FOREST PROTECTION
RESEARCH DIVISION SERIES NUMBER E3 ISSN: 0158-3832 ISBN: 0 7305 5622 0

PSYLLIDS IN EUCALYPT PLANTATIONS

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INTRODUCTION

Psyllids, also known as jumping plant lice or lerp insects, are sap-sucking insects related to whiteflies, aphids and scale insects. In Australia, there are more than 300 species of psyllid, most of which are of no economic significance. Most species are host specific (live and feed only on a group of closely related plants or a single tree species), including the psyllids which feed on eucalypts.

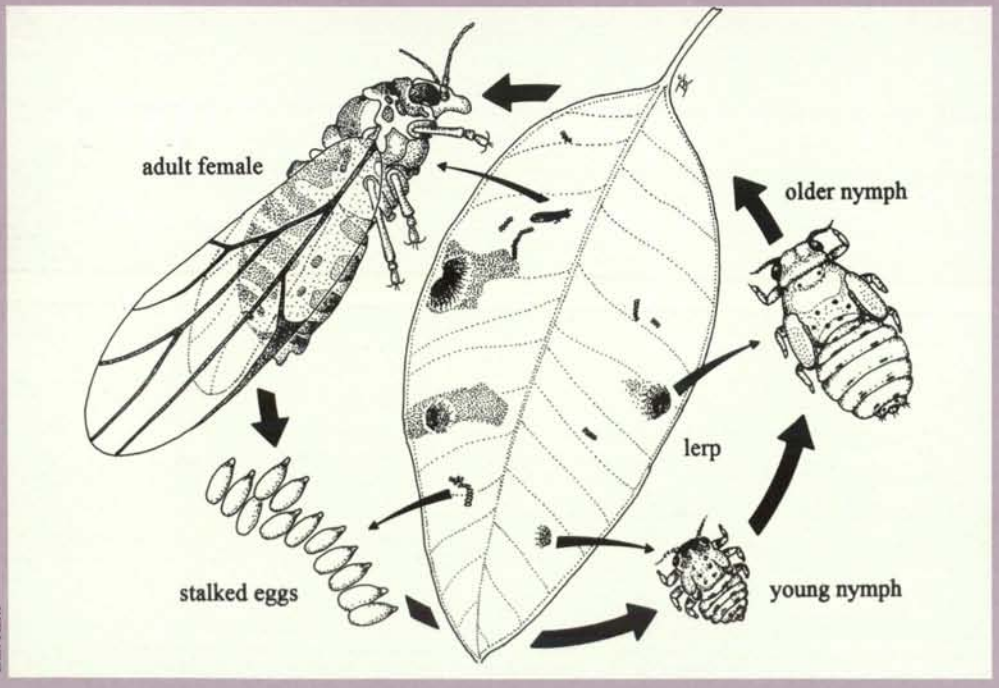
The young psyllids (nymphs) of many eucalypt-feeding species secrete protective waxy or sugary coverings called **lerps** on leaves or stems. The lerp helps to protect the nymph from natural enemies and dehydration in Australia's harsh climate.

The nymphs of other species do not produce lerps, but form galls or pits on leaf surfaces, or make leaves curl. Some species hide under the lerps formed by other psyllids or in the shelters formed by some moths; others produce fluffy white threads on the young shoots and buds on which they are feeding. These are often called "free-living" psyllids. The adults of all psyllids are highly mobile, and do not use lerps for protection.

LIFE HISTORY AND GENERAL BIOLOGY

Adult psyllids (2 - 8 mm long) hold their wings roof-like over their bodies and look a little like miniature cicadas. Although the adults are highly mobile, many species are poor fliers and rely on wind for dispersal over large distances. Both nymphs and adults feed on the sap from leaves or shoots.

Female psyllids generally lay yellow, brown or black stalked eggs on leaves or buds, either singly or in clusters, rows or circles.



D.S. Kent

Figure 1. Typical psyllid life cycle (leaf actual size, insects greatly enlarged).

After hatching, the nymphs find suitable feeding sites where they remain, feeding and developing through five nymphal stages, before emerging as adults (Fig. 1).

There may be two to six generations per year, depending on the species.

There are at least 10 different groups of lerp-building psyllids on eucalypts, but most pest species belong to the genera *Cardiaspina* and *Glycaspis*. *Cardiaspina* species produce shell-like or lacy lerps which are quite distinctive for each species (Fig. 2). *Glycaspis* species (Fig. 3) tend to produce sugary white conical lerps, and many species can only be identified by close examination of the adults and a knowledge of the tree species on which they were found.

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Figure 2. Brown lace lerp (Cardiaspina *sp.).*

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Figure 3. Glycaspis *lerps and nymph.*

DESCRIPTION OF DAMAGE

Psyllids feed by sucking sap from leaves and shoots. Although this may cause local discoloration or malformation, they have little effect on their host plants when population levels are low.

R.H. Eldridge

Figure 4. Evidence of free-living psyllids.

Plantation trees are always at risk from psyllid attack, although the species involved may change as the trees grow. For example, newly planted eucalypts may be infested by free-living psyllids which can deform the new foliage, but do not otherwise appear to harm the trees. The nymphs of many of these species produce fluffy white threads on the new shoots (Fig. 4). Infestation can be triggered by the stress of transplanting, or the seedlings may have been kept in tubes for too long. Unless the infestation is very severe, the seedlings will usually outgrow the problem. They have rarely caused much damage in the past, but they should be monitored carefully, as there is some evidence that their potential as pests in plantations may have been underestimated.

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Figure 5. Cardiaspina *sp. lerps and damage.*

When feeding, the nymphs of *Cardiaspina* species secrete substances that cause localised death of the leaf cells. Initially this appears reddish-purple but later turns brown (Fig. 5). The discoloration is usually more obvious before new foliage appears. When infestation is severe, the trees look scorched or burnt.

Feeding by *Glycaspis* is less noticeable, especially on mature leaves, however massive defoliation can occur when population levels are high. New foliage is subsequently attacked and the cycle repeats itself. On Sydney blue gum (*Eucalyptus saligna*), large populations of *Glycaspis baileyi* can sometimes cause a general purplish discoloration of the foliage.

The nymphs of some free-living psyllids can produce excess sugary secretions called "honeydew". Also, the sugary lerps of *Glycaspis* appear to dissolve slightly in very wet conditions. These secretions attract ants and other insects that feed on excess honeydew. Sooty mould may also develop on these secretions, blackening the leaves and reducing the rate of photosynthesis.

Most eucalypts can cope with high psyllid numbers for a couple of seasons, and recover after the population declines. Repeated defoliation, however, will deplete a tree's reserves faster than they can be replaced by photosynthesis. This can result in crown 'die-back' in both saplings and large trees and may lead to the eventual death of the tree. Apart from feeding damage, psyllid infestations can cause further problems for trees. They can become more susceptible to attack by other insects such as borers and termites.

CONTROL

Natural enemies include parasitic wasps, hoverfly larvae, lacewings, ladybird larvae, ants and spiders. Many birds also feed on psyllids, including honeyeaters (bell miners often indicate the presence of *Glycaspis* species), thornbills, pardalotes and rosellas.

It is not yet known why some species occasionally have population explosions. Although psyllids have similar life cycles, the conditions necessary to initiate and maintain high populations can differ between species. Climate is one of the main factors influencing psyllid populations. It not only influences the population but also the quality and quantity of available food and the effectiveness and abundance of natural enemies. For example, outbreaks have been recorded after a succession of unusually dry and/or wet conditions. One theory is that this form of stress improves the nutritional content of the foliage. Other psyllid species are thought to respond to the presence of large amounts of fresh young foliage.

High psyllid populations collapse eventually, either as a result of changes in the weather conditions or the depletion of suitable foliage due to feeding damage and premature leaf fall. Once the population starts to decline, the influence of natural enemies increases.

Healthy, vigorously growing eucalypts can usually outgrow the damage caused by psyllids, but psyllid attack can be a sign that trees are under stress. Wind, frost, root damage, compacted soil, salinity, drought or waterlogging are all important sources of stress.

Insecticides can be used to control psyllids while the trees are small, but the key to chemical control is vigilance. By the time damage is noticeable it is usually too late to take effective action. The trees must be monitored carefully, and the insecticide applied when new foliage has developed and the psyllids appear to be increasing. Spraying is only feasible for trees under four metres high.

FURTHER INFORMATION

State Forests of NSW (1995). Control of insects on eucalypts. *Forest Protection Series No. C1*. 4 pp.

Some known and potential psyllid pests of eucalypts

Name Scientific/common	Host tree	Description
Cardiaspina albitextura (white lace lerp)	*Eucalyptus camaldulensis, E. blakelyi, E. tereticornis, E. saligna*	Pure white fan-shaped lerp *c.* 3 mm by 5 mm, the outer half with a fine, regular 'lacy' network. A major pest species in *E. camaldulensis, E. blakelyi.*
Cardiaspina fiscella (brown basket lerp) (Fig. 2)	*E. grandis, E. saligna, E. robusta, E. botryoides* and other closely related species	Pale brown lacy 'shell' up to 5 mm in diameter, usually on underside of leaves. A major pest species on *E. grandis.*
Cardiaspina maniformis (fingered lerp)	*E. grandis* and other closely related species	Light brown solid 'shell' with some ribs extending beyond the edge like webbed fingers. Often found on the upper surface of leaves, in association with *C. fiscella.*
Eucalyptolyma maideni (spotted gum psyllid)	*E. maculata, E. citriodora, E. gummifera*	Lerps white, brittle, irregular or horn-shaped, often fringed; *c.* 10 mm.
Glycaspis spp. (bell bird psyllid, sugar lerp), incl. *G. (Glycaspis) baileyi* *G. (S)hirsuta, G.(S)seriata* *G. (G)taylori* *G. (G)brimblecombei*	Major pest of many eucalypt species, rarely or never found on others. *E. saligna, E. robusta, E. resinifera* *E. pilularis* *E. globulus, E. ovata* *E. camaldulensis*	White conical or dome-shaped sugary lerps, often with fine curly filaments extending from lerp. The lerps of most species are indistinguishable, but the animals are very host specific, almost to the point that identification of the tree host can be made from a correct identification of the adult psyllid. Lerps tend to occur along veins of leaf.
Blastopsylla spp. (eucalypt shoot psyllid)	*E. (Symphyomyrtus)** spp.	Free-living; produce white fluffy material on new shoots.
Ctenarytaina eucalypti (blue gum psyllid)	*E. globulus, E. nitens, E. leucoxylon* and others	Free-living; produce white fluffy material on new shoots.

* Eucalypts are divided into a number of sub-groups, two of which are *Symphyomyrtus* and *Monocalyptus. Symphyomyrtus* is the largest of these sub-groups.

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