

Genetic analysis of *Adenanthos cunninghamii*

Report to Rare Flora Officer, Albany region.

Introduction

Adenanthos cunninghamii is an endangered species found in Two Peoples Bay Reserve and Torndirrup National Park. It is suspected to be a hybrid between *A. sericeus* and *A. cuneatus* since it co-occurs with the two species and has morphology intermediate between them. In Torndirrup National park the *A. cunninghamii* individuals are all morphologically similar with fine, flat deeply lobed leaves. At Two peoples Bay there are *A. cunninghamii* individuals as well as many individuals with leaf morphology intermediate between the fine flat leaf typical of *A. cunninghamii*, and the wide, slightly lobed leaf characteristic of *A. cuneatus*. A genetic analysis of *Adenanthos cunninghamii* was undertaken to investigate the hybrid status of the species.

Methods

Populations of *A. cunninghamii* at Two Peoples Bay Reserve and at Torndirrup National Park were assayed with 3 AFLP primers. Plants from each of the putative parent species from each population were also assayed.

Results and Discussion

The majority (>99%) of bands present in *A. cunninghamii* were present in both *A. sericeus* and *A. cuneatus*. *Adenanthos cunninghamii* contained a very low level of species specific bands (0.3-0.4%) compared to the much higher level of species specific bands in *A. sericeus* (19-27%) and *A. cuneatus* (25-34%). Thus *A. cunninghamii* is a genetic mixture of *A. sericeus* and *A. cuneatus* and does not have its own genetic identity. A separate species would be expected to have a unique genetic identity that distinguishes it from other species. The presence of the 2 bands specific to *A. cunninghamii* most likely represents a sampling effect, ie. the bands are present in either *A. sericeus* or *A. cuneatus* but by chance are not present in the individuals sampled in this study.

In an analysis of relationships the individuals of each species clustered together. The *A. cunninghamii* cluster was intermediate between the *A. sericeus* and *A. cuneatus* clusters. Thus the genetic position of *A. cunninghamii* is intermediate between *A. sericeus* and *A. cuneatus* in a similar way in which the morphology is intermediate between these species.

Seed from *A. cunninghamii* was collected by Peta Ireland and was germinated and potted up by the Threatened Flora Seed Centre. These seedlings do not have the fine flat leaves of *A. cunninghamii*, but display the fine terete leaves characteristic of *A. sericeus* or wide slightly lobed leaves similar to *A. cuneatus*. Thus *A. cunninghamii* does not produce progeny that are consistent with the taxonomic identification of *A. cunninghamii*. The progeny show segregation in morphology with leaf characters ranging in shape from those typical of *A. sericeus* to those similar to *A. cuneatus*.

Conclusion and Recommendation

Adenanthos cunninghamii is a hybrid between *A. sericeus* and *A. cuneatus*. The plants in Torndirrup National Park represent the F1 generation. The population at Two Peoples Bay represents a hybrid swarm containing the F1 generation (*A. cunninghamii*) as well as plants showing segregation of morphology from selfing of F1s or from backcrossing with the parental species. Hybrid origin does not preclude listing as Declared Rare Flora, but there are additional criteria for listing of hybrid species. One of the additional criteria is "they must be a distinct entity, that is the progeny are consistent within the agreed taxonomic limits for that taxon". *Adenanthos cunninghamii* does not meet this criterion for listing of hybrids as DRF therefore it should be removed from the DRF list. No further conservation action is required.

This work was carried out by Esther Walker, Murdoch University as an Honours project under my supervision. The full report on the project is available in Walker E (2002) Determining the hybrid status of *Eucalyptus bennettiae* and *Adenanthos cunninghamii*, Honours Thesis, Murdoch University.

Dr Margaret Byrne
Science Division
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