FOREST PROTECTION

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PSYLLIDS - INSECT PESTS OF EUCALYPTS

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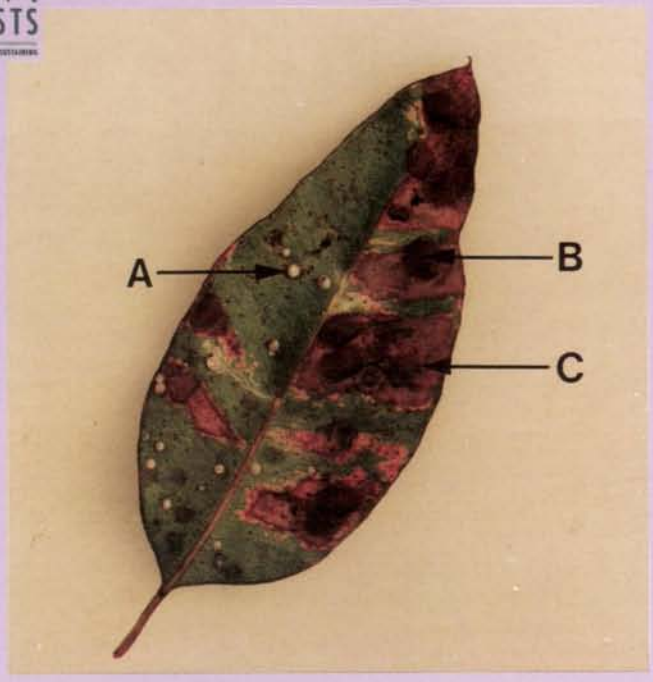
INTRODUCTION

Psyllids (jumping plant lice or lerp insects) are a common and diverse group of sap-sucking insects (Hemiptera:Psylloidea), related to whiteflies, aphids and scale insects. Most species appear to be host specific or confined to a group of closely related plants. Adult psyllids (approximately 4 mm long) hold their wings roof-like over their bodies and look a little like miniature cicadas. Many species are poor fliers and rely on wind for dispersal. Female psyllids generally lay yellow to brown stalked eggs, either singly or in clusters, on leaves or buds. After hatching, the nymphs find suitable feeding sites where they remain, feeding and developing through five nymphal stages, before emerging as adults. More than 300 species occur in Australia, and there may be two to six generations per year, depending on the species.

Although this advisory note focuses on psyllids attacking eucalypts, psyllids are common on many other native plants. Many free-living species occur on acacias. Native figs (*Ficus* spp.) are often attacked by the fig psyllid (*Mycopsylla fici*), which produces a white sticky material underneath the leaves; heavy infestations can cause premature leaf fall. Kurrajongs are sometimes affected by the star psylla (*Protyora sterculiae*).

PSYLLIDS ON EUCALYPTS

Every eucalypt has its own group of psyllid species. The nymphs of many species secrete protective waxy or sugary coverings called **lerps**. The lerp helps to protect the nymph from natural enemies and dehydration in Australia's harsh climate. A few species form galls or pits on leaf surfaces, and some make leaves curl. Others are free-living and protect themselves by producing fluffy white threads between the young shoots and buds on which they are feeding. There are at least 10 genera of lerp-building psyllids on eucalypts, but the most common species belong to the genera *Cardiaspina* and *Glycaspis*. *Cardiaspina* species produce characteristic shell-like or lacy lerps, while *Glycaspis* species tend to produce white sugary lerps (Figure 1).



A *Glycaspis* species
B Brown basket lerp *Cardiaspina fiscella*
C Typical damage caused by *Cardiaspina* species

Figure 1. Two species of psyllid on a eucalyptus leaf.

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 species are thought to increase in response to the presence of large amounts of fresh young foliage.

High psyllid populations always 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. Natural enemies include parasitic wasps, hoverflies, lacewings, ladybird larvae, ants and spiders. Many birds also feed on psyllids, including honeyeaters, thornbills, pardalotes and rosellas.

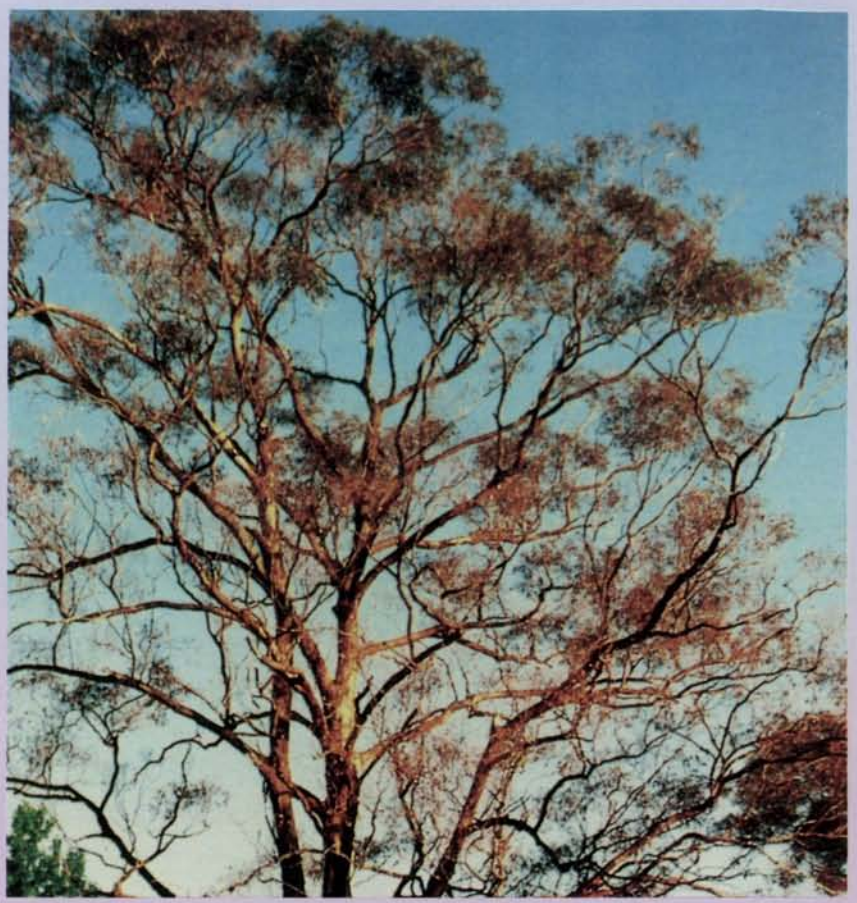


Figure 3. A eucalypt showing symptoms of attack by a white lace lerp, Cardiaspina *species.*
Photo by E.E. Taylor

PSYLLID DAMAGE

Psyllids feed by sucking sap from leaves and shoots. Although this may cause local discoloration or malformation, they cause little damage to their host plants at low population levels. Unfortunately, in Australia a few species occasionally undergo population explosions, particularly species of *Cardiaspina* and *Glycaspis*. When feeding, *Cardiaspina* species secrete substances that cause localised death of the leaf cells. Initially this appears reddish-purple but later turns brown (Figure 1). This discoloration is usually more obvious before new foliage appears (Figure 2) giving the tree a scorched or burnt appearance (Figure 3).

Figure 2. Cardiaspina *species damage on old foliage with unaffected new growth..*

Feeding by *Glycaspis* is less noticeable than *Cardiaspina*, especially on mature leaves, however massive defoliation can occur at high population levels. New foliage is subsequently attacked and the cycle repeats itself. Free-living species are usually found on young foliage and rarely cause much damage.

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' that 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. Some feeding psyllids also attract ants and other insects that feed on the 'honeydew' they produce. Sooty mould may develop on these secretions, blackening the leaves and reducing the rate of photosynthesis.

ALTERNATIVES TO CHEMICAL CONTROL

Population explosions of insects are rare in undisturbed natural environments. Human intervention has altered the balance between psyllids and their natural enemies and allowed some species to 'escape' from the regulatory influence of predators and parasites.

Healthy, vigorously growing eucalypts can usually outgrow the damage caused by psyllids, and 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. Examples include drainage from swimming pools, grazing stock camping or cars parked under trees, and root damage from building activities.

Action can often be taken to reduce the stress on the tree, if the cause is known. Proper watering can reduce the effect of drought, and waterlogging can be helped by improving the drainage. Compacted soil can be improved by removing the cause, loosening the topsoil and mulching. Trees which prefer rich soil can be helped by applying a suitable fertiliser.

Increasing plant density and diversity is one way of improving the control exerted by natural enemies. In the home garden, it may be worthwhile to grow understorey plants, such as thickets of hakeas and grevilleas, to attract insectivorous birds and provide safe nesting sites. Nectar-producing plants also provide food for insect predators and parasites. State Forest nurseries can recommend suitable plants for your area.

Some trees are less susceptible to attack from certain insects than others of the same species. Scientists are now identifying the factors that increase resistance to attack, and will use them in future breeding programmes to produce hardier trees.

In the meantime, an alternative solution is to plant trees which are not attacked by damaging psyllid species. Although a few psyllids feed on casuarinas, they rarely cause significant damage. Blakely's red gum (*E. blakelyi*) is regularly attacked by the white lace lerp (*Cardiaspina albitextura*) on the southern slopes of New South Wales, but this psyllid does not attack white box (*E. albens*), which will grow in the same area. Similarly, Sydney blue gum (*Eucalyptus saligna*), flooded gum (*E. grandis*), swamp mahogany (*E. robusta*), and southern mahogany (*E. botryoides*) are attacked by the brown lace lerp (*Cardiaspina fiscella*) and the bell bird psyllid (*Glycaspis baileyi*). Tallowwood (*E. microcorys*), brush box (*Lophostemon confertus*) and turpentine (*Syncarpia glomulifera*) have similar site requirements but are not attacked by these psyllids.

CHEMICAL CONTROL

Insecticides can be used to control psyllids, although by the time damage is noticed it is usually too late to take effective action. If a valued tree has been attacked heavily by psyllids over consecutive seasons however, an insecticide, correctly applied, can give the tree some respite, and allow the canopy to recover. The tree must first be monitored, and the insecticide applied when new foliage has developed and the psyllids appear to be increasing (Figure 2). Details of insecticides registered or covered by Pesticide Orders for the control of psyllids are provided on the insert with this pamphlet.

It must be noted that these insecticides are hazardous chemicals. They will kill beneficial insects such as bees, predatory insects and parasites as well as psyllids. They must be used judiciously and strictly in accordance with the registration label or the instructions provided on the insert. The insecticide label and insert states the appropriate concentration to be used and operator safety precautions.

When spraying trees under four metres high, attention must be given to the prevailing weather conditions and timing of application to avoid spray drift and chemical burning of the foliage. Do not apply in windy, hot or wet conditions.

Tree injection involves placing insecticide into small holes drilled into the sapwood of the tree. The insecticide is taken up to the leaves with the sap, where feeding insects ingest it. With this procedure, non-target organisms do not come in direct contact with the insecticide, and being absorbed into the leaves, it is protected from the weather. However, it causes physical damage to the tree, and repeated applications are not recommended. Professional tree surgeons should be familiar with the procedure.

Details of the tree injection technique are provided in State Forests' Caring for Trees Series CT-9 "Tree injection for Insect Control", or in the book "Australian Trees, Their Care and Repair" by Hadlington and Johnston (1988), published by NSW University Press Ltd.

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FOREST PROTECTION

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INSECTICIDES RECOMMENDED FOR CONTROL OF PSYLLIDS ON EUCALYPTS AT JUNE 1994

A. Chemicals Registered in New South Wales (all relevant information is provided on the insecticide label).

Supracide (= 400 g/L methidathion)
Apply as a foliage spray.

Nuvacron (= 400 g/L monocrotophos)
Apply by stem injection.

Azodrin (= 400 g/L monocrotophos)
Apply by stem injection.

These products are too hazardous to be recommended for use by the home gardener. They should only be applied by a professional tree surgeon or a licensed pest control operator.

B. Chemicals covered by a Pesticide Order in New South Wales.

Rogor (= 400 g/L dimethoate)
Apply as a foliage spray to trees under four metres high. Mix four (4) mL of product per litre of water. Add approximately 10 mL of liquid detergent per 4 L of spray mixture. Apply by stem injection to trees higher than four metres. If the tree has a full crown of leaves, use 1.5 mL of product per 1 cm tree diameter then dilute with water on a 1 to 1 basis. On half crowned trees (half leaves missing), use 0.9 mL of product per 1 cm tree diameter then dilute with water on a 1 to 1 basis.

Maldison (= 500 g/L malathion)
Apply as a foliage spray to trees under four metres high. Mix 3 mL of product per litre of water. Add approximately 10 mL of liquid detergent per 4 L spray mixture.

At present no insecticide is registered in New South Wales for aerial application to control psyllids on eucalypts.