



## **\$6M breeding research targets wood quality**

CSIRO Forestry and Forest Products researchers have begun work on a \$6 million joint project which aims to increase the value of Australia's pine wood production by around \$176 million Net Present Value over a 20-year harvesting period with a projected 27-year rotation.

Project leader, CSIRO's Dr Harry Wu, says the project will build on the already substantial (around 30 per cent) growth-rate gains achieved in the last two generations of pine breeding program.

"The growth-rate increases have reduced the rotation age for Australia's radiata pine plantations from about 40-45 years to 27-30 years," Dr Wu says.

"CSIRO estimates the additional income gained so far from the resulting increase in production levels at between \$260 million and \$510 million."

One unwanted side-effect of the shorter rotations is a higher proportion of juvenile wood in the harvested logs. Compared with mature wood, juvenile wood's undesirable characteristics include: lower density, shorter fibres, lower cellulose content and a higher incidence of knots. Timber cut from logs with a high proportion of juvenile wood have reduced stiffness and strength, more distortion and surface checks, and poorer finishing properties for structural timber.

"The increase in juvenile wood in pines bred for faster growth has caused concern in many countries," Dr Wu says. "A result of this is the decision by ArborGen - a joint venture of three large companies, two of which are based in the US - to become a partner and financial-backer of the gene discovery research of the 'Juvenile Wood Initiative' project."

Other partners are: a consortium that runs radiata pine breeding programs across southern Australia, the **Southern Tree Breeding Association**; the Queensland Department of Primary Industries (Forestry), which manages breeding programs for slash and Caribbean pines; and the Forest and Wood Products Research and Development Corporation who are contributing over \$1m to the project.

The number of years during which trees produce juvenile wood varies greatly according to species and location. In radiata pine, the first 10 annual growth layers are generally considered juvenile and, as a result, between a third and half of the timber in a tree harvested at age 27 may be juvenile wood.

However, research has shown that the age of transition from juvenile to mature wood is highly variable within the pine species. Also, characteristics of the juvenile wood - including a key property, stiffness - vary markedly. As a result, Dr Wu says, there appears to be major potential for selective breeding programs to reduce the juvenile wood content of fast-grown timber and improve the quality of that which remains.

An early goal of the project will be to develop a reliable way to measure the stiffness of a young tree's timber without felling the tree. One method that looks promising involves directing sound waves through the tree. Researchers will use CSIRO's SilviScan technology to examine relationships between wood's stiffness and other characteristics that can be targeted in selection.

"A key goal is to integrate traditional quantitative and modern molecular genetics to maximise the efficiency of the selection process," Dr Wu says.

Genetic trials will provide data on variability within key characteristics and the extent to which properties are inherited. In addition, the latest molecular genetics techniques will be used to identify and characterise genes associated with improved juvenile wood. These genes will then be used to 'map' the genes that control juvenile wood in radiata pine, and to identify genetic 'markers' that can be used in selection.

### **More information:**

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