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GRAINS RESEARCH
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CORPORATION

SAFFLOWER

SECTION 7

INSECT CONTROL

APHIDS (PLUM, GREEN PEACH AND LEAF CURL) | CUTWORMS (AGROTIS SPP.) | HELICOVERPA SPP. | RUTHERGLEN BUG (NYSIUS VINITOR) | REDLEGGED EARTH MITES (HALOTYDEUS DESTRUCTOR) AND BLUE OAT MITE (PENTHALEUS MAJOR) | OTHER PESTS

Insect control

Safflower is most susceptible to damage by insects during establishment and between budding and harvest. Several insect pests have been recorded on safflower, and although some are widespread, others are confined to certain regions and climates. Some of the more common insect pests are described here, and growers can consult a range of crop-insect identification and management guides for other pests or more specific details. A list of insecticides registered for use in safflower at the time of printing is provided in Table 1. Note that insecticide legislation varies between states. Label directions should always be followed; contact your local agronomic adviser for more specific recommendations. Permits may also be available to use other products ([Australian Pesticides and Veterinary Medicines Authority](#)).¹

Table 1: Summary of insecticide active ingredients and their target pests for which one or more products are registered for use in safflower in at least one state of Australia.

	Aphids	Cutworms	Heliothis	Redlegged earth mite, blue oat mite	Rutherglen bugs	Thrips	Lucerne flea
<i>Bacillus thuringiensis</i>			✓				
Chlorpyrifos		✓		✓			
Deltamethrin		✓	✓		✓		
Dimethoate				✓			✓
Esfenvalerate			✓				
Maldison					✓		
Nuclear polyhedrosis virus (NPV)			✓				
Trichlorfon		✓			✓		

Note that the trade names provided are examples only and other products containing the same active constituents may be available

7.1 Aphids (plum, green peach and leaf curl)

Aphids are usually yellow, green or brown in colour, oval, up to 3 mm long and may have wings (Figure 1). They are an intermittent pest of safflower crops, most common during budding and flowering, but may also be present at any growth stage.

7.1.1 Damage caused by aphids

Aphids prefer to eat new shoots and the underside of leaves by sucking sap, causing a mottled appearance, distortion and the shrivelling of buds and capitula. High population levels can weaken plants, reducing yield, especially if crops are under moisture stress.²

¹ N Wachsmann, T Potter, R Byrne, S Knights (2010) Raising the bar with better safflower agronomy. Agronomic information and safflower case studies, <http://www.grdc.com.au/BetterSafflowerAgronomy>

² N Wachsmann, T Potter, R Byrne, S Knights (2010) Raising the bar with better safflower agronomy. Agronomic information and safflower case studies, <http://www.grdc.com.au/BetterSafflowerAgronomy>



Figure 1: *Green peach aphids.*

Photo: QDAF

7.1.2 Thresholds for control

Crops should be monitored regularly, especially during establishment and between budding and flowering. Control is warranted when 20% of plants have >20 aphids per shoot, bud or capitula. The presence of beneficial predatory insects such as ladybird beetles, lacewings, hover flies and parasitic wasps should also be monitored; these can often keep aphid populations in check. ³

7.1.3 Management/control

Various biological control options are available for use in safflower. ⁴

7.2 Cutworms (*Agrotis* spp.)

Cutworm larvae are hairless with dark heads and bodies, often with longitudinal lines and/or dark spots (Figure 2). Caterpillars grow up to 50 mm long and curl up when touched. The moths are dull brown or black in colour. Although cutworms are not common in early crop growth, crops should be monitored from establishment. Caterpillars reside in the soil during the day, so it is best to inspect crops late in the afternoon or at night for this pest when they come to the surface. ⁵



Figure 2: *Black cutworm (Agrotis ipsilon) larvae (left) and adult (right).*

Photo: QDAF

7.2.1 Varietal resistance or tolerance

No varietal resistance or tolerance is known for safflower.

³ N Wachsmann, T Potter, R Byrne, S Knights (2010) Raising the bar with better safflower agronomy. Agronomic information and safflower case studies, <http://www.grdc.com.au/BetterSafflowerAgronomy>
⁴ N Wachsmann, T Potter, R Byrne, S Knights (2010) Raising the bar with better safflower agronomy. Agronomic information and safflower case studies, <http://www.grdc.com.au/BetterSafflowerAgronomy>
⁵ N Wachsmann, T Potter, R Byrne, S Knights (2010) Raising the bar with better safflower agronomy. Agronomic information and safflower case studies, <http://www.grdc.com.au/BetterSafflowerAgronomy>

7.2.2 Damage caused by cutworms

Cutworms feed near ground level, eating leaves and, more damaging, chewing through stems so that plants fall over, allowing the upper leaves to be consumed at ground level. Plants often die, leaving bare patches in crops. ⁶

7.2.3 Thresholds for control

When first observed, cutworms may already be at high population levels in crops. Treatment is therefore recommended at the first sign of damage; this is most effective late in the afternoon or at night when cutworms move from the soil to plants to feed. ⁷

7.2.4 Management/control

Spraying with chlorpyrifos or deltamethrin is the most effective method of control, although biological control agents such as brown earwigs, caterpillar parasites and some spiders may be beneficial. ⁸

7.3 *Helicoverpa* spp.

Helicoverpa punctigera (native budworm) and *H. armigera* are major insect pests of all crops. Eggs are spherical and white at first, darkening as the larvae develop. Newly hatched larvae are generally light in colour with dark heads. Older larvae have large variations in colour including yellow, green, pink, reddish brown and almost black, often with a broad, yellowish white stripe along each side of the body and a dark-edged, whitish line down the middle of the back (Figure 3). *Helicoverpa* larvae of both species have four pairs of ventral prolegs at the rear of the body. Eggs are laid singly, usually on leaves and bracts surrounding the buds, the upper leaves or the stems below the buds. Fully grown native budworm larvae are ~40 mm long. ⁹

For more information, see *GrowNotes—Chickpeas*.

Weekly trap catch data for *H. punctigera* and *H. armigera* from locations across all states can now be [viewed online](https://jamesmaino.shinyapps.io/MothTrapVis/). The adjustable bar below the map allows selection of a time period (1 wk, 2 wks, 1 mth, etc). <https://jamesmaino.shinyapps.io/MothTrapVis/>

7.3.1 Varietal resistance or tolerance

No varietal resistance or tolerance is known for safflower.

7.3.2 Damage caused by *Helicoverpa*

Helicoverpa larvae (caterpillars) feed on leaves, but most damage is caused when they graze buds and flowers, preventing seedset. Heavy infestations between budding and seedfill can significantly reduce yield. ¹⁰

6 N Wachsmann, T Potter, R Byrne, S Knights (2010) Raising the bar with better safflower agronomy. Agronomic information and safflower case studies, <http://www.grdc.com.au/BetterSafflowerAgronomy>

7 N Wachsmann, T Potter, R Byrne, S Knights (2010) Raising the bar with better safflower agronomy. Agronomic information and safflower case studies, <http://www.grdc.com.au/BetterSafflowerAgronomy>

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Figure 3: *Helicoverpa armigera* larva and moth.

Photo: QDAF

7.3.3 Thresholds for control

Crops should be inspected regularly from budding and during flowering for moths, caterpillars and damage to buds or capitula. Damage to flower buds from 4–8 larvae of 5–7 mm length generally warrants control. However, well-grown crops may tolerate higher populations on buds and developing seed heads before treatment is necessary, provided adequate water is available in the soil profile.¹¹

7.3.4 Management/control

An integrated approach is most successful in controlling *Helicoverpa* populations in safflower. Control options considered should include insecticide-resistance management strategies and bio-insecticides such as *Bacillus thuringiensis* and Nuclear polyhedrosis virus, as well as conventional insecticides. Pupae busting of later summer crops to 10 cm depth may reduce the population of ‘over-wintering’ pupae.¹²

7.4 Rutherglen bug (*Nysius vinitor*)

Adults are 5 mm long and grey-brown in colour with clear, folded wings. Nymphs are reddish brown and pear-shaped (Figure 4). High population levels can substantially reduce the yield and quality of safflower crops. Infestations can be sporadic, with the pest moving in and out of crops. Infestations are most common during hot, dry weather, and where there are few other green crops growing. Activity is often greater towards evening.¹³

¹¹ N Wachsmann, T Potter, R Byrne, S Knights (2010). Raising the bar with better safflower agronomy. Agronomic information and safflower case studies, <http://www.grdc.com.au/BetterSafflowerAgronomy>

¹² N Wachsmann, T Potter, R Byrne, S Knights (2010). Raising the bar with better safflower agronomy. Agronomic information and safflower case studies, <http://www.grdc.com.au/BetterSafflowerAgronomy>

¹³ N Wachsmann, T Potter, R Byrne, S Knights (2010). Raising the bar with better safflower agronomy. Agronomic information and safflower case studies, <http://www.grdc.com.au/BetterSafflowerAgronomy>



Figure 4: *Rutherglen bugs feeding on a safflower flower.*

Photo: QDAF

7.4.1 Varietal resistance or tolerance

No varietal resistance or tolerance is known for safflower.

7.4.2 Damage caused by Rutherglen bug

Adult bugs feed on the upper stems, buds and developing capitula. Severely damaged buds and flower heads wilt and die or become grossly malformed. Adult bugs may also lay eggs in the developing seed heads, and feeding by large numbers of nymphs and adults from flowering onwards can reduce seed yields, especially where crops are deprived of moisture during seed growth. Damage may occur across whole crops or in patches.¹⁴

7.4.3 Thresholds for control

Because infestations of Rutherglen bugs tend to be sporadic, check a large number of sites within a paddock to determine extent and severity. The threshold for spraying is generally ~15 adults per plant, but well-growing crops may tolerate more, because healthy plants can renew up to 40% of buds if adequate water is present.¹⁵

7.4.4 Management/control

Rutherglen bugs can be controlled with products containing deltamethrin, but there is a continuous risk of re-infestation from crops or weedy areas. Timing is also critical due to the transient nature of infestations.¹⁶

7.5 Redlegged earth mites (*Halotydeus destructor*) and blue oat mite (*Penthaleus major*)

Adults are 1 mm long and black to purplish blue in colour with eight brightly coloured legs (Figure 5). Mites are an intermittent pest of most concern during establishment. They often hide under clods of soil or on the underside of leaves during hot weather.¹⁷

¹⁴ N Wachsmann, T Potter, R Byrne, S Knights (2010) Raising the bar with better safflower agronomy. Agronomic information and safflower case studies, <http://www.grdc.com.au/BetterSafflowerAgronomy>

¹⁵ N Wachsmann, T Potter, R Byrne, S Knights (2010) Raising the bar with better safflower agronomy. Agronomic information and safflower case studies, <http://www.grdc.com.au/BetterSafflowerAgronomy>

¹⁶ N Wachsmann, T Potter, R Byrne, S Knights (2010) Raising the bar with better safflower agronomy. Agronomic information and safflower case studies, <http://www.grdc.com.au/BetterSafflowerAgronomy>

¹⁷ N Wachsmann, T Potter, R Byrne, S Knights (2010) Raising the bar with better safflower agronomy. Agronomic information and safflower case studies, <http://www.grdc.com.au/BetterSafflowerAgronomy>



Figure 5: Redlegged earth mite (left) and blue oat mite (right, with distinguishing red area on back).

Photo: QDAF

7.5.1 Varietal resistance or tolerance

No varietal resistance or tolerance is known for safflower.

7.5.2 Damage caused by mites

Redlegged earth mites and blue oat mites have a rasping mouthpiece that damages leaves, allowing the mites to feed on plant fluids. Typically, this causes a silver discoloration, often referred to as windowing. Very high population levels can lead to the distortion of leaves and leaf tips, or whole seedlings may wither and die. Inspections for these mites are more effective in the cooler conditions of late afternoon or night.¹⁸

7.5.3 Thresholds for control

Mites are usually present in large numbers, especially in dry seasons. Spraying should occur when significant damage occurs to leaves during early growth. Crops tend to grow away from this pest after stem elongation.¹⁹

7.5.4 Management/control

Several insecticides are registered for use in safflower, and there are some biological control agents such as ladybird beetles. Some growers choose to spray a residual insecticide to bare soil between sowing and emergence to reduce problems during establishment. Border spraying to reduce the numbers of these pests moving into safflower paddocks is another option.²⁰

7.6 Other pests

Other pests known to infest safflower crops in Australia include thrips, lucerne flea, black field crickets, grasshoppers, locusts, wireworms, false wireworms, jassids (leafhoppers) and myrids.²¹

¹⁸ N Wachsmann, T Potter, R Byrne, S Knights (2010) Raising the bar with better safflower agronomy. Agronomic information and safflower case studies, <http://www.grdc.com.au/BetterSafflowerAgronomy>

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²¹ N Wachsmann, T Potter, R Byrne, S Knights (2010) Raising the bar with better safflower agronomy. Agronomic information and safflower case studies, <http://www.grdc.com.au/BetterSafflowerAgronomy>