

Special Issue — “Breeding for Wood Quality”

C. HARWOOD

CSIRO Forest Biosciences, Private Bag 12, Hobart, Tasmania 7001, Australia

This special issue of the Journal comprises 14 selected and peer-reviewed papers from the first Australasian Forest Genetics Conference, incorporating a meeting of Australia-New Zealand Forestry Research Working Group 1 (RWG1), which was held in Hobart from 11 to 14 April 2007.

Although the theme “Breeding for Wood Quality” was addressed by the majority of the 55 conference presentations, the meeting covered a wider range of subjects. Several presentations focused on breeding for growth and adaptation, while others reported applications of molecular technologies to population genetics and improvement. Two papers included here provide cases studies on advanced methods for exploring genotype-by-environment interaction for growth, and other papers focus on deployment issues.

The conference theme acknowledged the new emphasis on wood quality in breeding objectives for Australian and New Zealand breeding programmes for plantation trees. Reviews of genetic parameters for growth, tree form, and wood quality are presented in this issue for two important plantation species, *Pinus radiata* and *Eucalyptus nitens*. CSIRO pioneered research on breeding for wood quality over 50 years ago (Fielding 1953), and for decades wood scientists and tree breeders have been well aware of the need for genetic improvement of wood quality. A particular problem foreshadowed in the 1960s was the lower density, weaker plantation-grown wood now resulting from shorter rotations and lower stockings. There is a larger proportion of weak corewood in a fast-grown log than in a slow-grown log harvested at the same size. In addition, there is a well-known (at least in *P. radiata*, and here reported for *E. nitens*) adverse genetic correlation between growth rate and wood density, such that new breeds selected for faster growth also tend to have somewhat lower wood density and weaker, less stiff wood. Action to address this difficult problem requires breeding and deployment strategies to cope with the adverse genetic correlation. One of the accounts of deployment reported the current release of millions of rooted cuttings of tested clones of *P. radiata* in New Zealand 5–9 years after 800 candidate clones from embryogenesis were both stored cryogenically and planted in field trials. The clones that performed best in the trials were taken out of storage and multiplied.

The conference reported, as do papers in this issue, on application of technological advances in wood quality measurement, including fast and accurate assessment of large numbers of standing trees for wood quality using tools based on near infrared spectroscopy, acoustic velocity, and SilviScan analysis of wood micro-density and micro-fibril angle. Structural and appearance grade solid-wood products are much affected by wood properties that determine product quality such as shrinkage and collapse, spiral grain and checking. Studies on the measurement and genetic control of these traits in *E. pilularis*, *P. radiata*, and subtropical pine hybrid clones are represented here.

Reports of quantitative genetic studies on less-studied species including *E. cladocalyx* and *E. longirostrata* are also included. These species are of current interest for planting in dryland temperate and subtropical Australia where they have been shown to outperform better-known plantation species on marginal sites. The financing of plantations in such environments may increasingly be influenced by their role in carbon sequestration, which in turn is dependent on biomass allocation and wood density as well as stem volume growth. Genetic studies on wood density of two important tropical species, *E. urophylla* and *Acacia auriculiformis*, are also included.

Inevitably, the style and content of some papers in this issue reflect in part the format and timing of the conference. Affiliations of authors have been updated to reflect subsequent organizational changes. The next Australasian Tree Breeding Conference will be held in Western Australia in 2009.

FIELDING, J.M. 1953: Variation in Monterey pine. Forestry and Timber Bureau, Australia. *Bulletin No. 31*. 43 p.