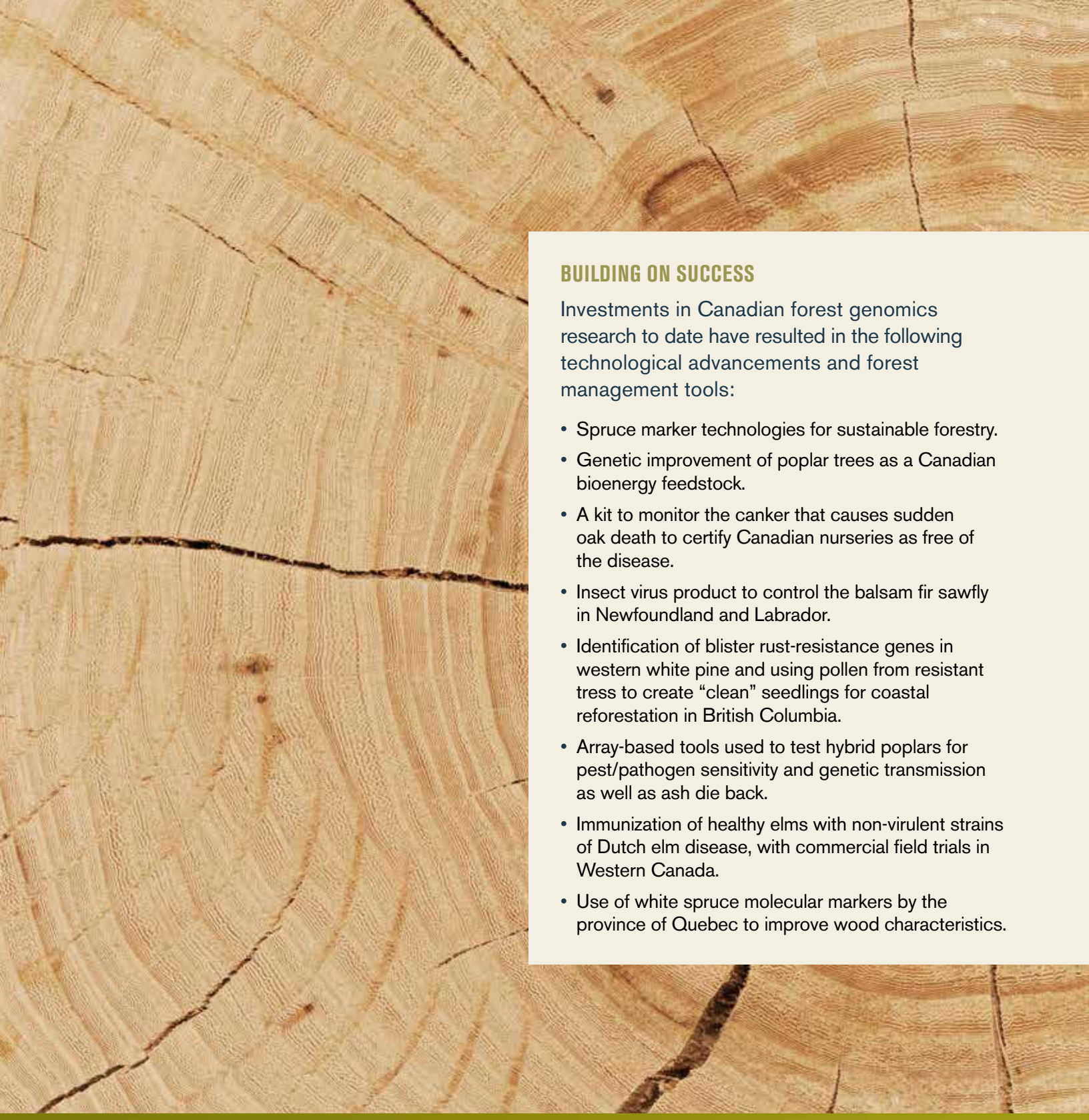
- Increase yield, wood quality and tree resistance to pests through better tree breeding.
- Make improved value-added products and processes out of wood products.
- Resolve trade issues by rapidly identifying pathogens or pests in Canadian (and foreign) wood products that may threaten cross-border or interprovincial trade.
- Equip foresters to identify, manage and mitigate the risk that insect pests and pathogens pose to forests, and prepare for future disease and pest invasions.
- Maximize forest regeneration and sustainability by informing tree planting based on knowledge of how trees are adapting to climate change.

WHY CANADA CAN LEAD IN FOREST GENOMICS:

- ✓ Canadian forest genomics researchers are world leaders, particularly in conifer and forest pest research.
- ✓ We have excellent genomics research capacity throughout the country.
- ✓ We have internationally-competitive large-scale technology platforms and R&D centres across the country with a proven ability to serve the forest sector.
- ✓ Canada's close ties with the United States on common forest priorities means we can jointly leverage new forest technologies and applications, identify gaps and share best practices.

"We believe that genomics is a powerful enabler for objectives of FPInnovations as they relate to diversifying the forest industry from pulp, paper and lumber into a high-margin bioproducts-based industry."

– Pierre Lapointe, President and Chief Executive Officer, FPInnovations



BUILDING ON SUCCESS

Investments in Canadian forest genomics research to date have resulted in the following technological advancements and forest management tools:

- Spruce marker technologies for sustainable forestry.
- Genetic improvement of poplar trees as a Canadian bioenergy feedstock.
- A kit to monitor the canker that causes sudden oak death to certify Canadian nurseries as free of the disease.
- Insect virus product to control the balsam fir sawfly in Newfoundland and Labrador.
- Identification of blister rust-resistance genes in western white pine and using pollen from resistant tress to create “clean” seedlings for coastal reforestation in British Columbia.
- Array-based tools used to test hybrid poplars for pest/pathogen sensitivity and genetic transmission as well as ash die back.
- Immunization of healthy elms with non-virulent strains of Dutch elm disease, with commercial field trials in Western Canada.
- Use of white spruce molecular markers by the province of Quebec to improve wood characteristics.

Canada’s Opportunity

The time is ripe to advance genomic-based solutions for healthier, more productive and sustainable forests in Canada. Opportunities for the sector are detailed in the recently-published strategy paper *Forest Sector Challenges, Genomic Solutions*, available on Genome Canada’s website at **www.genomecanada.ca/en/sectorstrategies**.

GenomeCanada