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Arthropod assemblages of mistletoe: composition and spatial turnover

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Introduction

- Invertebrates make up 47% of the estimated 0.5 million species of eukaryotes in Australia (Nielsen 1999) and play critical functional roles e.g. pollination and nutrient cycling.
- To conserve and manage invertebrate communities, we need to quantify their diversity and spatial turnover in species composition. Recent studies suggest that ground-dwelling arthropods (insects and spiders) have a higher spatial turnover than vertebrates and plants (Ferrier *et al*., 1999; Oliver *et al*. 1998). By comparison, the spatial turnover of arboreal arthropods has not been well studied.
- In addition to being the first community-level comparative study of the arthropods that inhabit mistletoe in Australia, this research will reveal the spatial turnover of this component of the arboreal invertebrate fauna.

Box mistletoe flowers

Mistletoe day moth (Comocrus behri): larva left, adult right

Beetle on box mistletoe

Box mistletoe clump in red box tree

Butterfly (Delias sp.) larvae on box mistletoe

Research questions

- What is the diversity of arthropod assemblages of box mistletoe compared to that of the host eucalypt trees?
- How does species composition of the arthropod assemblages of mistletoe change across the landscape?
- What are the relative influences of geographic distance and habitat variables on change in assemblage composition?

Study design

Study area: Australia > New South Wales > South-west slopes > Upper Billabong Creek Catchment.

Study sites: 10 remnant eucalypt woodlands on private land (3-24ha).

Study species: Box mistletoe, *Amyema miquelii;* and host eucalypts: red box - *Eucalyptus polyanthemos*, yellow box - *E. melliodora*, and Blakely's red gum - *E. blakelyi.*

Sampling units: Mistletoe clumps and equivalent amount of host eucalypt foliage.

Distance between samples: 2-23km (2005), 2-40km (2006)

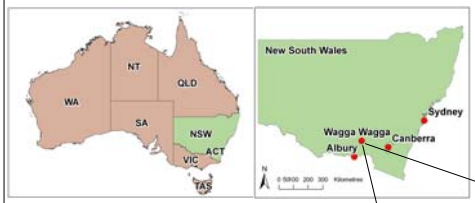
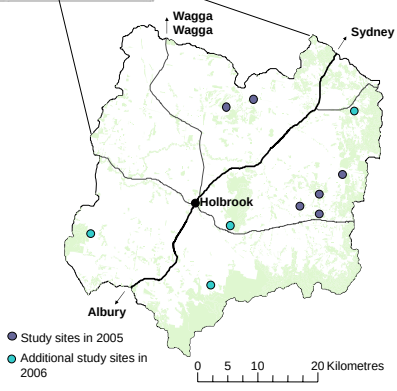


Figure 1. Location of sampling sites: Upper Billabong Creek Catchment, New South Wales, Australia

Box mistletoe clumps in a red box tree



Sampling procedure

The foliage is sampled from a cherry-picker (max. 12m above ground), by enclosing it in a plastic bag, then spraying with pyrethrum-based insecticide & shaking the foliage to dislodge the arthropods.

Samples are sorted to order, then morpho-species.

A pilot study was conducted in Spring 2005 and this will be extended in Spring 2006.

Preliminary Results

- **Assemblage composition.** Psyllids were the most abundant taxon in the mistletoe samples, followed by spiders and wasps (Fig. 2). Sorting of the eucalypt samples is not yet complete but the same orders as for the mistletoe samples are present.
- Ordination of the mistletoe samples (Fig. 3) revealed that the composition of the arthropod assemblages is influenced by both **habitat and spatial variables**.
- Further analyses will be conducted to determine the **spatial turnover** of the arthropod assemblages of mistletoe.

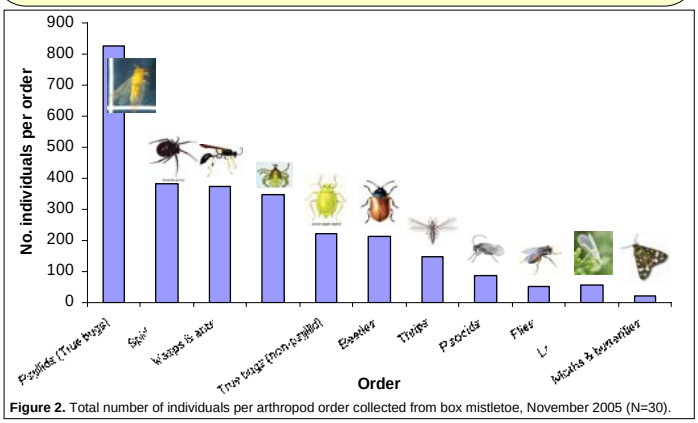


Figure 2. Total number of individuals per arthropod order collected from box mistletoe, November 2005 (N=30).

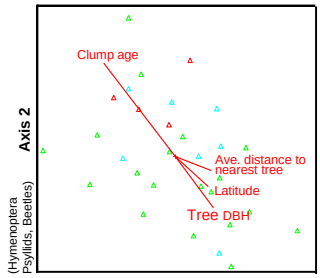


Figure 3. NMDS Ordination of arthropod samples collected from box mistletoe, November 2005. Bray-Curtis similarities calculated from untransformed densities, N = 30. Stress: 13% (2D recommended, $P<0.05$) All vectors have significant tau (Tree DBH: $P<0.01$, all others: $P<0.05$). Orders most influential on each axes are shown in brackets.

Expected outcomes

- Distinctness of the arthropod assemblages of box mistletoe compared to the eucalypt host trees - based on species composition, abundance and trophic groups.
- Degree of spatial turnover of the arthropod assemblages of box mistletoe, and the relative influence of geographic distance and habitat or environmental variables on spatial turnover.
- Thus, contribution to the knowledge of the distribution and abundance of arthropods in remnant woodlands, to aid in the optimal design of conservation reserves and restoration areas.

(Beetle larva)

References

Ferrier, S., Gray, M.R., Cassis, G.A. & Wilkie, L. 1999. Spatial turnover in species composition of ground-dwelling arthropods, vertebrates and vascular plants in north-east New South Wales: implications for selection of forest reserves. In: *The other 99%. The conservation and biodiversity of invertebrates.*, eds W Ponder & D Lunney, The Royal Zoological Society of New South Wales, Mosman, Australia, pp. 68-76.

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