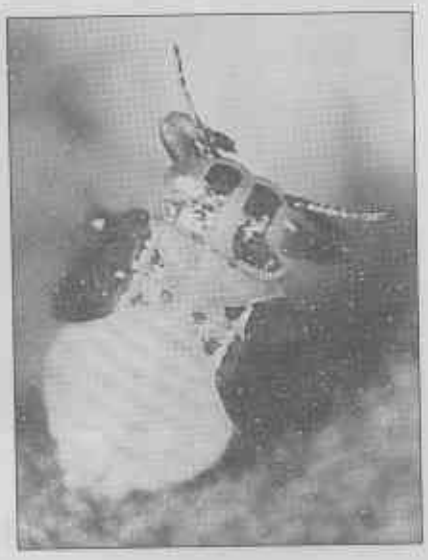
FAUNA

FLAT-TOPPED YATE – WHAT IS RURAL TREE DECLINE?

By Janet Farr

FLAT-TOPPED yate (*Eucalyptus occidentalis*) in the Lower Great Southern has been visibly declining for 17 years. The decline is most evident in remnant yate swamps and along creek lines between Tambellup and Jerramungup. The cause of this decline has been attributed to a species of lerp, or more accurately, psyllid, now called *Cardiaspina jerramungae.*

This insect was first discovered at Kebaringup in 1982, when the fire-scorched appearance of flat-topped yate alerted locals to a potential problem. Initially identified as a species found in 1923 near Sydney on grey ironbark, this posed questions on how the insect got to Western Australia. However the possibility of an introduction explained the sudden occurrence of an insect at outbreak levels which until 1980 was unknown in this State. But there was some dispute on the original identification. Psyllids in the genus *Cardiaspina* usually have a limited host range, restricting their host plants to closely related eucalypts. Therefore this insect seemed out of character. Closer scrutiny of the original Sydney specimens compared with Western Australian specimens finally confirmed that the insect on flat-topped yate was in fact a new species. The insect was therefore named *Cardiaspina jerramungae* after the town Jerramungup, meaning place of the flat-topped yate. Now that we knew this insect was a new species, new questions arose. What is the biology of this psyllid? Does its biology compare with existing knowledge of the genus? And, why has there been a dramatic population increase when prior to 1980 this insect was in such low numbers as not to be noticed?



Late nymph with wing buds

Adult female (shows size as about 3mm)

The main preferred hosts of *C. jerramungae* are *E. occidentalis* and *E. platypus* var *heterophylla* (coastal moort) and it has also been found on wandoo. However the greatest damage impact is on *E. occidentalis.* Eggs are laid preferably on mature leaves and are attached to the leaf by a stalk. Newly emerged nymphs crawl over the leaf until they find a suitable feeding site. Whilst feeding, nymphs build a lerp case under which they live. The lerp case starts as a disc and is built up through five nymphal stages into a distinctively shaped protective covering. The finished lerp resembles a sea shell shaped inverted basket with dark bands. The adults are winged and look like mini cicadas. There are three generations a year: two short generations in summer and autumn (Dec - Feb, Feb - May) and one long winter-spring generation (May - Dec).

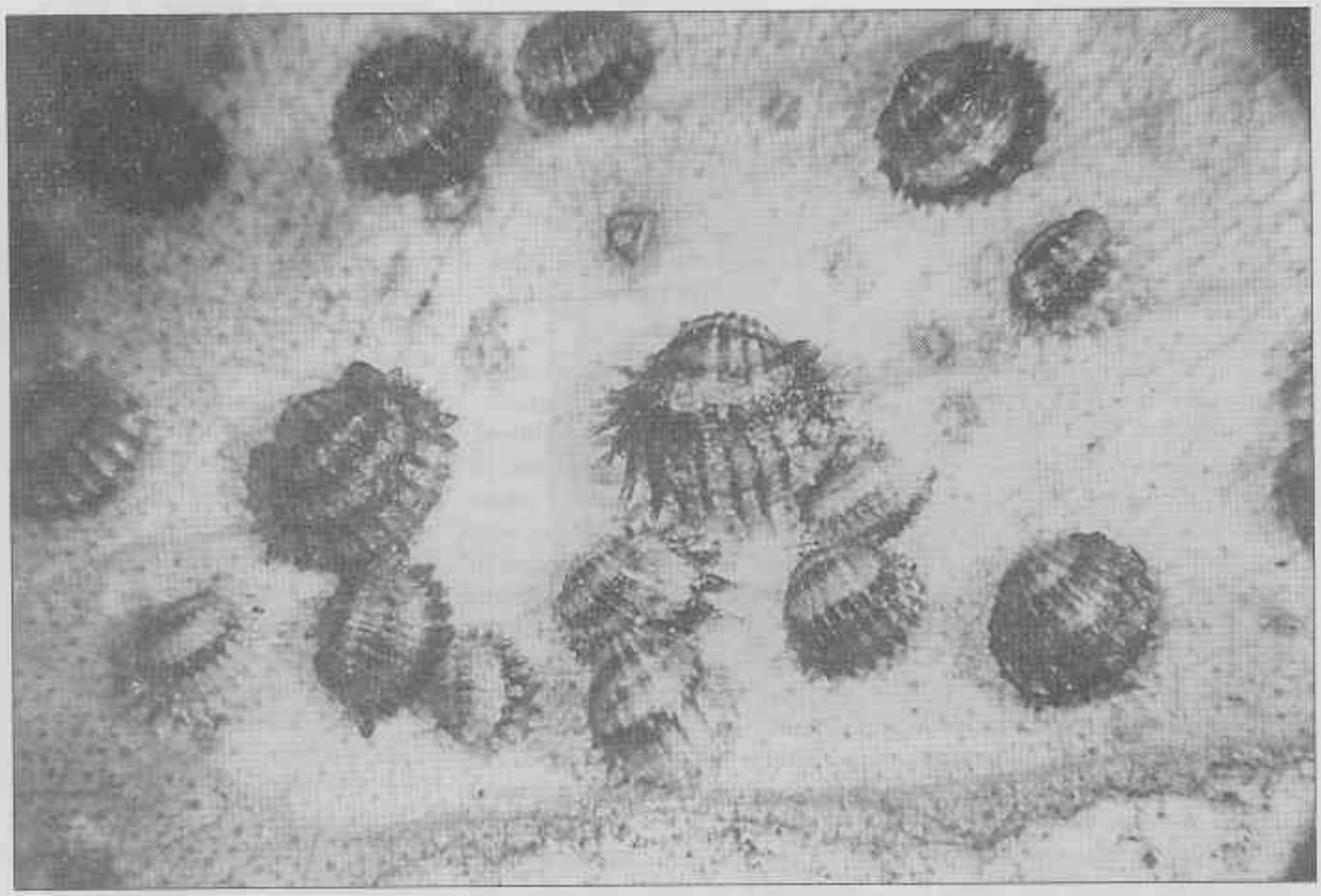
The general biology and life cycle are comparable with other species of *Cardiaspina* studied in the eastern states of Australia. Some of these species are known to outbreak on their eucalypt hosts causing severe crown damage. These insects are called cyclic outbreakers. This means that every so many years, populations increase dramatically followed by a drop back to population maintenance levels. There is no evidence prior to 1980 to suggest *C. jerramungae* followed the cyclic outbreaking pattern. Fluctuations in an insect's population levels is inevitable. But prior to this time fluctuations in *C. jerramungae* must have been so low as to remain unnoticeable. Therefore for an insect to shift its population dynamics from unnoticeable to around 300 eggs per leaf in peak outbreak times means something has changed.

In Western Australia, widespread replacement of native perennial deep-rooted vegetation with annual shallow-rooted crops and pastures has led to increasing ground water recharge and rising water tables. Thus the surface and ground water hydrology of the entire south-west has fundamentally changed on a scale that is only just being appreciated. Flat-topped yate is salt tolerant, not salt resistant and naturally exists in lower areas of the landscape where salinity problems

continued on page 11

FAUNA

continued from page 10



Mixture of lerp cases, mainly late stage

are often first recognised. Furthermore this tree species originally existed in a complex heath and open woodland vegetation system which was highly species diverse. Remnant stands of flat-topped yate are often species poor. Our research has shown that during the initial stages of the outbreak, natural parasitism of *C. jerramungae* was negligible in remnant stands. However within the Fitzgerald National Park, parasitism was as high as 15%. Also in an intensive study area near Cranbrook, survival from egg to adult of the outbreaking psyllid fell from 36% to 0.05% when a flock of striated pardalotes invaded the area. This is an isolated case however, in general parasites and predators have little influence on psyllid populations in the peak of an outbreak. Parasites and predators usually keep an insect population in check within its normal maintenance levels. Populations dramatically fall after most of the preferred food resource is depleted, essentially causing starvation. Following such a decline the trees will reflush with new young leaves. Once these leaves mature the psyllid population will again rise. Thus *C. jerramungae* has now become a cyclic outbreaker, comparable to other outbreaking species in the eastern states. The population dynamics of this insect has now changed such that, even maintenance population levels are far higher than the original pre outbreak level.

The recurring outbreaks of *C. jerramungae* are thus a symptom rather than a cause of decline. The dramatic change in the population dynamics of this insect is one of many symptoms of a drastically altered environment. Agro-forestry schemes, the work of Landcare groups, schemes such as *Land for Wildlife* and recovery plans similar to that devised for Toolibin Lake, are steps being taken to halt the degradation of our environment. Flat-topped yate resistant to *C. jerramungae* has been found. These trees are rare but CALM is investigating the possibility of using seed from such trees to breed resistant stock. The research is in its infancy. But should we be successful, resistant trees could be used for revegetation and reclamation projects in salt affected areas.

Further information
"Lerps Bugs and Gum Leaves" LANDSCOPE, Spring 1992.
"Recovering Lake Toolibin" LANDSCOPE, Spring 1994.

Janet Farr is a Research Scientist, specialising in entomology, at CALM, Manjimup. She can be contacted on 08 9771 7985
All photos by J. Farr.