GENETIC AND ECOLOGICAL CONSEQUENCES OF POPULATION FRAGMENTATION IN *EUCALYPTUS WANDOO*

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INTRODUCTION

In south-west Australia recent land clearing for agriculture has led to fragmentation of eucalypt woodlands (Fig. 1). These remnants are important for biodiversity conservation. Woodland trees are long-lived and as a consequence remnants have the impression of stability. However, little is known about the effects of fragmentation on the viability of woodland tree populations. These effects are being investigated in *Eucalyptus wandoo*.

MATERIALS AND METHODS

Genetic diversity (*A*, *He*, number of rare alleles), reproductive output (flower and set seed) and soil nutrients were measured in 19 populations ranging in size from 2 to *ca*.17000 trees (Fig. 1).

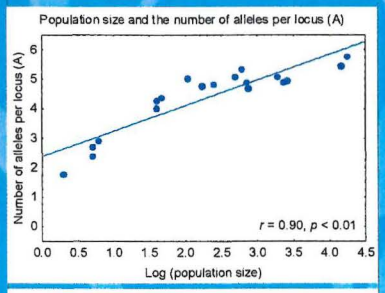
RESULTS

There was a significant positive correlation between population size and allelic diversity (number of alleles per locus and number of rare alleles) (Fig. 2), but no correlation between population size and gene diversity (*He*, r=0.22, p=0.36).

Fig. 1 Areas of natural vegetation (green) and location of sampled populations of *E. wandoo* (yellow) in the Dongolocking area of south-west Western Australia.

There was a significant negative correlation between population size and soil nutrients (Fig. 3).

There was a significant positive correlation between population size and fruit set, and a positive trend with seed set (Fig. 4).



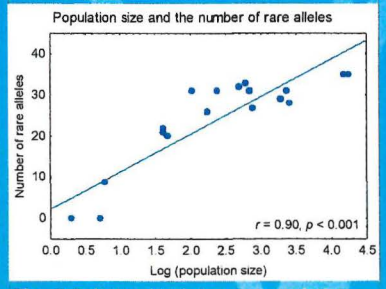


Fig. 2 Relationship between population size and, alleles per locus and number of rare alleles.

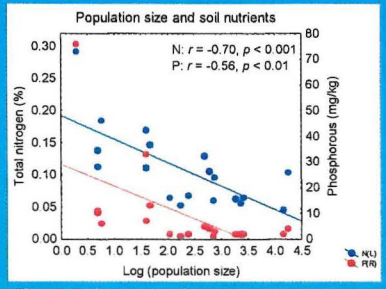
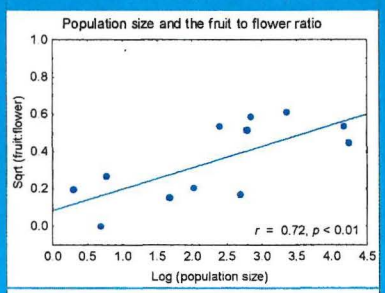


Fig. 3 Relationship between population size and soil nutrients.



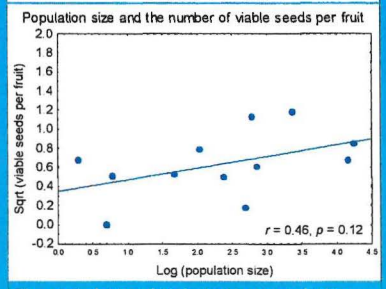


Fig. 4 Relationship between population size and, fruit set and seed set.

DISCUSSION

Significant correlations between population size, and genetic diversity and fecundity were observed in *E. wandoo*. Small populations had lower allelic diversity through fewer rare alleles. There was no association with heterozygosity as most trees represent the original generation prior to fragmentation. A trend to lower fecundity in smaller populations may be related to pollinator / mating system effects. Lack of resources is unlikely to be responsible for reduced fecundity as smaller populations had higher nutrient levels.

Further work investigating pollination, mating system, gene flow, seed germination and seedling growth are being carried out.

CONCLUSION

E. wandoo is a key component of woodland remnants in the Western Australian wheatbelt, providing habitat for a large number of associated species. In the current landscape *ca*. 70% of remnants are less than 1 ha in size. Our initial results suggest that a large number of the *E. wandoo* remnants may not persist unless population size and remnant area are increased through restoration.

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