



## Factors affecting the growth and health of eucalypt plantings in the Wimmera

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*This Agriculture Note identifies the effects of insect pests, fungal diseases and soil nutrition on the growth and health of Eucalyptus globulus, E. camaldulensis and E. cladocalyx plantings on farms forming part of the Wimmera Agroforestry Network in Western Victoria.*

### Introduction

The establishment of trees on farms has been actively pursued and promoted by the Wimmera Agroforestry Network with the support from the Department of Sustainability and Environment (DSE). In general tree plantings are established successfully using well defined silvicultural practices.

However, tree growth and condition can decline rapidly in subsequent years and there is considerable concern among landholders and community groups in the Wimmera about the long-term success of some past re-vegetation projects. Most of these projects do not provide for post-establishment monitoring of growth, health and condition of trees and therefore no information is available to landholders that would enable identification of possible causes for the failure or success of tree plantings.

Therefore a study was undertaken to examine the health and condition of common tree species in a range of plantations in collaboration with the Wimmera Agroforestry Network (WAN) with the support of DSE and the National Heritage Trust.

The main objectives of the survey were to:

- characterise each site in terms of climate, topography, and soil type
- identify the major insect pests and to assess their damage potential
- evaluate any trends/relationships between the insect pests and the eucalypt host species
- measure and compare the growth performance of species
- determine the soil properties most relevant to tree growth, and
- assess the nutrient status of species and the requirement for treatment with fertilisers.

The survey concentrated on 1994 to 1998 plantings of:

- *E. cladocalyx* F. Muell. (Sugar gum)
- *E. camaldulensis* Dehnh. (River red gum)
- *E. globulus* Labill. (Southern blue gum).

The survey was conducted on sites consisting predominantly of pre-canopy-closure and widely spaced trees, which represented the most common planting regime in the area.

### Major insect pests and potential for damage

The four major insect pest groups identified at the WAN sites during the survey period were:

- Chrysomelid leaf beetles (*Chrysophtharta* and *Paropsis* spp.),
- Gumleaf skeletoniser (*Uraba lugens*)
- Christmas beetles (*Anoplognathus* spp.)
- Psyllids (*Cardiaspina* spp.)

Some 'minor' pests also observed during the same period were:

- gum tree scale (*Eriococcus* spp.)
- leaf miners, treehoppers (*Eurymela* spp.)
- cup moths (*Doratifera* spp.).

Chrysomelid leaf beetles potentially pose a significant threat to eucalypts, particularly in stands of *E. globulus* aged 8+ years, where they can cause significant defoliation predominantly in the upper crown.



*Figure 1. Adult beetle, larvae and characteristic foliage damage of Chrysomelid leaf beetles.*

The Gum leaf skeletoniser also has the potential to cause significant damage to *E. camaldulensis* in the Wimmera region across all ages.



Figure 2. Larvae and characteristic foliage damage of Gum leaf skeletoniser

Christmas beetles present a low to moderate threat, particularly to *E. camaldulensis* and to a lesser extent *E. globulus* on ex-pasture sites within widely spaced trees.



Figure 3. Adult beetle and characteristic foliage damage of Christmas beetles

Psyllids pose a significant ongoing threat to *E. camaldulensis*, especially to foliage in the lower crowns although upper crowns may also be affected in severe infestations.



Figure 4. Nymphs and characteristic foliage damage of Psyllids

Of the three eucalypt species surveyed, *E. camaldulensis* was the most preferred host species for a wide range of insect pests. This susceptibility has the potential to significantly impact on the health and growth *E. camaldulensis* in the Wimmera area. Alternatively, *E. globulus* was predominantly only susceptible to chrysomelid leaf beetle defoliation and *E. cladocalyx* displayed a good general resistance to a range of insect pests.

Soils were tested for the presence of *Phytophthora cinnamomi*, a soil-borne fungus that infects tree roots and causes ‘die-back’ in eucalypt forests mainly in the coastal regions of Victoria but it is also present in the Grampians just south of the Wimmera. The tests showed that no plantations included in the survey were currently infected with *P. cinnamomi* and thus this fungus had no effect on plantation health and growth.

### Soils and tree growth

Sites included in the survey covered a wide range of soil properties but the majority of agroforestry plantations were on acidic, non-saline soils. Growth of *E. cladocalyx* and *E. camaldulensis* declined as exchangeable calcium and soil pH increased. Results of the survey indicated these species are likely to perform better on acidic soils with a pH range of 5 to 6. Growth was only weakly correlated with soil phosphorus (total and extractable) and further research would be required to develop soil testing as a reliable indicator of phosphorus available for uptake by plantation eucalypts on these cultivated soils.

### Nutrition and tree growth

Foliage diagnostic testing showed low and deficient levels of nitrogen and in particular phosphorus and zinc in *E. globulus* and *E. cladocalyx* indicating that these species can be expected to respond to fertiliser. In contrast, levels of these nutrients were consistently higher in foliage of *E. camaldulensis* indicating that nutrient availability was adequate for this species. Growth of *E. globulus* and *E. cladocalyx* was strongly correlated with the levels of phosphorus in foliage indicating that performance of these species across the range of sites to date is being limited by the supply of soil phosphorus (Figure 5). Plantations at a number of sites require treatment with phosphate fertiliser to ameliorate phosphorus deficiency and restore tree health and growth.

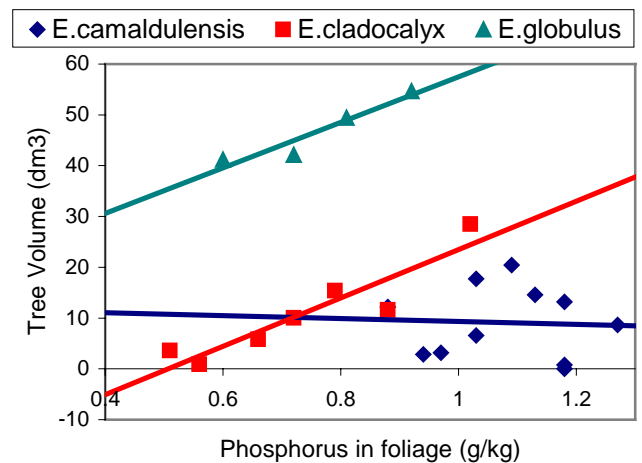


Figure 5. Relationships between average tree volume and concentrations of phosphorus in foliage of *E. camaldulensis*, *E. cladocalyx* and *E. globulus* in the 12 Wimmera agroforestry plantations.

### Conclusions

The study provides an insight into some of the major insect pest species and the damage they may cause in low rainfall area eucalypt plantations. The survey also highlighted some important plant-soil relationships affecting tree growth that need to be considered across a wider range of sites in the Wimmera. These findings may be incorporated into plantation management strategies to maximise tree health and growth in the Wimmera.

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## Further information

A complete copy of this report can be obtained from:

Charles Hajek  
Private Forestry Industry Development Officer  
Horsham  
03 5362 0744

For additional Notes on insect pest and plantation nutrition issues, visit the DSE Private Forestry website:

<http://www.nre.vic.gov.au/forestry/private>

DSE/DPI Customer Service Centre  
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