

Genetic Diversity of *Doryanthes excelsa*

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Introduction

The monocot *Doryanthes excelsa* (Doryanthaceae) or “Gynea Lily” is indigenous to the central coast of New South Wales, Australia (Fig. 1) and has considerable potential as an export cut-flower crop¹ (Fig. 2). The illegal collection of floral and seed material from wild populations for the cut-flower and seed industries poses an additional threat on certain populations that have already been reduced in size by land clearing.

As an initial step towards the conservation of this species, random amplified polymorphic DNA (RAPD) markers were used to assess genetic diversity of plants within and between natural populations.

Results

87 individual plants from nine populations of *D. excelsa* were used in this study. Ten RAPD primers produced 103 amplified fragments across the entire data set. An UPGMA dendrogram (Fig. 3) shows squared euclidian distances among the individuals, derived from the Dice algorithm² for calculating genetic distance. Four distinctive clusters can be seen, comprising of the Somersby, Newfoundland State Forest and Kremnos Creek populations separated from the remainder of the sampled individuals from the other populations.

An Analysis of Molecular Variance was conducted on the data which showed an F_{ST} of 0.443, indicating high inter-population diversity, relative to intra-population diversity. The two ‘northern’ populations at Kremnos Creek and Newfoundland contributed significantly to this result. When individuals from these two populations were excluded from the analysis, the F_{ST} was reduced to 0.298.

Conclusions

There was significant diversity between the ‘northern’ populations at Kremnos Creek and Newfoundland S.F., and the remaining ‘southern’ populations.

Overall inter-population diversity was high, indicated by an F_{ST} of 0.4432.

These results indicated that there may be restricted gene flow between populations. In some instances this may be due to geographical isolation.

Future conservation measures should be directed at preserving this diversity.

References

1. Burchett, M., Nash, S. & Richardson, N. (1989) *Doryanthes excelsa* as a commercial crop. *Aust. Hort.* 87 (9): 36-39
2. Dice, L.R. (1945) Measures of the amount of ecological association between species. *Ecology* 26 (3): 297-302



FIGURE 2: A typical young *D. excelsa* inflorescence, with the first flower just opened.



FIGURE 1: Sample collection sites based on the natural distribution of *D. excelsa*, used for the RAPD analysis.

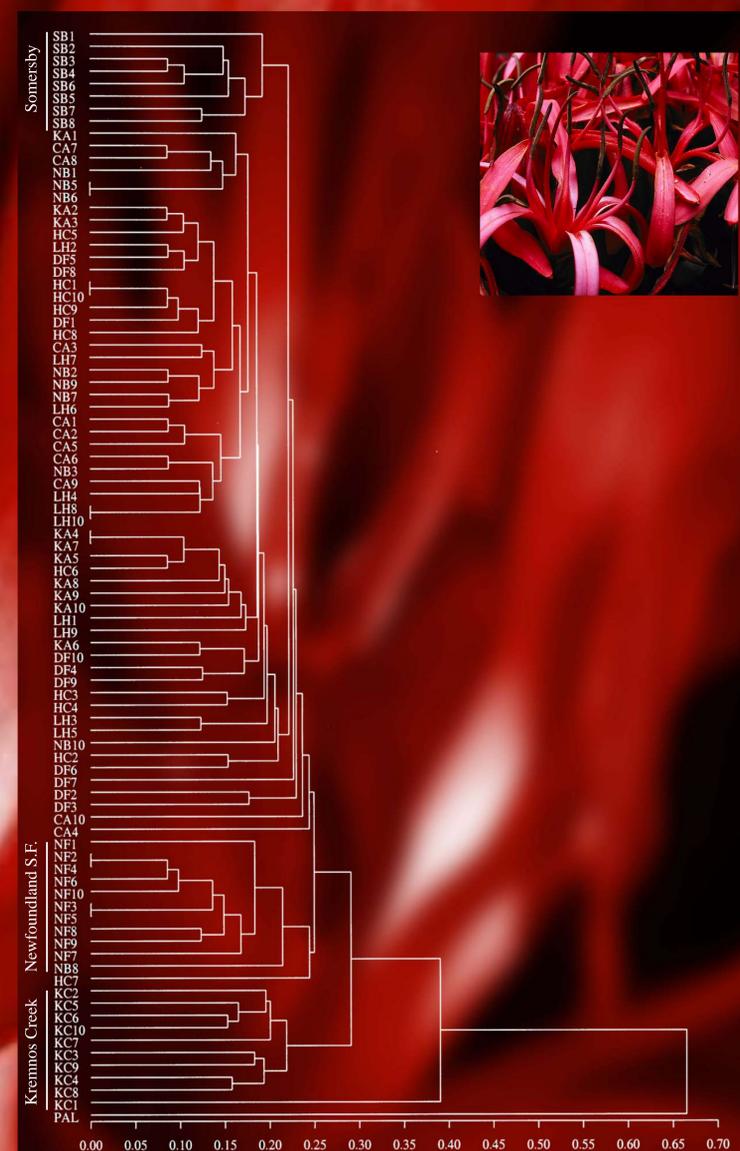


FIGURE 3: An UPGMA dendrogram showing the relative diversity of 87 accessions of *D. excelsa*, $F_{ST}=0.4432$ and a single *D. palmeri* accession. The two-letter prefixes correlate to the place names in Figure 4 and the numerals refer to the accession number. (Inset: *D. excelsa* floral detail. Photo: Rob Cross)