

# AGRICULTURAL INSECT PESTS AND BENEFICIALS OF THE KIMBERLEY

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# AGRICULTURAL INSECT PESTS AND BENEFICIALS OF THE KIMBERLEY

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The north of Australia is largely undeveloped, but has the potential to become an important area of food production for our domestic and export markets.

With a re-awakening of our environmental responsibilities, farmers of today realise that long-term sustainability is the future for farming.

The Ord River Irrigation Area Land Conservation District Committee (ORIA LCDC) has recognised that local farmers are implementing a fundamental change to their management practices in an attempt to minimise their off-farm impacts. We would like to offer our support to this process with the publication of this field manual as a tool to make more informed decisions in the control of insect pests.

It is our intention to ensure that the information in this manual is current. We will ensure this by regularly updating the manual with information on new insect pests and beneficial insects as they become relevant.

*Dick Pasfield*  
*Chairperson ORIA LCDC*

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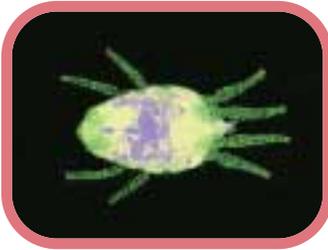
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## Russet/Passionvine mite (*Brevipalpus phoenicis*)

Sponsored by Amcor Fibre Packaging. **AMCOR** FIBRE PACKAGING  
AUSTRALASIA



◀ *Adult. Length 0.08 mm.*  
Photo: Crop Knowledge  
Master Hawaii.

*Banana on right with russet  
mite damage.*  
Photo: Angus Williams AGWEST.



### **COMMON HOSTS**

Bananas.

### **POTENTIAL HOSTS**

Papaya, passion fruit and citrus.

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## **STATUS**

More frequent during drier warmer conditions (either end of the dry season).

## **IDENTIFICATION**

Individual russet mites are not easily visible with the naked eye, as they are less than 0.1 mm long. Best viewed using a 10x hand lens or dissecting microscope.

- Eggs are laid into crevices in the plant surface. Eggs are orange and laid singly. They are grouped which can allow these tiny eggs to be seen with the naked eye.
- Larvae or newly hatched mites have six legs. Nymphs have eight legs, and are essentially small adults.
- Adults have 8 legs. They are flat overall, and are wedge-shaped, being broader at the head with a slight taper to the back. Two pairs of legs are extended forwards and two pairs are extended behind. They have a slight reddish-orange tinge.

## **HABIT/HABITAT**

- Feeding intensifies in higher humidity.
- All stages of mite cause damage through feeding.

## **LIFE CYCLE**

After hatching the mites pass through three stages before becoming adults. From egg to adult usually takes 20 to 30 days. Female russet mites generally reproduce without mating (parthenogenesis).

## **DAMAGE**

Feeding by mites causes the surrounding plant cells to collapse. In time the cells darken. The feeding from heavy infestations causes brown markings with a pitted appearance on the fruit's surface.

In banana plantations russet mites tend to attack perimeter plants. This is associated with dust from roadsides.

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## Spur-throated locust (*Austracris guttulosa*)

Sponsored by WaterCorp.



▲  
*Spur-throat.*  
Photo: John Moulden AGWEST.

◀ *Adult. Length 70 mm.*  
Photo: John Moulden AGWEST.

### COMMON HOSTS

Bushland areas and most crops and mangoes.

### STATUS

An infrequent pest with the potential to cause major damage. Usually active during the wet season, extending into the early dry season.

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## IDENTIFICATION

- Adults are 50 to 60 mm long. They are tan coloured, with a central pale stripe running down the entire length of the back. When the grasshopper is viewed from the underside, there is a prominent spur between the first pair of legs. Their wings are mottled. **Note:** There are other grasshoppers with spur-throats, but these are solitary and are much larger or smaller than *Austracris guttulosa*.
- Nymphs emerge as pale green, wingless hoppers. As they grow older, a dark stripe forms along the centre of their back.
- Eggs are laid in the soil and are 5 to 6 mm long.

## HABIT/HABITAT

- Adult females lay eggs into the ground in pods of about 130-150, and plug the hole at the surface. Females can lay several of these pods.
- Nymph hoppers pass through 6 to 8 moults (or instars). Wing development occurs with each moult.
- Nymphs rarely feed in bands.

## LIFE CYCLE

- One generation each year.
- Adult locusts are long-lived (10 to 12 months).
- Complete development, egg to adult, takes 10 to 13 weeks (temperature dependent).

## DAMAGE

Feeding can be quite destructive causing severe damage to leaves, stems and fruiting bodies. Both adults and nymphs cause damage.



## Yellow winged locust (*Gastrimargus musicus*)

Sponsored by Rogers Machinery.



◀ Yellow hind-wings of adult. Length 50 mm  
Photo: John Moulden AGWEST.

Female adult. Length 50 mm.  
Photo: John Moulden.



### COMMON HOSTS

Sugarcane, sorghum, maize, native grasses and pasture grasses.

### STATUS

An infrequent pest with the potential to cause major damage. Usually active during the wet season, extending into the early dry season.

---

## **IDENTIFICATION**

- Adults are a darkish brown grasshopper 40 to 50 mm long. Fore wings are mottled. The hind wing is mainly yellow and quite noticeable when in flight.
- Juveniles emerge as dark brown, wingless hoppers and grow to 30 mm in length.
- Colour varies between the green solitary phase and the brown gregarious or swarming phase.

## **HABIT/HABITAT**

- Hopper bands (a feeding front) are formed when large numbers of juveniles aggregate.
- Males make a clicking sound in flight.
- Adult females make a tunnel, lay eggs into the ground in pods, and plug the hole at the surface.

## **LIFE CYCLE**

Life cycle can be complete in two months. The majority of eggs laid at the end of a wet season remain dormant through the dry season, and will hatch with the opening of the next wet season. There are usually three generations during the wet season, with swarms occurring with the later generations.

- Eggs to hatching, 1 to 3 weeks, up to 4 months.
- Hoppers, 5 instars (sizes) to adult, 4 to 5 weeks.
- Adults can lay eggs after 2 weeks and live for 4 to 6 weeks.

## **DAMAGE**

Feeding can be quite destructive causing severe damage to leaves, stems and fruiting bodies. Both adults and nymphs cause damage.

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## Maize/Corn aphid (*Rhopalosiphum maidis*)

Sponsored by Ord River District Cooperative.



▲ Wingless *R. maidis*. Length 2 mm.  
Photo: Natarsha Zilm AGWEST.

◀ *R. maidis* colony on sweetcorn. Length 2.4 mm.  
Photo: Angus Williams AGWEST.

### COMMON HOSTS

Narrow-leaved plants: maize, sweetcorn and sorghum.

### STATUS

Common. Numbers build up towards the end of the growing season.

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## **IDENTIFICATION**

Length ranges from 0.9 to 2.4 mm. Wingless forms have an elongated body, short antennae, and short siphunculi (the two stems at the back of the aphid), yellowish green to dark olive green. Similar colouration in the winged forms. No dark marking below the siphunculi.

## **HABIT/HABITAT**

Colonise the plant's whorl where they are protected from the wind and predators. In high densities they cover most areas of the plant, particularly around flowering parts and heads.

## **LIFE CYCLE**

Aphids have four nymphal stages. Development rate is inversely related to temperature, very rapid in high temperatures. They have an extremely short generation, taking 4 to 5 days for the completion of a life cycle.

## **DAMAGE**

*Hoplosiphum R. maidis* is a vector of many plant viruses. The only virus detected so far in the ORIA has been Johnson Grass Mosaic in sorghum.

## **SIGNIFICANCE**

- When harvesting sorghum, the header can be gummed up with honeydew.
- Reduce seed set by reducing pollen flow.
- Insecticides do not control virus transmission.

## **NATURAL ENEMIES**

Predatory control of the maize aphid from lacewings, hover flies and ladybirds, are very effective in sorghum crops prior to seed set.

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## Cotton/Melon aphid (*Aphis gossypii*)

Sponsored by Wesfarmers Landmark.



*Winged, wingless, aphid moults and parasitised aphids. Length 2 mm.*  
Photo: AGWEST.



*Aphis gossypii on melon leaf. Length 2 mm.*  
Photo: AGWEST.

### COMMON HOSTS

Cotton, cucurbits, beans, guava, citrus, eggplants, tomatoes, cocoa, capsicum, many other crops and ornamentals.

### IDENTIFICATION

- Can be winged (1.1 to 1.8 mm) or wingless (0.9 to 1.8 mm). All stages of nymphs to adults vary in colour, from a pale green to dusky/dark green. Often seen in colonies around the growing point of the plant, on flowers, stem or the underside of leaves. Within the vicinity of the colony will be white shrivelled skins or casts that remain on the plant after the aphid moults. Colonies on plants will be predominantly wingless.
- Winged females are blackish green.

---

### **HABIT/HABITAT**

- All *Aphis gossypii* are females that can reproduce without mating (parthenogenesis). All females are viviparous (have live young).
- Aphid populations build up over the dry season and peak before the wet season. Rain drastically reduces aphid populations and aphid flights.
- Winged aphids are produced when a colony on a plant becomes overcrowded, or for dispersal flights, usually before the end of a season.

### **LIFE CYCLE**

Aphids have four nymphal stages. Development rate increases rapidly in higher temperatures. Aphids have an extremely short generation, taking 4 to 5 days for the completion of a life cycle.

### **DAMAGE**

- High populations can cause leaf curling and stunting of new growth. High populations will also produce excess honeydew (sticky exudate from aphids) which can lead to sooty moulds, affecting lint or fruit quality.
- *Aphis gossypii* cause major damage with their ability to transmit viruses. Zucchini Yellow Mosaic Virus is one of many viruses that *A.gossypii* can carry.

### **SIGNIFICANCE**

- Big economic losses.
- Disease – high pesticide use potential and high potential to chemical resistance. *Aphis gossypii* is rapidly gaining pesticide resistance.
- Poor fruit quality caused by honeydew.

### **NATURAL ENEMIES**

There are some wasps which parasitise aphids. They cause the aphids to swell and become bronzy in colour, known as mummies. Ladybirds, lacewings and hoverflies are all predators of aphids.

---

## Green mirid (Creontiades dilutus)

Sponsored by Lefroy.



Lefroy Valley



*Nymph. Length 6 mm. Photo: Simon Eyres AGWEST.*



*Adult. Length 7 mm. Photo: Simon Eyres AGWEST.*

### **COMMON HOSTS**

Cotton, lucerne, sunflowers, beans and sorghum.

### **STATUS**

Can cause major damage. Early dry season pest.

---

## IDENTIFICATION

- Nymphs are 1 to 6 mm long and pale green. Their body is fattest in the middle, narrowing towards the head and abdomen.
- Adults are 7 mm long. They have a narrower abdomen hidden by translucent wings. Their green colour is not as vivid as the nymphs. The antennae of adults and nymphs are long and prominent.
- Eggs are laid singly. Only a small portion of the mirid egg is visible on the leaf, as the majority of the egg remains below the surface.

## HABIT/HABITAT

Mirids are hard to find as they are easily disturbed. Adults will fly off and nymphs will hide. If looking for green mirids, it is best to scout for them early in the cool of the day while they are less active.

## LIFE CYCLE (EGG TO ADULT 3 TO 4 WEEKS)

- Egg 7 to 10 days.
- Five nymphal stages (instars) 14 days.
- Adults – can live for 3 to 4 weeks.



## DAMAGE

Green mirids use their stylet mouthparts to feed on plant tissue, causing surrounding cells to die where they pierced the tissue. They like to feed around plant terminals, on the squares of cotton plants and young leaves, causing the affected areas to wilt or blacken. Tipped-out terminals in cotton causes the plants to branch off. A tipped-out crop has stagered maturation.

Because mirids are hard to detect, a lot of damage can occur before the problem is detected. The feeding pressure of the nymph is suspected to be four times higher than the adult.

Once broad-spectrum insecticides have been used in crops, mirids are usually less of a concern.

---

## Mango planthopper (Colgaroides acuminata)

Sponsored by Kimberley Primary Industries Association.

[www.kimberleyprimaryindustries.com.au](http://www.kimberleyprimaryindustries.com.au)



▲  
*Egg cluster and newly emerged nymphs.*  
*Egg 6 mm.*  
Photo: Angus Williams AGWEST.



*Adults. Length 10 mm.*  
Photo: Angus Williams AGWEST. ▶

### COMMON HOSTS

Mangoes, citrus, ornamentals.

### STATUS

Isolated outbreaks, with low to moderate damage.

---

## **IDENTIFICATION**

Whitish powder or sooty mould on leaves, stems, flowers or fruit.

- Eggs are laid in solid circular clusters of about 50 eggs, 6 mm in diameter on both sides of mature leaves in raised egg pods. The eggs are whitish and pointed and tend to lean towards the centre of the egg mass.
- The nymphs are 1 to 7 mm, pale green and have pointed triangular heads, with two white tufts projecting off the end of the abdomen. White skins are left behind after the nymphs moult.
- Adults are 13 mm long and have white wings folded tent-like over their body and have a triangular appearance.

All forms are likely to jump away when disturbed.

## **LIFE CYCLE**

- 1 to 2 months.
- 4 instars until adult.

## **DAMAGE**

- Nymphs and adults are sap suckers, favouring leaves, new shoots, flowers and fruit. Severe infestations can cause fruit to fall.
- Feeding planthoppers leave honeydew, often leading to the development of sooty mould and quality problems.

## **SIGNIFICANCE**

- Need to be in large numbers to cause economic damage.
-

## Pink wax scale (*Ceroplastes rubens*)

Sponsored by Freshchoice.



*Adults. Length 4 mm.*  
Photo: Angus Williams AGWEST.



*Sooty mould damage.*  
Photo: Angus Williams AGWEST.

### **COMMON HOSTS**

Citrus, abiu, longans, guava, sapodilla, star apple, avocado, Herbert river cherry and mangoes (Florida flavoured mangoes are considerably more affected by pink wax scale than Kensington Pride).

### **STATUS**

Common, minor importance.

---

## IDENTIFICATION

- The female adult is hidden underneath a violet to pink wax casing 4 to 5 mm long and 3 mm high, with four white stripes on its edge. It could be described as a flat-rimmed bowl inverted on the leaf surface with a dimple central to the top.
- Adult males are short lived and are rarely seen.
- Eggs are red and are concealed under the female's waxy casing.
- Juveniles are oval-shaped and are mobile. Additional instars are stationary, taking on female adult features.

## HABIT/HABITAT

- Pink wax scale is found on leaf midrib or veins, stem or fruit.
- Mature female lays eggs under the protection of the wax casing and then dies. The eggs hatch and crawlers emerge and disperse.
- Scale spreads by wind dispersal of crawlers.

## LIFE CYCLE

- Two generations each year.
- Higher leaf nitrogen improves scale fertility. Generally each female lays around 200 eggs.

## DAMAGE

In high numbers, pink wax scale produces a lot of honeydew. This leads to the development of sooty mould on leaves, stem and fruit, and the potential downgrading of the fruit.



## NATURAL ENEMIES

- The parasitic wasps, *Anicetus communis* and *Anicetus beneficus* are effective against pink wax scale. *Anicetus beneficus* has been released in Kununurra but may not have become established.
  - Exit holes, are sometimes seen in pink wax scale.
-

## Silverleaf whitefly (*Bemisia tabaci* Biotype-B)

Sponsored by Direct Produce Distributors



▲  
*Adults and mobile nymphs.*  
*Length of adults 1.5 mm.*  
*Photo: Chris Freebairn QDPI.*

◀ *Immobile nymph, final instar. Length 1 mm.*  
*Photo: Paul De Barro CSIRO entomology.*

### COMMON HOSTS

Has a wide host range: cassava, cotton, capsicums, eggplant, soybeans, beans, cucurbits, tomatoes, sweet potato, onions, lucerne, numerous weeds and ornamentals, plus many more.

### STATUS

Potentially a frequent and major pest. NOT FOUND YET IN ORIA, but has been detected in the eastern states and in Perth, confined to nurseries in most sightings.

---

## IDENTIFICATION

- Eggs are football-shaped and transparent. They are laid on the under side of the leaves.
- Nymphs are oval-shaped with prominent eye spots 0.5 to 1.5 mm. Only first instars are mobile. Instars two to four are immobile. The final instar nymphs are a non-feeding pupal stage. They have two distinctive red eyespots.
- Adults are 1.5 mm long with fine, white wings folded over the body in a tent like formation.

## HABIT/HABITAT

- The Cotton whitefly (*Bemisia tabaci* the native biotype) has been present throughout Australia and Kununurra for many years, and has not yet caused any problems.
- The cotton and silverleaf white fly are very similar and can only be distinguished by biochemical testing of the later instars.
- White flies readily disperse when disturbed. Generally adults prefer to fly over short distances from plant to plant, but they can spread easily from crop to crop by wind dispersal.

## LIFE CYCLE

- The complete cycle takes upward of 25 days.
- Adult females are able to lay 1 to 3 days after emerging from the pupal stage. Females lay between 100 to 300 eggs.
- Unfertilised eggs produce males and fertilised eggs produce females.

## DAMAGE

- Virus transmission. The only known virus in Australia so far is the Australian tomato leaf-curl virus, transmitted by both biotypes. It severely damages tomato crops.
- Excessive production of honeydew and sooty mould.
- Stunted plant growth through sucking pressure from feeding.

## SIGNIFICANCE

- Quickly develop resistance to pesticides.
  - Ongoing surveys are made for silverleaf whitefly. If you detect significant numbers of whiteflies in your crop, notify Agriculture Western Australia (08) 9166 4000 for someone to come and collect specimens for DNA testing.
-

## Mediterranean fruit fly (*Ceratitis capitata*) Queensland fruit fly (*Bactrocera tryoni*)

Sponsored by OMGA.

 Ord Mango Growers Association

FLIES



*Mediterranean fruit fly. Span 5 mm.*  
Photo: AGWEST.



*Queensland fruit fly. Span 7 mm.*  
Photo: Chris Freebairn QDPI.



*Fruit fly maggots in infected nectarine.*  
Length 7 mm. Photo: AGWEST.



*Tomato with fruit fly sting marks.*  
Photo: Richard Piper Scientific Advisory Services.

### COMMON HOSTS

Mangoes, citrus, papaya, stone fruit and guava.

### STATUS

Neither are established, both have high potential pest status.

### IDENTIFICATION (GENERAL TO ALL FRUIT FLIES)

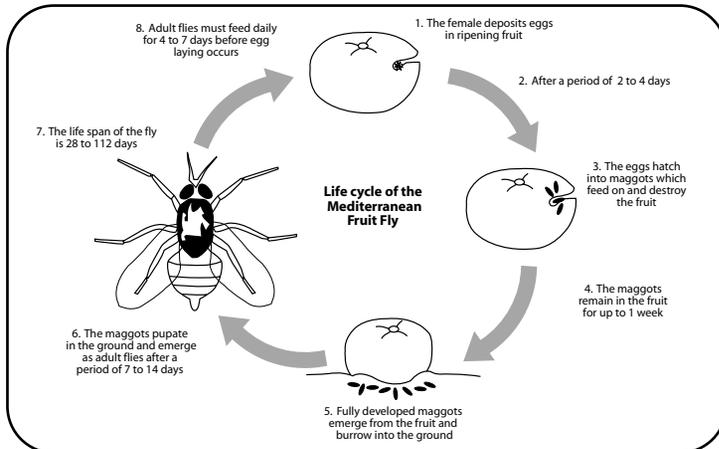
- Eggs are white, about 1 mm long, and banana shaped.
- Fruit flies are usually detected as larvae or maggots in infected fruit. The larvae are creamy white 1 to 8 mm long. They are pointed at one end, which usually has a black active mouthpart. Feeding larvae speed up the decomposition of infected fruit.
- Pupation takes place in the soil. Pupae are dark brown capsules about 5 mm long.
- When the adults emerge, they force their way through the soil. The body length of adult flies is 4 to 8 mm. Their bodies are usually brown or black with yellow markings.

---

## HABIT

Activity of the native fruit fly species increases with the filling and ripening of the host species, August to December. Also a critical time for orchard hygiene.

## LIFE CYCLE



*Modified diagram from AgWA farm note 1993: Control of Mediterranean fruit fly (Medfly) in backyards – Francis De Lima, Bill Woods and Sonya Broughton.*

## DAMAGE

Early fruit fly stings (ovipositing holes) are not easily noticeable. They are usually detected later, appearing as a single or series of bruises on the fruit. Up close, it is possible to see one small hole near the centre of the bruise. Inside the fruit will be the feeding and developing maggots. The fruit will continue to rot after the larvae have emerged and dropped to the ground to pupate.

## SIGNIFICANCE

The Mediterranean fruit fly is established through coastal Western Australia south of Broome. Queensland fruit fly occurs in Queensland and New South Wales. Outbreaks of these fruit flies would see the ORIA lose its area freedom status and they would inhibit the trade of fruit nationally and internationally.

## DETECTION - WHAT TO DO

If any maggots are found in fruit, contain and seal them in a plastic bag and notify Agriculture Western Australia (9166 4000). Do not bury the fruit or throw out with the garbage.

---

**26-spotted ladybird** (*Epilachna vigintisexpunctata*)  
**28-spotted ladybird** (*Epilachna vigintioctopunctata*)

Sponsored by South Pacific Seeds.



*26-spotted ladybird larva and adult. Length 6 mm. Photo: AGWEST.*



*26-spotted ladybird adult. Length 6 mm. Photo: Simon Eyres AGWEST.*

**COMMON HOSTS**

Cucurbits (prefer rock melon and honeydew), cotton and tomatoes.

**STATUS**

Occur frequently early in season, with moderate to high damage.

---

## **IDENTIFICATION**

- The 26-spotted and 28-spotted ladybirds are very similar to each other.
- Eggs are yellowish-green and football-shaped. They are laid in clusters or rafts on the underside of leaves and stems.
- Larvae are yellowish-green grubs covered with branch like spines and are about 6 mm in length. They are slow movers.
- Pupation takes place in the soil or on the leaf.
- Adults are yellowish-orange with 26 or 28 spots on their back, are about 6 mm long, oval-shaped, and have a hemispherical profile.

## **HABIT/HABITAT**

- Adults are effective fliers.
- Adults and larvae feed mainly on younger plants, hence they are generally an early season pest.
- It is common to find larvae and adults on the same plant.

## **LIFE CYCLE**

- Eggs take up to 1 week to hatch.
- Larvae feed for up to 3 weeks.
- Pupation takes up to 1 week.

## **DAMAGE**

- Larvae feed on the underside of the leaf and adults on the upper. Both larvae and adults graze on the leaf surface (which browns off) or chew completely through, giving a patchy skeletonised appearance.
- Feeding occurs in a circular pattern from the leaf perimeter.
- The skin of young fruit can be damaged.

## **SIGNIFICANCE**

The 26-spotted and 28-spotted ladybirds have the ability to transfer cucumber mosaic virus from one rockmelon plant to another. Transfer occurs via contaminated mouthparts as they feed from an infected plant and then move and feed on uninfected plants.

---

## Banana weevil borer (*Cosmopolites sordidus*)

Sponsored by Visyboard.



*Adult. Length 12 mm. Photo: Simon Eyres AGWEST.*



*Larva. Length 12 mm. Photo: Simon Eyres AGWEST.*

### COMMON HOSTS

Bananas.

### STATUS

Banana weevil borers are active all year round in all stages of development.

### IDENTIFICATION

- Egg – 2 mm long, oval/elongated and are pure white to pearly white. Usually concealed and hard to find.
- Larvae – 12 mm fully grown, c-shaped, legless, creamy white with small, brown head.
- Adult – 12 mm long, black, hard shelled, pronounced snout, dark grey when dried out.

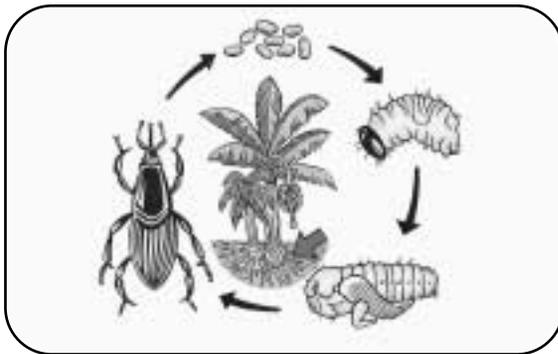
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## HABIT/HABITAT

The main spread of banana weevil borer is by planting infested material. Flight among adults is rare, so further spreading happens relatively slowly from crawling, wandering adults. Adults and larvae are active mainly at night, feeding or laying eggs. During the day, they hide in crevices and under rotting plant material.

## LIFE CYCLE

- In northern Australia, the complete life cycle (egg to adult) is estimated to be 30 to 50 days. Adults live for up to two years.
- Eggs are laid singly into cavities drilled by the adult female. Favourite sites for egg-laying are wounds or cracks from old leaf sheaths on the stem at the base of the banana plant.
- Eggs hatch after about eight days and the small grubs begin to feed on the corm. They tunnel deeper as they grow larger (four instars or moults) and will move back towards the outside of the corm as they approach maturity and pupation.



*Banana weevil borer life cycle. Diagram courtesy of Aventis.*

## DAMAGE

- The larvae and the adult feed on the corm of the banana plant, forming tunnels that can extend 300 mm up the stem. Boring allows secondary diseases to develop in the corm.
  - Severely infested plants have yellow leaves. Young suckers can look withered and can fail to develop. If there is a lot of tunnelling, the plants are weakened, and can fall over in windy conditions.
  - Good crop hygiene plays an important role in creating unfavourable conditions for the weevils to breed.
  - Fallen plants need to be cleaned up as they provide the perfect environment for the weevils to thrive.
  - Low levels of tunnelling in healthy plants do not affect the plants' production.
-

Northern pumpkin beetle (*Aulocophora palmerstoni*)  
Spotted pumpkin beetle (*Aulocophora hilaris*)

Sponsored by S&G.



Northern pumpkin beetle. Length 7 mm.  
Photo: Simon Eyres AGWEST.



Spotted pumpkin beetle. Length 6 mm.  
Photo: Simon Eyres AGWEST.



Pumpkin beetle damage. Photo: AGWEST.

**COMMON HOSTS**

Cucurbits (particularly rock melons) and lucerne.

**STATUS**

Frequent, major in early season. Less frequent and less significant in cooler weather.

---

## **IDENTIFICATION**

- Adults are 6 to 7 mm long. Northern pumpkin beetles are elongated, orange to yellow-orange beetles with dark eyes and long antennae. Spotted pumpkin beetles are similar but slightly smaller, with two black spots on each wing cover, forming two black bands across their back when resting.
- Larvae or grubs are creamy and grow up to 12 mm long. They are found feeding near the roots, or where the fruit touches the soil.
- Both pupate in the soil;
- Feed in clusters; and
- Are strong fliers.

## **HABIT/HABITAT**

The northern pumpkin beetle is more common than the spotted pumpkin beetle.

## **LIFE CYCLE**

- Clusters of eggs are laid in the soil or on dead leaves.
- Larvae one month.
- Adults are long-lived (many months).

## **DAMAGE**

- Adults: Chew on seedlings, leaves and flowers. Main damage is through destroying seedlings and fruit drop.
  - Larvae: Secondary damage from fruit rot.
  - Virus transmission: Squash mosaic virus.
-

## Redshouldered leaf beetle (*Monolepta australis*)

Sponsored by Vanderfields.



*Adult. Length 6 mm. Photo: AGWEST.*



*Skeletonised cotton leaves. Photo: Angus Williams AGWEST.*

### **COMMON HOSTS**

Wide host range including mango, cotton, sandal wood host plant (*sesbania*), citrus, cucurbits and maize.

### **STATUS**

Early to mid dry season. Common, causes major damage, usually in patches.

---

## **IDENTIFICATION**

Adults are 6 mm long. They are a mustard-yellow beetle with a cherry to blood-red band across the shoulder. There are two red spots halfway down the back.

Detection in the field is easiest in early morning or evening light, looking away from the sun. Plants appear scorched or skeletonised.

## **HABIT/HABITAT**

Adults are sometimes seen as individuals. When a solitary redshouldered leaf beetle locates a favourable plant, the beetle emits a pheromone attracting surrounding beetles, commonly into swarming numbers. Swarms tend to occur along the edges of a crop.

## **LIFE CYCLE**

Eggs are laid in the soil either in the crop or bushland, and hatch after 12 days. Larvae feed on plant roots for 1 to 3 months. Mature larvae are 12 mm long and are pale coloured. Pupation takes place in the soil and adults emerge.

## **DAMAGE**

Redshouldered leaf beetles feed voraciously, rapidly stripping leaves, flowers, silks or fruit. However they often will isolate one or two trees/plants and not affect adjacent trees/plants at all. To prevent damage, swarms need to be detected early and controlled quickly.

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## Citrus leafminer (*Phyllocnistis citrella*)

Sponsored by RTI.



*Adult. Length 4 mm.*  
Photo: Chris Freebairn QDPI.



*Larvae. Length 3 mm.*  
Photo: Chris Freebairn QDPI.



*Damage.* Photo: Chris Freebairn QDPI.

### COMMON HOSTS

Citrus.

### IDENTIFICATION

- Eggs are flat, more round than oval, are translucent, 0.3 mm long. Eggs are laid on the underside of leaves at the junction of the central and radial veins.
- Larvae feed just below the surface of the leaves. As they tunnel during feeding, they leave twisted, silvery tracks. Larvae are pale green and are up to 3 mm in length.
- Pupae (cocoon) are found curled on the leaf margin. They are yellowish brown and are 2.5 mm long.
- Adults with their wings folded back are 4 mm long, the body is only 2 mm long. They are rarely seen, as they are nocturnal.

---

### **HABIT/HABITAT**

- Found throughout most of Australia.
- Leafminers occur in young transplanted citrus and can reduce early tree development.
- Prevalent all year round but peak during flushes, targeting the new soft leaves.

### **LIFE CYCLE 14 TO 18 DAYS (EGG TO ADULT)**

- Eggs take 2 to 4 days before the larvae (grubs) emerge.
- Larvae feed for 6 to 7 days passing through 3 instars.
- Pupation takes 6 to 7 days.
- Adults survive for a week or longer.



### **DAMAGE**

- Feeding from the larvae causes the leaves to curl or distort. Fresher younger leaves are targeted.
- The citrus leafminer causes more damage to immature trees.
- Trees older than five years are less affected.

### **SURVIVAL**

There is a high amount of mortality of citrus leafminer eggs and larvae. Overcrowding, parasitism and predation all significantly contribute to mortality.

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## Cluster caterpillar (*Spodoptera litura*)

Sponsored by Ord River Cucurbit Growers Association. [www.ordrivermelons.com](http://www.ordrivermelons.com)



*Larvae newly emerged from egg mass.  
Grub length 2 mm. Photo: AGWEST.*



*Final instar larva. Length 35 mm.  
Photo: AGWEST.*



*Adult moth resting. Length 25 mm. Photo: AGWEST.*

### **COMMON HOSTS**

Broad-leaf crops/vegetables.

### **STATUS**

The cluster caterpillar is prolific throughout the year. Moderate to minor pest.

---

## **IDENTIFICATION**

- Eggs are white and usually found on the under-side of leaves. They are laid as a mass of 20 to 30 eggs, covered by a thin matting of fine, brownish hairs. The egg mass hatches uniformly.
- Newly emerged grubs (neonates) are gregarious feeders. They look very similar to heliothis neonates. The first instar heliothis and spodoptera both have dark heads, but the heliothis are a caramel brown, whereas the spodoptera have a greenish tinge. As the larvae grow and pass through more instars, they become more defined in appearance and tend to spread out and feed on their own. Spodoptera appear hairless, growing into plump, smooth grubs. Their colours are thick stripes of green, grey and cream. The last instars are much darker, developing large black triangles running along their back. Grubs grow to 30 to 40 mm long.
- Adults are 25 mm long and are dark grey/blackish, with white markings all over the fore wings. Hind wings are pale.

## **HABIT/HABITAT**

Outbreaks occur in areas within a crop – localised damage areas. Have a wide alternative host range other than agricultural and horticultural crops. They carry over through the wet season in high numbers.

## **LIFE CYCLE**

Life cycle takes about 30 days (from egg to adult).

## **DAMAGE**

Defoliate plants, destroy flowers, fruit and seed pods.

## **SIGNIFICANCE**

- Relatively soft and easily controlled.
  - Actively growing crops generally outgrow feeding damage. Spodoptera are more of a problem during flowering and seed set.
-

## Cotton bollworm/heliothis (*Helicoverpa armigera*) Native budworm/heliothis (*Helicoverpa punctigera*)

Sponsored by Lone Eagle.

Lone Eagle Aerial Spraying Kununurra



*Heliothis* on flower. Length 25 mm.  
Photo: Chris Freebairn QDPI.



*Heliothis* burrowing into cotton boll.  
Photo: Angus Williams AGWEST.



(left) *Helicoverpa armigera* with window on hind wing, (right) *Helicoverpa punctigera*.  
Length 25 mm.  
Photo: Angus Williams AGWEST.



*Heliothis* pupae. Length 20 to 25 mm.  
Photo: Angus Williams AGWEST.

### COMMON HOSTS

Cotton, beans, maize, chickpeas, sunflowers, tomatoes, cucurbits (particularly watermelon and rock melons), sorghum and sweetcorn.

### STATUS

Frequent throughout the growing season. Major pest.

---

## IDENTIFICATION

- Eggs are pearly white when freshly laid. Two day old eggs are brown. Eggs are dull black just prior to hatching. They are laid singly on the surface of leaves, stems, fruiting bodies, or flowers.
- Newly emerged grubs of *H. armigera* and *H. punctigera* (neonates) can not be differentiated. Both are creamy white. Heliothis in second and third instar (or moults) are caramel brown.
- *Heliothis armigera* and *H. punctigera* can be distinguished from each other from the second instar onwards. Only *H. armigera* has a darker fourth segment from the head, commonly known as a saddle. As the larvae grow and pass through more instars, they become more defined. Heliothis come in a large range of colours: pinkish, green, brown and grey, all with black dots at the base of most hairs. Fully grown grubs are 40 to 50mm long.
- Both species pupate in the soil. Pupae are dark brown and 20 mm long.
- Adult moths are 25 mm long and have light tan forewings with dark marking and spots all over. Male moths have a greenish tinge and female moths have a reddish/pinkish tinge. Both species have a large black patch on the hind wings. Only *H. armigera* has a small white window within this patch.

## HABIT/HABITAT

*H. punctigera* is considered to be migratory. It has a number of native host plants/trees outside the valley and will make flights to these areas during the wet season. *H. armigera* tend to remain within the valley over the wet season. Both are prominent in the valley during the dry season.

## LIFE CYCLE

Egg to adult moth 27 to 37 days.

Eggs to hatch two days.

Larvae 10 to 15 days.

Pupation 15 to 20 days.

## DAMAGE

Defoliate plants, destroy flowers, fruit and seed pods.

## SIGNIFICANCE

*Heliothis armigera* has high chemical resistance.

## NATURAL ENEMIES

There are several predators, parasites, diseases and bacteria that control both *Helicoverpa* species. Assassin bugs, lacewings and ladybirds are all predators of heliothis. *Trichogramma spp.* are highly effective parasites of *H. armigera* and *H. punctigera* eggs. Nuclear polyhedrosis virus (NPV) and *Bacillus thuringiensis* also affect the larvae of both species, although these pathogens are more effective when the larvae are smaller.

---

## Cucumber moth (*Diaphania indica*)

Sponsored by Yates Seed Co.



*Larvae feeding on rockmelon skin. Length 25 mm. Photo: Angus Williams AGWEST.*



*Adult. Length 25 mm. Photo: Angus Williams AGWEST.*

### COMMON HOSTS

Cucurbits: more common on rockmelons and honeydews.

### STATUS

Found commonly in early season. Numbers tend to decline in the cooler weather.

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## IDENTIFICATION

- Small round eggs are found on the underside of leaves.
- Newly emerged grubs are white with hairs. They eventually turn yellowish/green as they grow with two pale stripes running along the length of the back. Mature grubs are 25 mm long.
- Pupae are white, silk cocoons often wrapped in a leaf, or on the underside of the fruit.
- Adults are 25mm. They have a thick blackish band running along the perimeter of both fore and hind wings. The band is continuous across the body. The end of the abdomen has a prominent brush shape.



## HABIT/DAMAGE

Younger grubs have a preference for the fresher leaves and commonly feed on the second leaf back from the growing tip. Normally will be located on the underside of the leaf. Larger grubs move under developing fruit, chewing shallow and deep channels into the surface of the fruit. Grubs that feed solely on leaves are typically leaf rollers and sew together leaves with silk threads, forming a tunnel.

The larvae of the cucumber moth are hard to kill due to their feeding habit under the fruit and protection from leaf rolls.

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## Fruitpiercing moth (*Othreis materna*)

Sponsored by South Pacific Seeds.



Adult. Span 50 mm. Photo: AGWEST.



Larva. Length 60 mm. Photo: AGWEST.

### COMMON HOSTS

Mango, carambola, banana, pawpaw, rock melons and honeydew.

### STATUS

Frequent early season pest, with moderate to major damage.

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## IDENTIFICATION

- Adults are large moths (50 mm long), with creamy to grey forewings and prominent orange hind wings highlighted with a dark central spot and edge markings.
- Larvae can be extremely large 50 to 60 mm. They are dark brown or black with four large spots on their back and are hairless.
- Pupation takes place hidden within wrapped up leaves.

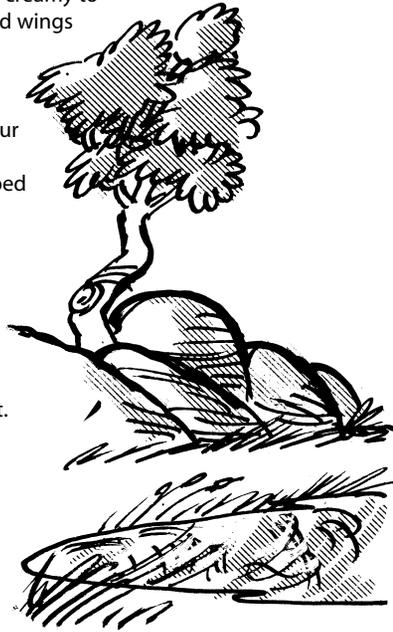
## LIFE CYCLE

Larvae to adult cycle is 5 to 6 weeks.

## HABIT/DAMAGE

Larvae feed on native vines (like snake vine). Moths generally migrate to orchards at night. They feed by a long proboscis or tubular mouthpart that drills into the fruit, to extract pulp.

Feeding causes fruit softening and possible fruit drop. Symptoms are similar to that of fruit fly, a small entrance hole in the skin (less than 1 mm in diameter). However, the damage to the flesh is usually confined to a small area, whereas fruit flies cause a large area of flesh to go mushy.



## Northern armyworm (*Leucania separata*)

Sponsored by OIC.



*Raft of eggs.*

Photo: Stewart Learmonth AGWEST.



*Adult. Length 25 mm.*

Photo: Angus Williams AGWEST.



*Feeding larva. Length 40 mm.*

Photo: Stewart Learmonth AGWEST.

### **COMMON HOSTS**

Maize, sweet corn, sorghum, sugarcane and grasses.

### **STATUS**

Minor occurrence, major damage.

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## **IDENTIFICATION**

- Eggs are creamy white and are laid in long, continuous egg masses.
- Larvae have soft, smooth skin, normally green with a brown head. The body colouration darkens almost to black when in plague numbers.
- Pupation takes place in the soil. Pupae are dark brown and are 20 mm long, similar to heliothis.
- Adult moths are a similar size to heliothis, 25 mm in length. The fore wings are grey-brown, with no distinctive markings. The hind wings are pale with grey wing veins becoming darker towards the wing tip.

## **HABIT/HABITAT**

- Eggs are usually difficult to find in the field because moths often cement leaves together while laying their eggs.
- Larvae are nocturnal feeders. They can be seen feeding in the throat of sweet corn during the day if the throat is teased apart.
- Feeding on the tassels is not usually significant, as pollen production is unlikely to be limiting, unless the population feeding is huge.

## **LIFE CYCLE**

Three to four weeks.

## **DAMAGE**

Most feeding occurs when the crop is in its vegetative phase. Vegetative loss would need to be large for feeding activity to reduce yield, as the host species are fast growing and usually outgrow the feeding.

Tassels are often attacked and so are the silks. Heavy infestation on silks can reduce seed set and yield.

## **NATURAL ENEMIES**

*Apanteles ruficrus* was released in ORIA 1979. These tiny wasps parasitise the northern armyworm larvae. They are maintenance parasites, keeping pest numbers in check, but they tend to lag behind when there is an outbreak.

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## Giant termite/mastoes (*Mastotermes darwiniensis*)

Sponsored by Barnyard.



*Pseudergate. Length 12 mm.*  
Photo: Simon Eyres AGWEST.



*Soldier protecting entrance of damaged trunk.*  
*Length 12 mm.*  
Photo: Angus Williams AGWEST.



*Mango tree attacked by mastoes.*  
Photo: Angus Williams AGWEST.

### COMMON HOSTS

Mango, citrus, avocado, papaya, tree plantations and native trees.

### IDENTIFICATION

- Winged reproductives (alates) establish new colonies. They have two pairs of equal-sized wings that are twice the length of the body (25 to 30 mm).
- Soldiers (12 to 13 mm) have large orange heads with mandibles.
- Pseudergates (7 to 12 mm) usually remain as the worker form. Depending on the status of the colony they can moult into reproductive alates, supplementary queens or soldiers.

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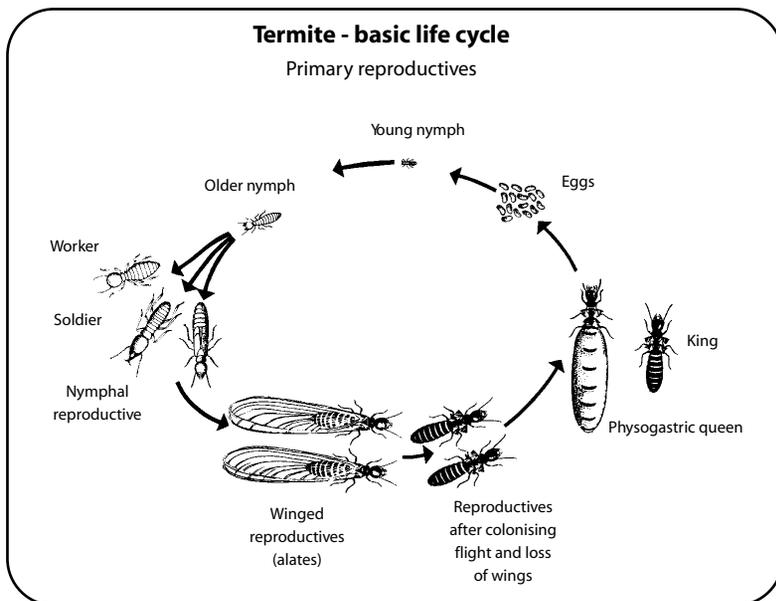
## HABITAT

- Subterranean, build nests in tree trunks or stumps.
- Colonies can consist of more than 100,000 individuals.
- Feeding sites can be over 100 metres from the nest.
- Colonies can branch off when food is abundant

## HABIT

- Activity increases during the wet season
- Flights of reproductives (alates) occur when humidity and temperature are similar to that underground in the nest. Flights occur in December/January before or after storms.
- Giant northern termites are less likely to infest in black soil. Most damage occurs on sandy or levee soils.
- Individual pseudergate termites can live for up to two years.

## LIFE CYCLE



## DAMAGE

- Tunnelling in roots, trunks, and branches often weakens trees that later fall over in high winds, or just kill the tree outright.
  - Presence is evidenced by dying branches or surface galleries, which look like tubes of mud on the tree trunk or limbs.
-

## Green lacewing (Family: Chrysopidae)

Sponsored by RUM Organic Fertilisers.



*Cluster of eggs. Length 10 mm.*  
Photo: AGWEST.



*Larva with debris stacked on back. Length 8 mm.*  
Photo: Mali Malipatil Agriculture Victoria.



*Adult. Length 12 mm.* Photo: Mali Malipatil Agriculture Victoria.

### COMMON HOSTS

A broad range predator. One of the most common lacewings found in Australia.

### STATUS

Common. Occurs naturally in most crops or can be released.

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## **IDENTIFICATION**

- Eggs are white, oval-shaped and are attached to the surface of plant leaves or stem by long, slender stalks (10 mm long). They are laid in groups or singly.
- Larvae (up to 8 mm) are flattish and long, predominantly black. They have large hooked jaws to catch their prey. Larvae camouflage themselves by putting the remains of devoured prey on their back.
- Pupae or cocoons are also camouflaged.
- Adults (12 mm) are green, have large, iridescent, red, beady eyes with two pairs of clear wings, folded into a tent shape over the abdomen.

## **HABIT/HABITAT**

- Larvae predate on many pest insects including aphids, thrips, scales, mealybugs, mites, whiteflies, moth and butterfly eggs, and small caterpillars.
- Adults feed on nectar and pollen.
- Activity reduces in cooler weather.

## **LIFE CYCLE**

- Eggs take about 4 days to hatch.
  - Larvae moult three times (up to 2 weeks) before pupation.
  - Pupation takes about 1 week.
  - Adults live for 3 to 4 weeks.
-

## Hover flies (Family: Syrphidae)

Sponsored by CALM.



DEPARTMENT OF CONSERVATION  
AND LAND MANAGEMENT



*Larva feeding on Aphis gossypii. Length 10 mm. Photo: Simon Eyres AGWEST.*



*Adult. Length 7 mm. Photo: AGWEST.*

### COMMON HOST

Hover flies are predators of aphids. Occurrence reflects the population status of aphids. Commonly seen among large aphid colonies mid to late dry season.

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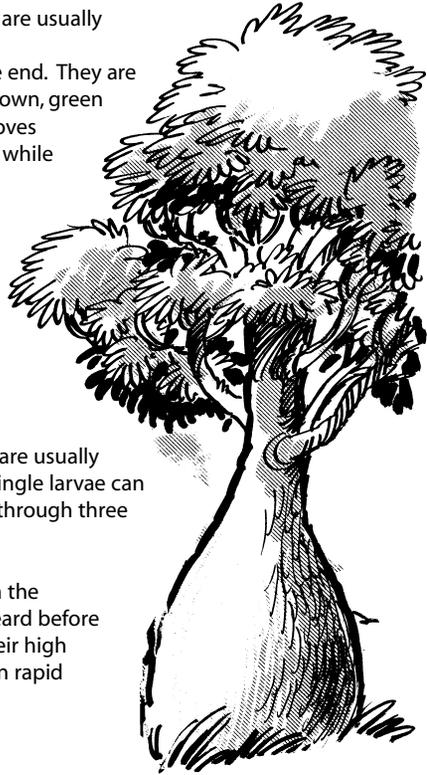
### IDENTIFICATION

- Eggs are white and oval-shaped. They are usually located near aphid colonies.
- Larvae are maggot-like, tapered at one end. They are 5 to 10 mm long and vary in colour: brown, green or pale cream coloured. Their head moves around tapping the surface of the leaf while locating aphids.
- Adults (7 mm long) have black and yellow striped abdomens. Adults are mimics of bees and wasps, and so are often miss-identified. Hover flies have only one pair of wings, whereas bees and wasps have two pairs.

### HABIT/HABITAT

Larvae feed voraciously on aphids. They are usually found in the vicinity of aphid colonies. Single larvae can devour hundreds of aphids as they pass through three instars or moults.

Adults feed on pollen or nectar, and from the honeydew of aphids. Adults are often heard before being seen in the field, identifiable by their high pitched hum. They characteristically fly in rapid sideways movements while hovering. They are inquisitive insects.



## Mealybug ladybird (*Cryptolaemus montrouzieri*)

Sponsored by Oria Orchards.



Larva and adult feeding. Length 5 mm. Photo: Chris Freebairn QDPI.



Larva and smaller mealybugs. Length 10 mm. Photo: Chris Freebairn QDPI.

### COMMON HOSTS

Mealybugs found on citrus, custard apples, jack fruit and tamarind trees.

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## **STATUS**

Native. Widely used in biological control worldwide.  
Introduced to ORIA by Di Robinson (AGWEST).

## **IDENTIFICATION**

- Larvae are elongated up to 12 to 13 mm in length. They have rows of long, soft, white filaments all over the body, which has a ragged appearance. Their legs are hidden. Can be mistaken for mealybugs. Distinguishing features: mealy bugs have shorter filaments only on the perimeter of the body and only reach sizes of 4 mm in length.
- Adults are 4 to 5 mm long, oval-shaped, with dark brown/black body and orange head and tail.

## **HABIT/HABITAT**

- Mealybug ladybirds predate preferably on mealybugs, and to a lesser degree, scale insects and aphids. Both adults and larvae predate. A single larva can consume up to 250 small mealybugs.
- Their populations will fluctuate with mealybug numbers. In Kununurra, high populations of larvae have been discovered periodically under the bark around the base of tamarind trees.
- Females lay eggs on masses of mealy bugs.
- Adult mealybug ladybirds are strong fliers and easily disperse.

## **LIFE CYCLE**

- Eggs take 5 to 6 days to hatch.
  - Four larval stages takes 12 to 17 days to pupation.
  - Pupation takes 7 to 10 days.
  - After five days, female adults are mature and can lay eggs (400-500).
  - Adults live for up to 50 days.
-

## Transverse ladybird (*Coccinella transversalis*)

Sponsored by TerraFirma Fertilisers.



▲  
*Larvae. Length 6 mm.*  
Photo: Simon Eyres AGWEST.



◀  
*Adults seeking aphids. Length 5 mm.*  
Photo: Simon Eyres AGWEST.

### COMMON HOSTS

Larvae and adults predate voraciously on a broad range of insect pests. Common targets include aphids, mites and heliothis eggs and small larvae.

### STATUS

Common. Occurs naturally in most crops or can be released.

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## **IDENTIFICATION**

- Eggs are yellow, ovoid and tapered at each end. They are laid in clusters of about 10 eggs.
- Larvae are soft bodied and elongated and are up to 5 mm long. They are predominantly black with small blunt spines running in rows along the back and sides. Two lateral rows are orange.
- Adults are 5 mm long, hemispherical in profile, and orange with three black markings on each wing, with a black strip running down the back. There are several other species of ladybirds that appear similar to the transverse ladybird.
- Not to be confused with the 28-spotted ladybird (see beetles section).

## **HABIT/HABITAT**

Eggs are normally deposited near their prey. All stages can be found around aphid colonies.

## **LIFE CYCLE**

- Eggs take up to 1 week to hatch.
- Larvae feed for 3 to 4 weeks going through 4 larval instars.
- Pupation takes up to 1 week.
- Adults live for several months.

## **SIGNIFICANCE**

Crop damage can occur before the ladybirds have an impact on an aphid population. Ladybirds are more effective predators when the pest densities are high.

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## Trichogramma spp. (Parasitic wasps)

Sponsored by Guano Australia Pty Ltd.



Female stinging moth egg. Size of adults is 0.5 mm. Photo: Chris Freebairn QDPI.

### COMMON HOSTS

Egg parasites of Lepidoptera (moths and butterflies), most importantly the native budworm (*Helicoverpa punctigera*) and cotton bollworm (*Helicoverpa armigera*).

### STATUS

*Trichogramma pretiosum* is the predominant species in Kununurra. It was imported from California USA in 1974. Two native species were detected prior to the release, and are believed to still exist. These species are *Trichogramma australicum* and *Trichogrammatoidea flava*.

### IDENTIFICATION

- Parasitised eggs turn shiny black.
- Larva and pupa are never seen as they develop inside the egg.
- Adults are minute (0.5 mm long), and have characteristic red eyes and a yellowish body.

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### **HABIT/HABITAT**

Female trichogramma oviposit (insert) one or several eggs into the Lepidoptera host egg. The trichogramma eggs hatch and the larvae feed on the contents of the host egg until they pupate. One to six trichogramma can emerge from the parasitised host egg. Once emerged, they mate and the life cycle is complete.

### **LIFE CYCLE**

- From oviposition into host egg to emergence - 10 days.
- Adults live for up to 5 days.

### **SIGNIFICANCE**

- Trichogramma are common in all crops where lepidopteran host eggs are found, except for chickpeas.
- Integrated Pest Management (IMP) strategies are very important, as trichogramma species are highly susceptible to insecticides.

