European earwig \( [\text{Forficula auricularia}] \) was first recorded in New South Wales in the 1930’s, and has now spread to all Australian states. In the Riverland it was first observed in the mid 1980’s attacking vineyards near Loxton. It has since become well established in a number of Riverland localities. In most vineyards, the European earwig is considered a minor pest and only occasionally requires control.

**DAMAGE**

In spring European earwigs feed in vineyards on new vegetative growth. When the populations are high they can consume whole buds at budburst, defoliate shoots and on rare occasions later in spring, feed on flowers and undeveloped fruit. The damage to leaves appears ragged with numerous small, irregular holes (Figure 1). However, any form of damage observed very rarely causes economic loss. In extreme cases they can contaminate machine harvested fruit, which may result in load rejection due to high levels of MOG (Material Other than Grapes). In new plantings European earwigs can also damage new growth, stunting the young vines.

**APPEARANCE AND HABITS**

Adult European earwigs range in size from 12-20 mm long. They have dark shiny brownish-black bodies with pale yellow legs, pincers and shoulders. Males have curved pincers which vary in size and are thicker at the base, while females have thin, straight and smaller pincers (Figure 2). Adults have small wings but do not fly. At all stages of growth they move around by crawling and running. Young European earwigs are similar in appearance to adults, but smaller, paler in colour and wingless.

European earwigs do not like very hot and dry conditions or cold periods. They are nocturnal, seeking shelter during the day and become active at night. European earwigs feed on many kinds of plant species. These include grapevines, ornamental flowers, and vegetables. They are also carnivorous and prey on a wide range of insects and mites.

Native species of earwigs look very similar to European earwigs. They generally have reddish brown foreparts and legs with a darker abdomen and pincers, but lack the black body. Native earwigs rarely cause damage to plants and mainly feed on leaf litter and other dead organic material.
**LIFE CYCLE AND BIOLOGY**
The European earwig has only one complete generation a year, as outlined below.

1. In autumn, pairs of adult European earwigs establish a nest 5 - 8 mm beneath ground level to overwinter.

2. In late winter and early spring, the female lays up to 50 white oval eggs, and then drives the male from the nest. Most of the males die shortly after leaving the nest.

3. The female will guard the eggs until they hatch two-three weeks later. She then continues to guard and feed the young hatchlings (nymphs). The nymphs will then progress through six instars (i.e. stages between moults) which all resemble small adults. Second instar nymphs become active at night after females open the nest, but they return to nests during the day.

4. Once the nymphs reach the end of the second instar, they do not return to their nests, and fend for themselves. In the Riverland this can occur as early as August, but commonly around budburst. These young earwigs are very vulnerable and may be consumed by adults.

5. Some of the females may lay eggs again in early summer, but all adult females will die before mid summer.

6. The time required for a European earwig to grow from a hatching to a mature adult is temperature dependent. At 25°C the development to adults takes nine to ten weeks, but at 15°C it takes up to 15 weeks.

7. In autumn, pairs of adult European earwigs from both hatchings prepare their overwintering sites.

**MONITORING**
Monitoring is the first process in determining whether a control option is required. It should occur before European earwigs move into the vine canopy (i.e. prior to budburst) and continue through to fruit set, after which time damage is rarely reported. If European earwigs were a problem in the previous season, more vigilant monitoring is required. Monitoring both the level of damage and population numbers is necessary, as there are no established thresholds for European earwig populations.

Earwigs are commonly found during the day sheltering beneath the bark of vines, inside cracks and holes of posts and strainers, and under debris on the vineyard floor. European earwig activity can also be observed at night with a torch. In late autumn and winter they can be found in burrows in the soil.

**CONTROL OPTIONS**
The control of European earwigs in vineyards should be carefully considered as control is not usually warranted. The damage they typically cause to grapevines has limited economic consequences and as MOG they rarely result in grape deliveries being rejected by the winery. In addition, they are often a potential useful predator of a number of soft bodied vineyard insect pests (e.g. light brown apple moth larvae, mealy-bugs and mites).

1. **Quarantine**
   Good vineyard hygiene practices help prevent the introduction of European earwigs. In most circumstances, they are introduced to vineyards by human activities. They commonly ‘hitchhike’ on machinery (e.g. trash on slashers) and other transportable vineyard materials (e.g. wooden pallets). Spreading of the pest by natural means is limited because earwigs cannot fly or crawl for long distances.
2. Biological
Birds are a major predator of European earwigs, but are not a reliable control option. They are difficult to contain and some species cause major damage to grape berries. Poultry can provide some control, but the cost to construct fencing must be considered.

3. Cultural
Vineyard floors free of shelter and food sources can significantly decrease European earwig numbers. Traditional vineyard management techniques often manipulate the vineyard floor surroundings, destroying earwig habitats. Cultivation can expose and kill some adults, nymphs, and many eggs. It also helps eliminate their food supply and shelter sites. However, frequent cultivation should be avoided because it can have a negative impact on soil health and increase the risk of soil erosion. Mechanical sweeping beneath the vine row can also help maintain a clean vineyard floor.

4. Baiting
The Australian Pesticides and Veterinary Medicines Authority have approved the use of some soil applied baits containing chlorpyrifos, in South Australian vineyards. It is the only approved chemical control for European earwig. The bait should be applied with a fertiliser spreader once, in late winter or early spring (August to October) before the movement of European earwigs into the vine canopy. Gloves should be worn when preparing and applying the bait. For further information please contact CCW viticulturalists. (Note: The current APVMA permit expires on 30th September 2009).

IMPORTANT
• Growers should ensure they follow both the registered product label instructions and Constellation Wines Australia’s (CWAU) spray diary requirements at all times. Occasionally there are important differences that growers will need to clarify through CCW viticultural staff.
• Failure to comply with both the label instructions and CWAU spray diary requirements may constitute a breach of HACCP requirements.

If you have trouble controlling European earwigs, please seek advice from the CCW Viticulturalists.

FURTHER INFORMATION

ACKNOWLEDGEMENTS
Fruit Doctors Pty Ltd., for help in editing this Fact Sheet.

DISCLAIMER
The information supplied in the Fact Sheet was the best available at the time of publication. However, the understanding and control of pests and diseases is constantly evolving and recommendations regularly change. The reader should seek a professional opinion before acting upon information in this Fact Sheet and should always comply with the winery’s requirements and recommendations, food safety legislation and the information on chemical product labels.

All rights reserved. No part of this publication can be reproduced or copied without the written consent of CCW Co-operative Limited.

Published by CCW Co-operative Limited
Box 238, Berri, South Australia 5343
Telephone (08) 8582 0300 Facsimile (08) 8583 2104
For further information contact Mr Peter Burne, Senior Viticulturalist