AUSTRALIAN COOPERATIVE TREE IMPROVEMENT STRATEGY FOR *Eucalyptus globulus*.

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ABSTRACT

The Southern Tree Breeding Association (STBA) runs the national tree improvement cooperative for *Eucalyptus globulus* in Australia. The formation of the STBA Eucalypt breeding program in 1994 amalgamated the pre-existing genetic resources of its members' individual programs that were spread across southern Australia. The breeding strategy was developed in collaboration with the Cooperative Research Centre (CRC) for Temperate Hardwood Forestry in 1995 and was designed to meet the commercial needs of STBA members. Recently, the STBA and CRC for Sustainable Production Forestry revised the strategy to focus on total tree improvement, by integrating deployment with breeding. Selection pressure has been greatly increased and the breeding objective modified. The majority of STBA members' plantations are being grown primarily for pulpwood to be used in the manufacture of kraft pulp and paper products. However, members are increasingly interested in breeding for the production of alternative products such as solid-wood, and the strategy addresses this need.

The consolidated genetic resource of *E. globulus* available to the STBA for breeding purposes is broadly based. The founder breeding population consisted of more than 600 parents selected from about 200,000 trees from 1,300 families assessed in 49 base population trials. Since 1995, the STBA has been making biparental crosses on an annual 'rolling front' basis. Seventeen second-generation progeny tests with full sib families have been established across southern Australia since 1997. Collection of early age progeny test data from these trials has commenced and second-generation selections from these trials will be used for breeding and deployment in the next few years.

The main features of the STBA tree improvement strategy include: (a) a clearly defined economic breeding objective; (b) a genetic evaluation system based on BLUP (TREEPLAN®); (c) a rolling front working plan with overlapping generations; (d) a short generation interval; (e) about 220 crosses per year with 75 full sib progeny per cross; (f) four progeny tests planted per year; (g) good genetic linkage across locations and years; (h) testing of families for specific combining ability; (i) genetic values customised for members production and deployment systems; (j) a quality control program for pedigree assurance using DNA fingerprinting; (k) a dynamic mate allocation system for cross-pollination; (l) a broadly based founder population; (m) an efficient system to manage coancestry and inbreeding; (n) deployment of selected full sib families using mass controlled pollination ; and (o) an effective research and development strategy supported by its research members. This paper outlines the main features of the strategy, progress to date and future directions.

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