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Forest Genetics for Productivity – the Next Generation

Report by Heidi Dungey, Coordinator IUFRO Working Party 2.02.20 - Breeding and genetic resources of Southern Pines (http://www.iufro.org/science/divisions/division-2/20000/20200/20220/)

Forest genetics has now reached a time when advances in genomics and remote sensing have become accessible to practitioners. The cost of genomics is now low enough that this technology can be operationally implemented into breeding programs. Remote sensing, in particular LiDAR or photogrammetry through unmanned aerial vehicles (UAVs) has the potential to replace on-ground assessments to provide data that are more accurate and less subjective than any data of any scale we have had before. The opportunities are enormous.

An international conference entitled "Forest Genetics for Productivity – the next generation" was held in Rotorua, New Zealand from March 14-18, 2016. This meeting presented on a range of topics relevant to modern tree breeding: from practical requirements for breeding trees to quantitative and molecular genetics and the importance of phenotyping. Experts in their fields were invited to talk to show the challenges and future and issues that we need to think about.

Cypress clonal blocks visited on the Tuesday field day. Photo provided by H Dungey. A video of the flyover by UAV, demonstrated on the day is available at https://www.youtube.com/watch?v=1UP17-2IWjc

Keynote speaker, Antoine Kremer from INRA, France first gave the conference an update and overview of genetics, the current status and future trends. Key issues for forest genetics included the use of new technologies and dealing with climate change for long-lived trees. Robert Banks, CEO of the Animal Genetics and Breeding Unit, Australia, presented a vision for forest genetics, highlighting learnings and directions from animal breeding.

Forestry industry representative, acting CEO of Timberlands David Balfour and John Butcher, CEO of the Radiata Pine Breeding Company (Conference Platinum Sponsor) challenged scientists with outcomes that New Zealand forestry growers would like to see addressed by science and how these would impact delivery.

Keynote speakers included Dario Grattapaglia (EMBRAPA & Universidade Católica de Brasília, Brazil), Jerry Tuskan (Oak Ridge Laboratory, TN, USA), Uli Schurr (Forschungszentrum Jülich, Germany), John McEwan and David Pont (Scion, New Zealand) impressed the delegates with a wide range of experience in genetics, genomics, phenotyping - both from a large and a fine scale.

It was great to see the participation of the Australian and New Zealand forestry sector and scientists as part of the aligned Australasian Forestry Breeding Conference as well. One hundred and nine delegates attended the conference, from 17 countries, including New Zealand, Australia, Canada, Chile, the Czech Republic, Estonia, France, Japan, Poland, South Korea, Sweden, U.S.A., Brazil and Germany.

The meeting was sponsored by several IUFRO Working Parties:

Unit 2.02.20 – Breeding and genetic resources of Southern Pines
Unit 2.02.02 – Breeding theory and progeny testing
Unit 2.02.05 – Breeding and genetic resources of Pacific Northwest conifers
Unit 2.04.06 – Molecular biology of forest trees

A three-day study tour to the South Island of New Zealand was held following the conference. The tour viewed planted and natural forest systems, and talked about the conflict of land use, species siting and issues with wilding pines.

Participants who wish to publish their papers have been asked to submit them for special publication in the New Zealand Journal of Forestry Science.

Presentations are now available on the website: http://www.fgpc2016.nz

Book of Abstracts: http://www.iufro.org/science/divisions/division-2/20000/20200/20220/publications/