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Establishing a world-leading tree breeding program

Research by the CRC for Forestry and its predecessors has helped create what is regarded as one of the world's best tree breeding programs.

As Australia makes the transition away from native forest hardwoods to a young plantation-grown resource, the industry faces some notable challenges: among them, how to breed plantation species for high quality timber and paper products while remaining competitive in international markets. The three successive forestry CRCs have provided world-class research since the early 1990s, geared towards breeding the most profitable timber. This has contributed to the establishment of what is regarded as one of the best tree breeding programs in the world.

Under the CRCs for Temperate Hardwood Forestry and Sustainable Production Forestry, researchers worked with the Southern Tree Breeding Association (STBA), to establish its national *Eucalyptus globulus* breeding program.

Their analysis of breeding trials conducted by STBA partners enhanced the efficiency of breeding and helped to ensure that genetic gains were rapidly and efficiently transferred to Australia's expanding plantation estate. This provided the foundation for early work on wood properties for pulpwood and the definition of breeding objectives aimed at maximising profits. The forestry CRCs supported the STBA's development of an industrial-scale genetic evaluation system called TREEPLAN®.

Research by forestry CRCs has improved methods of assessing wood density in breeding programs. Economic analysis of pilodyn pin penetration (an indirect measure of wood density) has shown that using this technique in a breeding program could significantly boost plantation value. Measuring density by taking wood cores has been found to produce similar additional increases in value.

Research was also conducted to identify native forest geographic areas of high genetic value for plantation growers, which led to a classification of natural forest areas, used by STBA members to target seed collection programs for plantation establishment. The classification has been used to improve the prediction of genetic value, and to capture the genetic diversity of this internationally important forest tree gene pool.

As a CRC quantitative geneticist, Dr Greg Dutkowski worked closely with the STBA on analysis of data from breeding trials. He later joined the STBA Board where he continued to provide specialist support, and is now with PlantPlan Genetics, an STBA spin-off company that provides genetic evaluation and advisory services in tree and plant improvement.

"This tree breeding program is very sophisticated because of its solid research base, good analytical techniques, solid economic objectives, and the integration of genetic resources nationwide," said Greg. "This is probably the best *E. globulus* breeding program in the world, and research by the forestry CRCs has been an important factor in its success."

Greg says lessons learnt from the project are being applied to smaller, short-rotation crops such as potatoes.



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Contact us

If you have any queries about this report or suggestions about how we could improve it, please contact:

CRC for Forestry
Private Bag 12
Hobart, TAS 7001
Australia

Email: crcforestry@crcforestry.com.au

Phone: +61 3 6226 7947

Fax: +61 3 6226 7942

ABN 53 115 064 910

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