

# CRSB Program at the Canadian Forest Service: a Snapshot

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## Laboratory, Microcosm and Field Studies of Viruses

Steve Holmes ([sholmes@nrcan.gc.ca](mailto:sholmes@nrcan.gc.ca))  
Great Lakes Forestry Centre, Sault Ste. Marie, ON

To study the persistence of viral DNA in the environment and DNA transfer from one organism to another

- development and validation of detection protocols for genetically engineered baculoviruses and their DNA in forest soil and aquatic microcosms
- controlled release in outdoor aquatic and soil microcosms of genetically modified spruce budworm baculovirus occlusion bodies and naked DNA (occlusion bodies detected in natural pond water for at least one year post-inoculation)

## Competition and Gene Flow in Viruses

Qili Feng/Basil Arif ([barif@nrcan.gc.ca](mailto:barif@nrcan.gc.ca))  
Great Lakes Forestry Centre, Sault Ste. Marie, ON

To develop and apply molecular approaches for the study of genetic loci towards stable integration of transgenes in recombinant viruses

- development of bioassays to test the stability of recombinant viruses
- identification of suitable loci for transgene insertion based on stability and lack of transfer to co-infected wild-type viruses

## Baseline Safety Data for *Bacillus thuringiensis* (B.t.)

Kees vanFrankenhuyzen ([kvanfran@nrcan.gc.ca](mailto:kvanfran@nrcan.gc.ca))  
Great Lakes Forestry Centre, Sault Ste. Marie, ON

To provide baseline data to facilitate the introduction of biotechnology products in forest environments and assist regulatory agencies to evaluate the safety of B.t.-based biopesticides

- inventory of virulence genes in isolates from B.t. products registered in Canada
- determination of hemolytic and non-hemolytic enterotoxin gene expression during pathogenesis in spruce budworm

## Molecular Containment

Tannis Beardmore ([tbeardmo@nrcan.gc.ca](mailto:tbeardmo@nrcan.gc.ca))  
Atlantic Forestry Centre, Fredericton, NB

To identify DNA sequence information necessary for the development of molecular containment at the level of the seed

- isolation of germination-specific genes

## Gene Flow in Trees

Nathalie Isabel ([nisabel@nrcan.gc.ca](mailto:nisabel@nrcan.gc.ca))  
Laurentian Forestry Centre, Québec City, QC

To develop an alternative method for measuring the impact of genetically engineered trees on the integrity of local populations through the evaluation of gene flow between exotic and native tree species

- measurement of gene flow between plantations and natural populations of poplar and larch (consistently low rates of hybridization in larch and highly variable rates in poplar have been shown)
- production of species-specific molecular markers (which have been valuable for the verification of plant material used in tree breeding)
- production of a simulation model for the introgression of transgenes

## Field Trials of Transgenic Poplar and Spruce

Armand Séguin ([arseguin@nrcan.gc.ca](mailto:arseguin@nrcan.gc.ca))  
Laurentian Forestry Centre, Québec City, QC

To establish research trials as a demonstration site and to develop environmental safety knowledge

- demonstration of transgene expression stability over time
- demonstration of non-persistence of tree recombinant marker genes in decomposing transgenic poplar leaf material

## Biodiversity in Microbial Communities Associated with Genetically Engineered Trees

Richard Hamelin ([rhamelin@nrcan.gc.ca](mailto:rhamelin@nrcan.gc.ca))  
Laurentian Forestry Centre, Québec City, QC

To establish a baseline of microbial diversity in tree rhizospheres and assess the level of horizontal gene flow in these communities

- development of molecular approaches based on DNA amplification to investigate entire communities of microorganisms
- molecular profiling of rhizosphere microbial communities associated with black spruce seedlings

## Risk Assessment of Transgenic Spruce for Spruce Budworm Management

Kees vanFrankenhuyzen ([kvanfran@nrcan.gc.ca](mailto:kvanfran@nrcan.gc.ca))  
Great Lakes Forestry Centre, Sault Ste. Marie, ON

To study budworm adaptation to transgenic spruce engineered with a *Bacillus thuringiensis* gene to assist regulatory environmental safety assessments

- assessment of key budworm behaviours in response to B.t. transgene expression in white spruce

## Molecular Diagnostics

Richard Hamelin ([rhamelin@nrcan.gc.ca](mailto:rhamelin@nrcan.gc.ca))  
Laurentian Forestry Centre, Québec City, QC

To develop a novel platform for molecular diagnostics of forest pests and products of biotechnology

- development of low-cost high-throughput validated fluorescent probe assays with high accuracy and reliability
- transfer of standard operating protocols to Canadian, U.S. and European regulatory agencies (for the diagnosis of scleroderris canker; sudden oak death; white pine blister rust; blue stains; exotic longhorn beetles)

## Science-based Regulations

Anne-Christine Bonfils/Linda DeVerno/Isabelle Gamache ([igamache@nrcan.gc.ca](mailto:igamache@nrcan.gc.ca))  
Headquarters, Ottawa, ON

To increase the efficiency, effectiveness and timeliness of Canada's regulations of forest biotechnology

- clarification of the respective roles of the federal and provincial regulatory agencies, involvement in international regulatory harmonization, and organization of discussions on environmental safety of genetically modified trees and viruses
- provision of expertise and human resources to the Canadian Food Inspection Agency for the development of forest tree specific regulatory directives for confined field testing

## Public Discussion

Anne-Christine Bonfils/Linda DeVerno ([abonfils@nrcan.gc.ca](mailto:abonfils@nrcan.gc.ca))  
Headquarters, Ottawa, ON

To proactively engage opinion leaders into discussing a broad range of issues related to the deployment of forest biotechnology applications

- development of readily accessible publications and presentations describing forest biotechnology and its regulation in Canada
- development of public discussion documents on genetically engineered trees and viruses, both in print and on-line