GENETIC PARAMETER ESTIMATES FOR GROWTH AND SELECTED WOOD PROPERTIES IN RADIATA PINE *(PINUS RADIATA* D.DON.)

D.P. Kain,[1] A.C. Matheson,[2] P.J. Kanowski[1], and P.D. Evans[1]

Temporal changes in genetic variances and juvenile:mature covariances of tree basal area were examined over the development of a 26 year-old stand of radiata pine *(Pinus radiata* D.Don), and used to estimate genetic gain in growth achieved by selection at different ages. The genetic control of selected wood properties, their genetic interrelationships, and their genetic relationships with growth were also quantified. Data were obtained from increment cores, sampled at breast height from a progeny trial near Canberra, Australia. The 20 full-sib families examined originated from a NCII mating design, with 5 female and 4 male parents. At establishment, each family in the trial was represented by a 5-tree plot in each of 8 replicates. After systematic thinning at age 25, and a simulated 20% thinning from below, a mean of 16 trees per family were included in the final analysis.

Measurements of annual ring widths from cores were used to estimate tree basal area for each year of growth. The wood properties: unextracted and extracted specific gravity, moisture content, heartwood percentage of basal area and extractive content; were measured from the same cores. Results suggest that heritability of basal area growth is low, and strongly affected by stand competition, dramatically decreasing at crown closure. Juvenile:mature genetic correlations exceeded their phenotypic counterparts for most of the study period, and were not linearly related to the logarithm of the ratio of the two subject ages (Lambeth's LAR). Maximum genetic gain per year would have been achieved by selection at age 17; however, this did not differ significantly from the gain achieved at age 8, and it is likely that economic analysis would favor selection at the earlier age, which still exceeds the average age of first flowering for radiata pine. Simulated thinning substantially increased genetic variance in tree basal area over the entire study period; it is likely that estimates of genetic variance and optimum selection age for growth are strongly influenced by silviculture, and that practiced in the trial was atypical.

Heritability of wood specific gravity, moisture content and extractive content were slightly lower than was expected from the literature; heritability of heartwood content exceeded most previous estimates. Non-additive genetic variance was high for moisture content, and higher for heartwood content. Removal of extractives from the core samples was found to be necessary to accurately determine genetic variance and covariance of wood specific gravity. Further research is necessary to determine ontogenetic thresholds for both growth and wood traits, and incorporate this information into reliable and general predictive models for early selection.

[1]Department of Forestry, Australian National University, ACT 0200 Australia
[2] CSIRO Forestry and Forest Products, Yarralumla ACT 2600 **Australia**