

Soldier fly

Sugarcane soldier fly

Inopus rubriceps

Yellow soldier fly

Inopus flavus

Distribution

Soldier flies are native insects that naturally inhabit grasslands and can cause severe damage to sugarcane crops. There are two main species of soldier fly that attack sugarcane. Sugarcane soldier fly occurs over a wide area from Innisfail in Queensland to Harwood in New South Wales. Yellow soldier fly has a more limited distribution, mainly occurring around Proserpine, Mackay and Plane Creek.

Soldier flies may cause significant yield losses in localised areas, and over the past few years have been problematic in the Finch Hatton area near Mackay and in the Bundaberg region.

Soldier flies live in a wide range of soil types from red volcanics and heavy clays to sandy alluvials.

Damage

Soldier flies inflict damage through feeding by the larvae. Larvae suck juice from the roots of both newly germinated setts and established stools. Small larvae cut off fine root hairs. Larger larvae burrow their heads, leaving visible cavities. Root damage impairs the ability of the roots to supply water and nutrients to the plant. Larvae may also inject a toxin into the plant during feeding, but this has not been proven. Poor germination may result when many larvae are present at planting, but this does not happen often. The more common damage is seen after harvest – the larvae inhibit underground bud germination, resulting in poor ratooning. Ratooning may be poor even though root damage seems moderate.

The adult soldier fly does not cause crop damage.

Symptoms

- Affected stools have few shoots and growth is usually poor.
- Damaged cane blocks appear weak and gappy, but stools along the edge are often healthy.
- Roots may show asymmetric cone-shaped hollows.



Above: Adult sugarcane soldier fly, male (left) and female (right). Note the red head of the female.



Above: Freshly laid soldier fly eggs (left) and soldier fly larva with its tough yellowish skin and rows of black hairs (right).



Above: Poor ratooning caused by soldier fly.



Above: Soldier fly larvae infected with the fungal disease *Metarhizium*.

Description and monitoring

Soldier fly larvae are white to brown in colour and from 1 mm long at hatching to 12 mm long when fully grown. They have tough-skinned, segmented bodies that are fairly circular in cross section and the body tapers at both ends. Each body segment has a row of small black hairs. The pupa forms inside the old larval skin, so pupae look very much like larvae except for a slight difference in shape.

Larvae are present all year but are largest during summer, so search for evidence of them beneath ratoon stools from September onwards. Larvae concentrate along the cane rows and are usually found within 150 mm of the soil surface. Young larvae are difficult to see during winter. Old pupal cases near the soil surface indicate potential problem areas.

Adult female soldier flies have a body length of about 12 mm, tapering towards the rear. The sugarcane soldier fly female has a black body and orange-red head; whereas the yellow soldier fly female's body, head and legs are an orange-yellow colour.

The male soldier fly is smaller than the female, with prominent black eyes. The sugarcane soldier fly male has a dark-brown body and head, and the yellow soldier fly male has a black body with brown-black head and yellow legs.

Adult soldier flies may be seen in the leaf canopy or on weeds soon after hatching, usually from March to July, depending on the climate.

Biology

Soldier flies are native species with native grasses as their natural host. They readily feed on introduced grasses such as sugarcane, especially in a monoculture situation. Adult soldier flies emerge from March to July, later in the north and earlier in the cooler south. Each female emerges, mates, lays eggs, and dies within 1-2 days. Females are not strong fliers and tend to lay their eggs close to where they emerged.

Eggs are laid in clumps of up to 200, about 10 mm below the soil surface or between the soil and overlying dead plant matter. Eggs hatch within 1-3 weeks, depending on the temperature.

About 90% of larvae mature into flies in one year (Figure 1), and the remainder take 2 years. Larvae feed within 150 mm of the soil surface in the sugarcane rows. They pupate within 10 mm of the soil surface. The pupal stage lasts for about 3 weeks before the adult fly emerges.

Management

No insecticide is registered for use against soldier fly as none has proven effective in trials. However, predators (e.g. wireworms and ground beetles) and the fungal disease *Metarhizium* can significantly limit soldier fly populations.

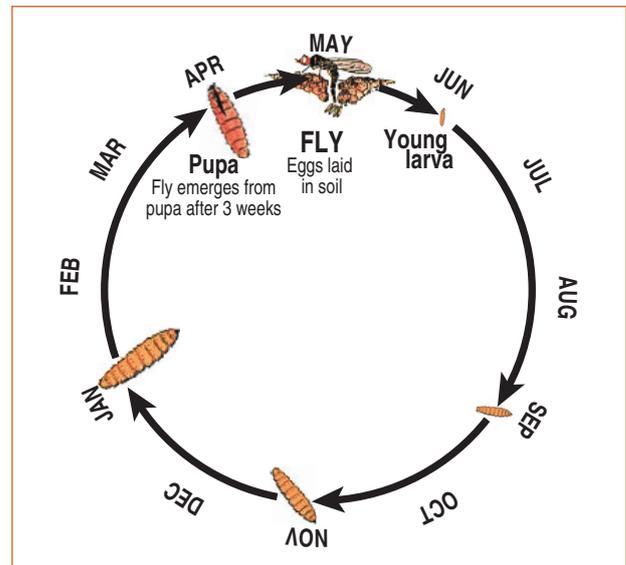


Figure 1: Sugarcane soldier fly life cycle (1-year variant).

In addition, management options can reduce numbers and their effect on the crop:

1. Take out affected blocks early in the harvest season.
This will lengthen the break from cane, and destroy the larval food while the new generation is still small and vulnerable.
2. Have a **grass-free** break from cane, e.g. a long herbicide fallow under trash after spray-out of the old ratoon, or a short fallow followed by a **non-grass** crop such as soybean.
Larvae will eventually starve as grasses are their natural food.
3. Plant the next cane crop after the flight period (i.e. after June).
Flies are less likely to lay eggs when there is no cane or grass during the flight period.
4. Plant sugarcane with minimum tillage following the herbicide fallow. Keep cultivation for the break-crop at minimal but adequate levels.
Extra cultivation does not effectively kill soldier fly and will harm natural enemies.
5. Grow varieties with strong root systems that ratoon quickly.
6. Harvest plant and early ratoon crops when conditions are good for ratooning.
Soldier flies will have less impact if ratoons come away quickly.

Do not:

- Plough-out and immediately re-plant infested blocks.
- Plant sugarcane early (in autumn) following an infested ratoon. Plant after the flight period (after June).