European Earwig

Forficula auricularia

Citrus SA

Prepared by Dr Paul Horne, IPM Technologies Pty Ltd, and James Altmann, Biological Services.

Description

Like all earwigs, European earwigs have a pair of forceps ("pincers") at the tip of their abdomen. Males and females have different shaped forceps, with those of the males being thicker and more robust looking than those of the females (see figures 1 and 2). The adults typically grow to between 11-15mm long.

Adults, (as pictured), have flight wings (the hind wings) folded up under short forewings (elytra) on their backs. Juveniles are similar in appearance but paler, smaller, and do not have flight wings.

Can be confused with Common Brown Earwigs

The native Australian common brown earwig (Labidura truncata), (figure 3), is a predatory species that looks similar to European earwig, but they are usually larger and have an orange triangle on their backs. This species is predatory, does not form large aggregations, and lives on the soil surface.

European earwig is an introduced species first detected in Australia during the 1930s. It is now widespread throughout the country, arriving in the Riverland in the 1980s.

Biology

European earwigs are polyphagous, meaning they eat a wide range of food. They can be plant feeders, scavengers and predators. They are considered pests in many crops but have also been regarded by some as useful biological control agents of pests such as Light Brown Apple Moth, scales, aphids and mealybugs, including in citrus crops in Europe. European earwigs are active at night and in the cooler months of the year. They are likely to be inactive in the summer months of mainland Australia.

In late autumn to winter female European earwigs lay one or two batches of up to 80 eggs in a chamber they construct in the soil. They are one of few insects to exhibit parental care. The adult female stays with the eggs until they have hatched and reached the second instar (nymphal stage) to protect them from predators, including male European earwigs.

Hatching in the Riverland occurs around early June onward, and juveniles become active above ground at night. First and early second instars return to the nest during the day, but late second instars onwards live above the soil in secluded sites away from direct light. Later instars and adults generally transition to tree canopies during spring, spending most of their time above ground where sheltered sites are available, including areas such as bark crevices, fruit clusters, curled leaves, under cover on the ground surface, and inside tree guards. European earwigs will typically live for about a year and have 5 nymphal stages (instars) and the adult (there is no pupal stage).

Figure 1: A male European earwig.
Figure 2: Female European earwigs.
Figure 3: Predatory Common Brown Earwigs. Female (left) and male (right).

European Earwig

Forficula auricularia

Citrus SA

Prepared by Dr Paul Horne, IPM Technologies Pty Ltd, and James Altmann, Biological Services.

Description

Like all earwigs, European earwigs have a pair of forceps ("pincers") at the tip of their abdomen. Males and females have different shaped forceps, with those of the males being thicker and more robust looking than those of the females (see figures 1 and 2). The adults typically grow to between 11-15mm long.

Adults, (as pictured), have flight wings (the hind wings) folded up under short forewings (elytra) on their backs. Juveniles are similar in appearance but paler, smaller, and do not have flight wings.

Can be confused with Common Brown Earwigs

The native Australian common brown earwig (Labidura truncata), (figure 3), is a predatory species that looks similar to European earwig, but they are usually larger and have an orange triangle on their backs. This species is predatory, does not form large aggregations, and lives on the soil surface.

European earwig is an introduced species first detected in Australia during the 1930s. It is now widespread throughout the country, arriving in the Riverland in the 1980s.

Biology

European earwigs are polyphagous, meaning they eat a wide range of food. They can be plant feeders, scavengers and predators. They are considered pests in many crops but have also been regarded by some as useful biological control agents of pests such as Light Brown Apple Moth, scales, aphids and mealybugs, including in citrus crops in Europe. European earwigs are active at night and in the cooler months of the year. They are likely to be inactive in the summer months of mainland Australia.

In late autumn to winter female European earwigs lay one or two batches of up to 80 eggs in a chamber they construct in the soil. They are one of few insects to exhibit parental care. The adult female stays with the eggs until they have hatched and reached the second instar (nymphal stage) to protect them from predators, including male European earwigs.

Hatching in the Riverland occurs around early June onward, and juveniles become active above ground at night. First and early second instars return to the nest during the day, but late second instars onwards live above the soil in secluded sites away from direct light. Later instars and adults generally transition to tree canopies during spring, spending most of their time above ground where sheltered sites are available, including areas such as bark crevices, fruit clusters, curled leaves, under cover on the ground surface, and inside tree guards. European earwigs will typically live for about a year and have 5 nymphal stages (instars) and the adult (there is no pupal stage).

Figure 1: A male European earwig.
Figure 2: Female European earwigs.
Figure 3: Predatory Common Brown Earwigs. Female (left) and male (right).

Damage specific to Citrus

Newly planted orchards

Earwigs can cause significant retardation of growth in new trees. Replant areas might harbour earwigs that caused no discernible damage to previous mature trees. Resident populations may then concentrate on the smaller trees of the new plantings.

Trunk guards utilised for protection from herbicides, sunburn control, and to reduce suckering, become ideal protected sheltering sites for earwigs. High numbers of juveniles hatching in early winter can harbour in the trunk guards moving up the trunks at night to feed.

Citrus buds start to swell and grow from mid July. Feeding by earwigs on slowly emerging bud growth can completely eliminate new foliage from July through to November. Affected trees may exhibit no new spring flush at all. This can be individual trees, or entire plantings depending on the infestation. The mature leaves on these trees from the previous year's growth is usually dark green as the nutrients are concentrated in the old foliage due to no new growth being present. Affected trees usually flush in the middle of summer/autumn when earwigs become inactive.

Figure 4: Trunk guard on young tree.
Figure 5: Lifting the guard exposes earwig congregations.
Figure 6: Affected tree in October, no spring growth .
Figure 7: Normal growth in October on adjacent tree.




Damage

Earwigs are nocturnal omnivores foraging mostly in the first half of the night after which they return to their hiding places.

They produce an aggregation pheromone and can develop into high numbers, forming large groups in tight spaces away from direct sunlight. European earwigs can be major pests in broad acre cropping systems in Australia during crop establishment as they attack germinating seedlings.

Feeding in fruit trees causes damage to new buds and young growth early in the season. Feeding can also occur on flowers and soft young developing fruits. Whilst the fruit is not destroyed the scarring continues to expand as the fruit grows. As fruits harden, they are no longer susceptible and mature foliage is rarely attacked.

Mature Trees

Damage in mature trees is not as common but can be significant. Feeding on buds occurs at the same time of the season (mid July onwards). Damage to buds appears similar to frost burn. Buds become swollen, whiteish brown at the base from chewing and there is no new growth.

Continued next page



Figure 8: Swollen, scarred buds from earwig feeding (October)
Figure 9: No new flush in spring (October) from earwigs feeding on buds
Figure 10: Trees with normal flush & developing fruits (October)

Mature Trees (cont)

Soft immature leaves that do grow, show scalloped feeding symptoms on leaf edges, sometimes only leaving the main centre leaf vein.

Severe infestation leads to no new spring growth, and therefore no flowering or crop development for that season on whole trees. Flowers can also be damaged, and young fruits can be scarred on the bases and sides leading to damage similar to, but not as deep, as Katydid feeding. These scars grow as the fruit expands.

Trees with heavy bud damage in July/August reflush and often flower during December to March causing significant problems with alternate bearing and out of season crops. Leaves from this flush are often more rounded at the tips compared to "dog-eared" spring growth.

At harvest badly affected trees are obvious as they are devoid of mature fruit. These trees either have no fruit, or a large crop of out of season 'second croppers'.

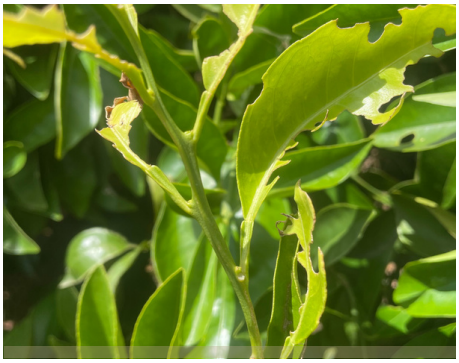

Figure 11: Typical earwig feeding damage symptoms on new growth.
Figure 12: Scalloping of leaf edges from earwig feeding.

Figure 13: Scarring at base of fruit from feeding on stigma/style.
Figure 14: Scarring on side of new fruit.
Figure 15: Scarring from earwigs at harvest

Figure 16: Summer flush & flowering (December) after heavy earwig damage in July to September
Figure 17: Second cropping fruit (March)

Figure 18: Whole tree damage (centre), partial damage (right), normal crop (left) in June.

Figure 19: Second croppers in June.
Figure 20: Normal crop on unaffected tree (June)

Monitoring

The most important factor in earwig management is monitoring or trapping for activity.

Active stages are nocturnal, and this makes it more difficult to recognise an earwig problem. If earwigs are suspected in young trees, lift and shake trunk guards to expose any harbouring pests. This should be conducted weekly from June onwards. Trunk guards should not be buried into the soil at the bases. This will encourage earwigs, ants, and possibly termites. Pests that bring soil into the guard and up the trunk can cause disease issues such as Phytophthora.

Earwig populations are favoured by high levels of organic mulch, and windbreaks such as Sudax or Bana grass. Adjacent older plantings can also be sources of high earwig populations including neighbouring orchards/vineyards. Damage can often commence on boundaries close to infested areas, and then spread slowly through the orchard.

Monitoring in mature trees should occur where damage occurred in previous seasons. Laying and pinning down of corrugated cardboard or carpet mats underneath trees in May creates a favourable site for earwigs to harbour. Rolled up corrugated cardboard placed into crowns of trees will also help trap pests in the canopy. Mats and traps should be checked weekly from June onwards to detect the start of earwig activity. Leaf litter underneath the tree or lodged in crowns should also be checked. Beating sheets can be placed underneath the canopy, and branches shaken to dislodge earwigs in the canopy.

Control

Frosts and hot/dry summers do not favour earwig development. Cultural controls such as lowering organic matter levels on the soil surface, cultivation, and skirting allows more light on the ground which helps reduce numbers. Cultivation can also destroy egg clusters if timed around early June. In young trees the removal of trunk guards is often enough to dissipate the earwigs. However, where pest numbers are high, baiting inside the tree guards, or after guard removal at the tree base is recommended. Regular control over several seasons can be required where high numbers develop.

Some entomopathogenic nematodes and fungi can attack earwigs. Birds (including poultry), reptiles, frogs and predatory ground beetles will feed on them.

In broadacre cropping European earwigs can be controlled using seed dressings, baits, or insecticide sprays. Chlorpyrifos labels have recipes for baits, and a new formulated bait (Transcend®) incorporating Metaldehyde (for snails) and Fipronil is now available.

In tree crops European earwigs can be controlled by trapping and treating aggregations or by foliar insecticide sprays. Residually toxic broad spectrum chemical sprays are disruptive to beneficial insects and mites present in the orchard. Only use these controls where absolutely necessary. Monitoring for secondary outbreaks of other pests such as scales and mites should occur in the following months. Growers will need to check registrations available for their own situation.

Whilst there is no threshold for earwig control, it is likely that damage similar to the previous season will occur if numbers are not lowered.

Therefore, detecting the first signs of activity helps to time any possible control actions.

Commissioned by:

Citrus SA

Citrus SA is an incorporated body that represents citrus growers in South Australia, funded by the Citrus Growers Fund. Citrus SA has formed close collaboration alliances with various stakeholders in South Australia including Summerfruit Australia, Riverland Wine, PIRSA, and the Horticulture Coalition of SA to address key issues important to South Australia.

Learn more at www.citrussa.com