



Eucalyptus Redgum Lerp Psyllid

Integrated Pest Management for Home Gardeners and Landscape Professionals

The redgum lerp psyllid, *Glycaspis brimblecombei* (Figure 1), was unintentionally introduced into Los Angeles in 1998 and now occurs on plant hosts throughout California. This aphidlike insect (family Aphalaridae, formerly in Psyllidae) sucks phloem sap and excretes large amounts of sticky honeydew. Native to Australia, redgum lerp psyllid also occurs in the eastern United States and much of the world where its host species of eucalyptus (Myrtaceae) occur.

Of the seven psyllid species known to infest eucalyptus in California, only those that feed beneath waxy covers (lerps) are pests. Redgum lerp psyllid is the most common and forms a roundish cover (Figures 2 and 3). The two other current pest species are spottedgum lerp psyllid (*Eucalyptolyma maideni*), which forms a feather- or funnel-shaped cover and lemongum psyllid (*Cryptoneossa triangula*), which does not have a cover of its own, but feeds beneath the coverings of spottedgum lerp psyllid and is a pest only where spottedgum lerp psyllid is a pest.

In California, four other psyllid species on eucalyptus (*Blastopsylla occidentalis*, *Ctenarytaina eucalypti*, *Ctenarytaina longicauda*, *Ctenarytaina spatulata*) feed openly on foliage and do not form lerps. They are generally not abundant or damaging. Of these, the bluegum psyllid (*C. eucalypti*) formerly was a pest but is now under complete biological control unless natural enemies are



Figure 1. Nymph exposed (left), eggs, adult, and lerp of redgum lerp psyllid.



Figure 2. Leaves of river red gum covered with lerps.



Figure 3. Redgum lerp psyllid nymph and lerps.

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disrupted, such as by pesticide application.

IDENTIFICATION AND LIFE CYCLE

Redgum lerp psyllid develops through three life stages: egg, nymph, and adult (Figure 1). This insect can be found on over two dozen *Eucalyptus* species but prefers river red gum (*Eucalyptus camaldulensis*). In California, flooded gum (*E. rudis*) and forest red gum (*E. tereticornis*) can also be heavily infested.

Nymphs are brownish to yellowish orange and resemble wingless aphids. They develop and feed beneath the waxy, caplike lerp, which is hemispherical and $\frac{1}{25}$ to $\frac{1}{6}$ inch (1 to 4 mm) in diameter. Lerp on leaves resemble armored scales and are commonly whitish but can appear blackish or gray as they age or become covered with sooty mold. Lerp vary in size between instars (immature stages). A nymph enlarges its lerp as it grows through 5 increasingly larger instars. The nymphs also abandon old lerp and move to form new, generally larger lerp.

Adult redgum lerp psyllids are about $\frac{1}{6}$ inch (4 mm) long from head to wing tips, excluding the slender antennae that are commonly held forward. Adults occur openly on foliage and their body is light green to yellow with brownish markings. Of the over 160 introduced or native psyllid species in California, adults of all other pest psyllids formerly could be distinguished from those of redgum lerp psyllid by this species' relatively long, forward projections (genal cones) on each side of the head below the eyes. But the more recently introduced Asian citrus psyllid (*Diaphorina citri*) that is widespread mostly in southern California also has distinct genal cones; these give the heads of both species a snout-like appearance when viewed from the side. Asian citrus psyllid does not feed on eucalyptus.

Eggs of redgum lerp psyllid are pale orange to yellowish, oblong, and less



Figure 4. Blackish sooty mold and old lerp.

than $\frac{1}{25}$ inch (1 mm) long. Females lay eggs singly or in scattered groups and prefer to deposit them on young leaves and succulent, new shoots.

Increases in psyllid abundance often coincide with the plant's production of new growth. However, all psyllid life stages can occur on both new and old foliage. Development time from egg to adult varies from several weeks during warm weather to several months when average temperatures are cool. This insect has several generations each year. All stages can be present throughout the year but are less abundant during winter.

DAMAGE

Psyllid adults and nymphs feed by sucking phloem sap through their strawlike mouthparts. Nymphs cause most of the feeding damage. Adults and nymphs excrete sticky honeydew on which blackish sooty mold fungi grow (Figure 4). Infested trees drop leaves prematurely when redgum lerp psyllids are abundant. Extensive defoliation from psyllid feeding weakens trees and can increase tree susceptibility to damage from other insect pests and abiotic and pathogenic diseases. Sticky honeydew and dark sooty mold foul leaves and surfaces beneath infested trees, and the blackish to brown, sticky, leaves litter the ground. Honeydew attracts ants, and sometimes abundant yellowjackets are drawn to feed on the honeydew and

can annoy or threaten people.

Some *Eucalyptus* species are avoided or are not heavily infested by this psyllid (Table 1). *Eucalyptus* species also differ in their susceptibility to damage from other insects and diseases according to tree species and factors including cultural practices (e.g., extent and seasonal timing of irrigation and pruning, if any), growing location (average annual precipitation, coastal versus inland), and soil conditions (drainage, moisture-holding capacity). Psyllid feeding and these other causes of damage or stress act in combination; when not effectively managed they are likely to cause susceptible trees to decline and die prematurely, sometimes quickly or gradually over several years.

MANAGEMENT

Cultural practices, growing site conditions and location, natural enemies, and the species of eucalyptus determine the extent to which the psyllid is abundant and a pest problem. Properly manage these where feasible to reduce the abundance of redgum lerp psyllid and certain other eucalyptus pests.

A psyllid-specific, tiny, parasitic wasp introduced in California provides substantial biological control, especially in coastal areas if its activities are not disrupted by practices such as the application of pesticides toxic

Table 1. Susceptibility of *Eucalyptus* Species to Certain Introduced Pests in California.

Common name (gum)	<i>Eucalyptus</i> species ¹	Longhorned borer ²	Redgum lerp psyllid	Tortoise beetle
Australian beech	<i>polyanthemos</i>	—	L	L
blue	<i>globulus</i>	H	L-M ³	H
dollar leaf	<i>cinerea</i>	—	L	—
flooded or desert	<i>rudis</i>	—	H	M
forest red	<i>tereticornis</i>	—	H	—
grand or rose ⁴	<i>grandis</i>	M	M	H
gray ironbark	<i>paniculata</i>	—	L	—
hybrid	<i>x trabutii</i>	L	—	—
Karri	<i>diversicolor</i>	H	M	—
lemon	<i>citriodora</i>	L	M ⁵	L
long flowered	<i>macandra</i>	—	M	—
manna	<i>viminalis</i>	H	M	H
mountain	<i>dalrympleana</i>	L	—	—
narrow leaved	<i>spathulata</i>	—	L	—
Nichol's willow leaved	<i>nicholii</i>	—	M	—
red flowering	<i>ficifolia</i>	—	L	L
red ironbark	<i>sideroxylon</i>	L	L-M	L
river red	<i>camaldulensis</i>	L	H	H
round leaved, or red flowered	<i>platypus, or nutans</i>	H	L-M	—
shining	<i>nitens</i>	H	M-H	—
silver	<i>crenulata</i>	—	—	L
silver dollar	<i>pulverulenta</i>	—	L ³	—
spotted	<i>maculata</i>	—	— ⁵	L
sugar	<i>cladocalyx</i>	L	L-M	—
swamp mahogany	<i>robusta</i>	L	L	—
Sydney blue	<i>saligna</i>	H	L	—
white ironbark	<i>leucoxylon</i>	—	M	—

— = information not available

H = highest susceptibility

M = moderate susceptibility

L = less or least susceptible or reportedly not attacked

Redgum lerp psyllid = *Glycaspis brimblecombei*

Tortoise beetle, or leaf beetle = *Trachymela sloanei*

¹Note that some of the tree species formerly in the genus *Eucalyptus* have been re-classified to genus *Corymbia*, for example *Eucalyptus citriodora* is now called *Corymbia citriodora*. The specific epithets in this list (e.g., *citriodora*, *ficifolia*, *maculata*) have not changed.

²Susceptible to the *Phoracantha semipunctata* species of longhorned borer, which may be similar to susceptibilities to the *P. recurva* longhorned borer.

³Susceptible to bluegum psyllid (*Ctenarytaina eucalypti*), but this psyllid is under complete biological control unless the activity of natural enemies is disrupted.

⁴*E. grandis* is also called flooded gum, but *E. rudis* is the flooded gum most infested by redgum lerp psyllid.

⁵Susceptible to spottedgum lerp psyllid (*Eucalyptolyma maideni*) and lemongum psyllid (*Cryptoneossa triangula*).

Adapted from Brennan et al (2001), Hanks et al (1995).

to it. Provide sufficient soil moisture, generally by periodic irrigation; reducing drought stress can substantially reduce psyllid abundance. Avoid application of nitrogen-containing fertilizer or irrigation water, which can stimulate the production of succulent, psyllid-preferred foliage. Application of systemic insecticide has sometimes provided control; however, efficacy has been variable and sometimes disappointing. Pesticide application will prevent or reduce the effectiveness of biological control.

Learn how management efforts for redgum lerp psyllid may affect the other introduced eucalyptus pests and their natural enemies before taking any control actions. Many former eucalyptus pests in California such as the bluegum psyllid (*Ctenarytaina eucalypti*) and eucalyptus snout beetle (gumtree weevil, *Gonipterus scutellatus*), are now under complete biological control from natural enemies deliberately introduced. The first-introduced eucalyptus longhorned borer (*Phoracantha semipunctata*) is completely controlled by an introduced egg parasitoid (parasite). Any of these pests might resurge in significance if certain insecticides are applied.

Consult the *Pest Notes* on eucalyptus longhorned borers, eucalyptus tortoise beetles, and psyllids that discuss these other insect species infesting certain *Eucalyptus* species.

Monitoring

Inspect valued eucalyptus regularly to detect problems caused by inadequate cultural care, tree-growing environment, and psyllids and other pests. Also look for important natural enemies of the pests and evidence of their beneficial activities. Do not wait until pest infestations or damage symptoms are severe to monitor trees because cultural controls such as providing sufficient soil moisture (generally by irrigation) and avoiding any nitrogen application to host tree's root zone are primarily preventive and must be practiced early. Where severe psyllid



Figure 5. Adult *Psyllaephagus bliteus*, a parasitic wasp, next to the lerp coverings of redgum lerp psyllid nymphs.

infestations are intolerable, identify those trees, but consider delaying any pesticide application until the following winter or early spring. It may be unrealistic to expect good control from insecticide applied after psyllids are already abundant.

The number of lerp coverings is not a good indication of the abundance of live psyllids. Some nymphs form multiple lerp coverings and leave their old covers empty. Other covers likely have small parasitoid emergence holes or harbor nymphs that are parasitized, but parasitism is not easily detectable until the psyllid's fourth or fifth (last) instar.

Use yellow sticky traps to capture adults of psyllids and parasitic wasps. Monitoring traps for adults is more time efficient than inspecting foliage for immatures. There is a correlation between the number of psyllid eggs and nymphs on leaves and adult female psyllids caught in yellow sticky traps. Yellow sticky traps provide a good indication of seasonal changes in psyllid and parasitoid activity.

Professional landscapers and property owners can keep records of the relative abundance of psyllids and natural enemies and their activity to help evaluate the effectiveness of any management efforts by comparing records

over time. Avoid applying insecticides to trees where a high proportion of psyllid nymphs are parasitized or adult parasitoids (tiny, dark to greenish wasps) are abundant in traps.

Biological Control

A psyllid-specific parasitic wasp (*Psyllaephagus bliteus*) from Australia that attacks only redgum lerp psyllid was introduced and now occurs at most locations where its host psyllid occurs. *Psyllaephagus bliteus* has significantly reduced psyllid abundance at coastal locations, commonly providing good biological control. At interior locations, such as California's Central Valley, the parasitoid has reduced the pest's abundance, but less so than in coastal areas. Depending on the situation, the parasitoid may not provide satisfactory biological control at locations with seasonally hot weather.

Adult *P. bliteus* are about 1/12 inch (2 mm) long and have a metallic green body and yellowish legs (Figure 5). Females lay eggs in psyllid nymphs of any age but prefer third and fourth instars. At moderate temperatures, a female parasitoid lays about 100 eggs during her life span. An elongate, pale parasitoid larva hatches, feeds



Figure 6. Lerps with emergence holes of the *Psyllaephagus bliteus* parasitoid.



Figure 7. A mummified and parasitoid-killed nymph of redgum lerp psyllid, exposed.



Figure 8. Adult pirate bug, *Anthocoris nemoralis*, feeding on a eucalyptus redgum lerp psyllid nymph.

inside the nymph, and kills it. Because parasitoid larvae do not hatch from their egg and begin feeding until their host nymph reaches the late fourth or early fifth (last) instar, nymphs can be parasitized for days or (during cool weather) weeks before their parasitism becomes visually apparent. Then *P. bliteus* larvae kill and mummify psyllid nymphs, causing their outer surface to become crusty and brownish. After killing their host and pupating inside, an adult wasp chews and leaves a roundish emergence hole in the parasitized psyllid nymph and its lerp cover (Figures 6 and 7). Adult wasps also feed directly on hosts, periodically puncturing nymphs and consuming the body contents. This feeding by adult wasps is of uncertain importance for this pest's biological control.

Redgum lerp psyllid is attacked by many predators including birds, adults and larvae of lady beetles (ladybugs) such as multicolored Asian lady beetle (*Harmonia axyridis*), adults and nymphs of minute pirate bugs (*Anthocoris* spp.) (Figure 8), green lacewings (e.g., *Chrysopa* and *Chrysoperla* spp.), syrphid fly larvae, and various spiders. Adult dragonflies (Odonata) will hover near infested trees and catch adult psyllids in mid-air. Naturally occurring predators apparently are not important in helping to control redgum lerp psyllid. But such predators as adults commonly migrate between nearby plants to feed and lay eggs and can be important in the biological control of pests on those other hosts, such

as aphids. Conversely, predators potentially reduce the effectiveness of biological control of redgum lerp psyllid by feeding on and killing parasitized nymphs. Because the methods for conserving (preserving) *P. bliteus* and other parasitoids are generally the same as for insect predators, potential predator reduction of parasitism likely cannot be managed or prevented in field situations.

Whenever possible, choose management efforts that protect natural enemies and avoid interfering with their beneficial activities. For how to do this see *Pest Notes: Biological Control and Natural Enemies of Invertebrates and Protecting Natural Enemies and Pollinators*.

Cultural Control

Minimize stress by providing eucalyptus trees with proper cultural care and protecting them from injury. When planting, properly prepare the site, correctly plant trees, and choose species and varieties most likely to thrive at that location. Consider how and whether trees will receive ongoing care after their establishment including appropriate, periodic irrigation.

Pest-Resistant Eucalyptus. If planting eucalyptus, choose resistant species to prevent redgum lerp psyllid from being a problem; only a few of the approximately 100 *Eucalyptus* species planted in California become highly infested by this pest. When selecting new or replacement species, also consider their susceptibility to other

pests and disorders. Consult Table 1 for a list of the approximate reported susceptibility to eucalyptus long-horned borers, redgum lerp psyllid, and tortoise (leaf) beetles.

When planting, choose eucalyptus species that are well adapted to the site, including tolerance to the prevailing soil-moisture conditions. Although certain eucalyptus species are drought-tolerant, other species are adapted to moist conditions. It may not be apparent that eucalyptus are stressed due to drought or other factors until trees become affected by additional damaging influences, such as abundant insects.

Irrigation. Consider providing valued eucalyptus with supplemental water during periods of prolonged drought. Species adapted (native) to riverbanks (riparian areas) and wetter growing regions are especially stressed by drought when planted in much of California unless they are appropriately irrigated, primarily during summer and fall.

The *Eucalyptus* species most susceptible to redgum lerp psyllid are adapted to relatively high soil moisture. Drought stress increases damage to trees from both redgum lerp psyllids and eucalyptus longhorned borers. If irrigating trees, apply water beneath the outer canopy, not near trunks. Avoid frequent, shallow watering that is commonly used for lawns. Avoid prolonged waterlogging (soggy topsoil), especially around the root crown. The specific amount and frequency of

water needed varies greatly depending on the tree species and site conditions, including the local climate and soil texture.

Fertilization. Avoid fertilizing eucalyptus trees. Psyllid nymphs and egg-laying females prefer the abundant, succulent new shoot growth stimulated by excess nitrogen. Eucalyptus rarely require nitrogen fertilization for good growth. Nutrition is a minor concern in comparison with providing appropriate soil moisture. If other plants within the drip line of the valued eucalyptus truly require fertilization, consider removing those plants, or apply only slow-release nutrient formulations at the minimum, recommended rate.

Pruning. You can prune off limbs that overhang surfaces where dripping honeydew, prematurely dropping leaves, and sooty mold are especially intolerable. Be aware that pruning commonly stimulates new growth of succulent foliage, which is preferred by psyllids. Except for dead or hazardous branches, which should be removed whenever they appear, prune eucalyptus only during December or January (in southern California) or November through March (in northern California). Trees are usually less stressed by moisture deficit during winter and adult eucalyptus longhorned borers, which are attracted to fresh tree wounds (e.g., from pruning cuts), are not active.

Do not prune too much during one season. If extensive limb removal is planned, space the trimming over several years so that trees maintain adequate foliage to produce (photosynthesize) food and to avoid causing extensive portions of previously shaded bark to become suddenly exposed to direct sunlight, which can result in sunburn cankers. Sunburned bark is especially prevalent among pruned trees that are also stressed by drought. To prevent the development of eucalyptus longhorned borers, which otherwise may emerge from cuttings and attack nearby hosts, debark, remove from the site, or solarize cut limbs and

logs as discussed in *Solar Treatments for Reducing Survival of Mountain Pine Beetle in Infested Ponderosa and Lodgepole Pine Logs*.

Chemical Control

Effectiveness by insecticides has been variable. Consider treating only those trees where the pest has been intolerable or tree health appears threatened by insect damage. Insecticides can kill the *Psyllaephagus bliteus* parasitoid or disrupt its activities that help to control redgum lerp psyllid. The insecticides that kill psyllids are also toxic to beneficial insects that feed on psyllids and commonly migrate between alternative hosts; these predators on other hosts sometimes control pests there. Leave at least some nearby eucalyptus untreated to provide a refuge for natural enemies. Avoid treating eucalyptus in coastal areas where the introduced parasitoid substantially reduces psyllid abundance. Instead of applying insecticides, for trees particularly susceptible to pest problems consider removing and replacing the trees with species that don't have serious insect problems.

Foliar sprays generally are not recommended. The lerp helps protect psyllid nymphs from spray contact. There are no selective insecticides that kill only psyllids. It is difficult to spray large trees without pesticide drifting off-target. If honeydew is intolerable and trees are small enough to be thoroughly sprayed, consider using a mixture of oil (an insecticide labeled horticultural, narrow-range, superior, or supreme oil e.g., Monterey Horticultural Oil) and insecticidal soap (potassium salts of fatty acid e.g., Safer Insect Killing Soap). Oil and soap will kill some of the psyllid adults, eggs, and nymphs and help to wash off honeydew. Oil and soap sprays are not highly effective against lerp psyllids, and foliar spraying can provide only temporary control.

The most effective and practical pesticides for large trees are systemic, neonicotinoids such as imidacloprid that is available to professional applicators

as Imicide Hp, Merit, and others. Certain formulations of imidacloprid are available to the home gardener, including BioAdvanced 12 Month Tree & Shrub Insect Control and Monterey Once a Year Insect Control II. Limited research has been conducted on pesticide efficacy for redgum lerp psyllid. It is not known why some users report good control with insecticide while others find the results disappointing.

Systemic insecticides are available for application into trunks or roots or by spraying foliage. Imidacloprid is also available to both home gardeners and professionals for application on or into soil beneath trees, such as diluted with water in a bucket and poured around the base of the trunk as directed on product labels. Some products can be sprayed on lower trunks and absorbed through bark. When using systemics, whenever possible and allowed by the product label, make a bark spray or soil application instead of injecting or implanting trees. Injecting or implanting trunks or roots injures trees, and it is difficult to repeatedly place insecticide at the proper depth. Especially avoid methods that cause large wounds, such as implants placed in holes drilled in trunks. Do not implant or inject roots or trunks more than once a year.

Imidacloprid may be effective when applied to moist soil during late winter to early spring, or before rainfall or irrigation are expected to facilitate root absorption of the insecticide. Summer or fall application to heavily infested or stressed trees is less likely to be effective and is not recommended. Avoid treating eucalyptus where parasitism of redgum lerp psyllid is prevalent. Imidacloprid is toxic to bees and natural enemies, and it translocates within the tree to nectar and pollen where it can poison these beneficial insects that visit blossoms. To potentially reduce this problem, delay any imidacloprid application until after the tree has completed its seasonal flowering.



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WARNING ON THE USE OF PESTICIDES

Pesticides are poisonous. Some pesticides are more toxic than others and present higher risks to people, nontarget organisms, and the environment. A pesticide is any material (natural, organic, or synthetic) used to control, prevent, kill, suppress, or repel pests. "Pesticide" is a broad term that includes insecticides, herbicides (weed or plant killers), fungicides, rodenticides, miticides (mite control), molluscicides (for snails and slugs), and other materials like growth regulators or antimicrobial products such as bleach and sanitary wipes that kill bacteria.

Always read and carefully follow all precautions and directions provided on the container label. The label is the law and failure to follow label instructions is an illegal use of the pesticide. Store all chemicals in the original labeled containers in a locked cabinet or shed, away from food or feeds, and out of the reach of children, unauthorized persons, and animals. Never place pesticides in food or drink containers. Consult the pesticide label to determine active ingredients, correct locations for use, signal words, and personal protective equipment you should wear to protect yourself from exposure when applying the material.

Pesticides applied in your garden and landscape can move through water or with soil away from where they were applied, resulting in contamination of creeks, lakes, rivers, and the ocean. Confine pesticides to the property being treated and never allow them to get into drains or creeks. Avoid getting pesticide onto neighboring properties (called drift), especially onto gardens containing fruits or vegetables ready to be picked.

Do not place containers with pesticide in the trash or pour pesticides down the sink, toilet, or outside drains. Either use all the pesticide according to the label until the container is empty or take unwanted pesticides to your local Household Hazardous Waste Collection site. Contact your county agricultural commissioner for additional information on safe container disposal and for the location of the Hazardous Waste Collection site nearest you. Follow label directions for disposal of empty containers. Never reuse or burn the containers or dispose of them in such a manner that they may contaminate water supplies or natural waterways.

Produced by the **Statewide Integrated Pest Management Program**, University of California, 2801 Second Street, Davis, CA 95618-7774.

Technical Editor: K Windbiel-Rojas

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Editor and Designer: B Messenger-Sikes

ILLUSTRATIONS: Figures 1-8, Jack Kelly Clark, UC IPM.

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To simplify information, trade names of products have been used. No endorsement of named products is intended, nor is criticism implied of similar products that are not mentioned.

This material is partially based upon work supported by the Extension Service, U.S. Department of Agriculture, under special project Section 3(d), Integrated Pest Management.

Suggested citation: Paine TD, Daane KM, Dreistadt SH, Gill RJ. 2022. UC IPM *Pest Notes: Eucalyptus Redgum Lerp Psyllid*. UC ANR Publication 7460. Oakland, CA.

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