THE ROLE OF GENETICS IN THE CONSERVATION AND UTILIZATION OF *ACACIA*

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Genetic information is important for effective conservation management strategies and is essential for efficient utilization of genetic resources. Genetic analysis covers a broad range of aspects including population genetics and mating systems, phylogeny and systematic relationships at the species level, and phylogeography.

Conservation, not just of rare species, but of all genetic resources is enhanced by knowledge of genetic diversity and structure. Reserve design for in-situ conservation and sampling strategies for ex-situ conservation are both affected by of the level of diversity within populations, and the structuring of this diversity, whether mainly within populations or with significant diversity maintained between populations. Mating system and levels of gene flow affect levels of diversity and population differentiation and are readily influenced by population size and fragmentation. Determination of phylogenetic relationships between related species allows appropriate comparisons between rare and widespread taxa, both in terms of genetic and ecological factors, as well indicating the phylogenetic value of species where priorities for conservation activity may need to be set. Phylogenetic and phylogeographic studies can also define genetic entities for conservation management units.

Commercial utilization of species requires effective selection of superior germplasm, and the development of breeding and improvement programs. Population genetics is valuable for determining the level and structuring of diversity and the identification of provenance effects, which influence sampling strategies to encompass a broad genetic base. The mating system and level of gene flow affects the design and functioning of seed orchards, as well possible introgression from planted stands to natural populations. Phylogeny and the definition of genetic/taxonomic entities are critical in the domestication of species complexes, and phylogeography can identify evolutionary influences that may have effects on traits of interest.

These principals will be illustrated with examples of genetic studies on two rare acacias and their widespread common relatives, and the elucidation of genetic/taxonomic entities and phylogeographic history of the *Acacia acuminata* complex.