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SPOTLIGHT

International Union of Forest Research Organizations

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Interconnecting Forests,
Science and People125th Anniversary
Congress 2017

The 125th Anniversary Congress on 18-22 September 2017 in Freiburg, Germany, will offer a wide selection of scientific sessions highlighting innovative research and interdisciplinary research approaches of relevance to forests, and focus on the transfer of scientific knowledge on critical global forest-related challenges to national and international political agendas. In a series of "Congress Spotlight" articles individual sessions shall be showcased to give a foretaste of the richness and scope of research findings that will be presented at the Congress. Keep updated at: <http://iufro2017.com/>

IUFRO 125th Anniversary Congress Spotlight / Theme 2 - #55 / September 2017

Genetics research crucial to future forest health, adaptation, conservation and sustainable management

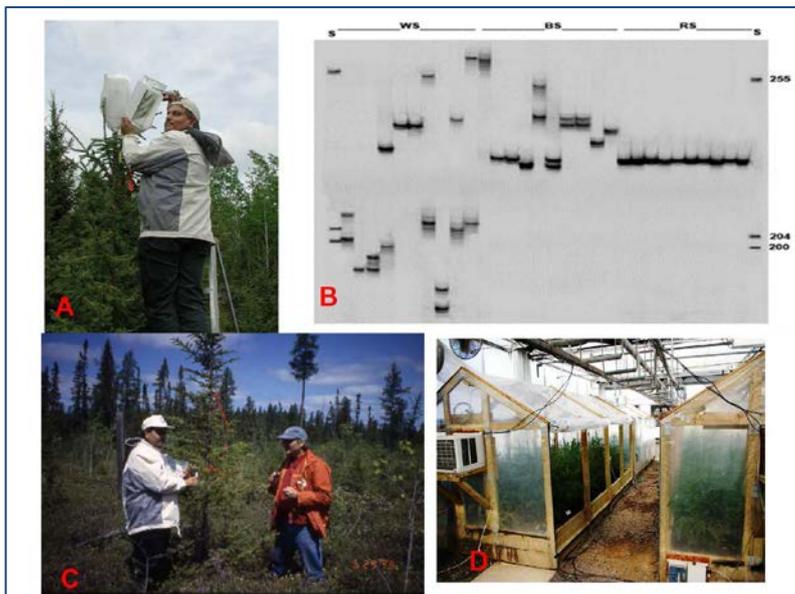
"The role genetics/genomics research can play in forest management is huge but, unfortunately, remains under-utilized," said Dr. Om Rajora, Professor of Forest Genetics and Genomics at the University of New Brunswick, Canada.

"Genetics/genomics research can greatly assist the management of natural and planted forests by conserving healthy, productive, well-adapted and genetically diverse natural forest and developing high yielding tree varieties with desired traits for deployment in plantations," he said.

Dr. Rajora is the organizer and coordinator of a session entitled **Genetics and Genomics for Conservation, Climate Adaptation and Sustainable Management of Forests** to be presented at the IUFRO 125th Anniversary Congress in Freiburg, Germany in September.

"Genetic diversity is the basis of all biodiversity," he said. "It provides the raw material for survival, adaptation and evolution of all organisms, especially under changed environment, climate and disease conditions.

"Therefore, conservation and management of genetic diversity in forest trees is critical for the stability and functioning of forest ecosystems because forest trees are normally the keystone species of many ecosystems, and many faunal and floral associations depend on their existence," Dr. Rajora added.



A. Controlled pollination in black spruce to produce F3 progeny at Petawawa Research Forest;

B. DNA fingerprints of 10 individuals each of white spruce (WS), black spruce (BS) and red spruce (RS) at a genic microsatellite showing genetic diversity;

C. Sampling of old-growth and post-harvest second-growth black spruce to examine the genetic effects of forest harvesting and renewal practices in Manitoba (Rajora and Pluhar 2003, *Theor. Appl. Genet.* 106: 1203-1212);

D. Testing of three-generation outbred pedigree of black spruce under ambient and elevated CO₂ conditions for QTL mapping of traits related to acclimation and adaptation to climate change.

All pictures were taken by Dr. Om Rajora or his associates

This research is critical to understanding the biological functioning of forest trees, discovering genes, their sequences and functions and variants that control or affect growth, wood properties, adaptation, disease and insect resistance, he said.

It's also important to understanding genetic response of forest trees to natural and human disturbances, climate and environment change, among many other things, he added.

“Understanding the biology of forest trees is critical to develop and implement any sound forest management plan. Can a physician, without knowing human biology, properly manage human health?” He asked. “The same question should apply to forest managers. Genes control many of the biological processes. Genetic diversity is the basis of forest sustainability because it provides the raw materials for species, populations and individuals to adapt and evolve, especially under changed environmental and disease conditions.

“Genetic and genomics research has a crucial role to play in understanding the acclimation and adaptive responses of forest trees to climate change – the major environmental issue of our time – and in developing mitigation measures to address the climate change effects,” he said.

He expects his session to “explore the progress and promise of forest genetics/genomics research with the objective of defining priorities for future research in order to maximize its impact on genetic biodiversity conservation, adaptation and sustainable forest management, especially under climate change conditions.”

Among the benefits he foresees from this research are:

- Development of enormous genetic and genomic resources of forest trees, helpful for forest biology and ecology research, forest management, tree improvement, conservation of genetic resources and other aspects;
- Development of scientifically sound forest management policies, plans and practices, specifically tailored for a species, forest ecosystem, region and area. (These plans could be viewed as similar to genome-based personalized medicine in humans);
- Effectively dealing with environmental issues, such as climate change, by understanding the acclimation and adaptation of forest trees to climate change and developing mitigation measures;
- Assisting ecological and economic sustainability of forest resources, and stability and functioning of forest ecosystems by conservation and sustainable management of forests under current and anticipated future climate change conditions.

Genetics/genomics research is relatively expensive, he said, and it would be helpful if there was recognition by funding agencies that longer-term (many forest trees take several decades to produce advanced-generation pedigrees) and higher-levels of funding research commitment is necessary.

It would also help to make genetic diversity assessment mandatory for ISO, FSC, SFI and CSA certification of sustainable forest management, he said.

“Furthermore,” he added, “forest genetics and genomics courses and training should be mandatory at the forestry undergraduate level so that foresters are adequately trained.”

He hopes this session will help increase public and professional awareness of the huge role that forest genetics/genomics can play in conservation and sustainable management of forests and in dealing with climate change issues.

And, Dr. Rajora said, it should be emphasized that all genetics and genomics research does not lead to genetically engineered trees. It is only one of the minor outcomes.

“Deployment of genetically engineered trees within the natural forest is a major concern and should not be done,” he said. “Deployment of genetically engineered trees may have its own place, but in the planted forest that is well isolated from the natural forest, or when all other options are exhausted.

“For example,” he continued, “if there is no other way to develop a disease- or insect-resistant tree other than genetic engineering, in order to save the species from extinction, application of genetic engineering is well justified. However, all precautions and measures must be taken so that transgenes do not contaminate the related natural gene pool.”

The September 18-22 Congress in Freiburg will celebrate IUFRO's 125th anniversary. Founded in 1892 in Eberswalde Germany, IUFRO has grown to unite more than 15,000 scientists (who cooperate in IUFRO on a voluntary basis) in almost 700 member organizations in more than 120 countries.

IUFRO promotes global cooperation in forest-related research and enhances the understanding of the ecological, economic and social aspects of forests and trees. It disseminates scientific knowledge to stakeholders and decision-makers and contributes to forest policy and on-the-ground forest management.

About 2000 scientists from 89 countries are expected to attend the Congress. The Genetics/Genomics session in Freiburg will be one of 172 that will cover a wide array of topics dealing with various aspects of forest research.

See you at the IUFRO 125th Anniversary Congress in Freiburg, Germany!
Look out for [#IUFRO2017](#) on Twitter and [@iufro2017](#) on Facebook!

The International Union of Forest Research Organizations (IUFRO) is the only worldwide organization devoted to forest research and related sciences. Its members are research institutions, universities, and individual scientists as well as decision-making authorities and other stakeholders with a focus on forests and trees. Visit: <http://www.iufro.org/>

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