Mirids

Green mirid – *Creontiades dilutus*
Brown mirid – *Creontiades pacificus*

Both the green and brown mirids are similar in appearance, however brown mirids are slightly larger and carry more dark pigments. While the brown mirid can cause similar damage at boll stage, at squaring stage they can cause lower damage than green mirids and they are usually found in much lower numbers than the green mirid on cotton and move they to cotton later than the green mirid.

Damage symptoms

Adults and nymphs cause early season damage to terminals and buds and mid season damage to squares and small bolls. Types of damage include blackening and death of terminals of young plants, rapid square loss without the presence of *Helicoverpa spp.* larvae and blackening of pinhead squares. Bolls that are damaged during the first 10 days of development will be shed, while bolls damaged later than this will be retained but not continue normal development and will incur yield loss. Black, shiny spots indicate feeding sites on the outside of bolls. When sliced open warty growths and discolouration of the immature lint can be seen within the boll.

Sampling

Sample what?

Sample for adults and nymphal instars of the pest. Mirids are a very mobile pest and are easily disturbed during sampling. It is important to include nymphs in the assessment as 4th and 5th instars cause similar amounts of damage to adults.

Sample fruit retention and types of plant damage that are symptoms of mirid feeding such as tip damage (early season) and boll damage (mid season).

Frequency

Sample at least 2 times/week.

Begin sampling at seedling emergence and continue sampling until last effective boll is at least 20 days old.

Methods

Use visual assessment of whole plants, a beat sheet or sweep net. All methods give comparable estimates of mirid abundance when plants are young. As the season progresses, the efficacy of whole plant visual sampling declines. Once the crop reaches 9–10 nodes, sample using either the beat sheet or sweep net.

When beat sheeting, each sample consists of the row of plants being vigorously pushed 10 times with a 1 m stick towards the sheet. Preliminary research has shown that the number of samples required for a good estimation of mirid numbers is between 8–10.

When using a sweep net, a sample can consist of 20 sweeps along a single row of cotton using a standard (380 mm) sweep net. Preliminary research has shown that at least 6 sweep samples are required to achieve a good estimation of mirid numbers.

It is essential to monitor fruit retention and signs of fruit damage as part of gauging the impact mirids are having on the crop. Not all bolls that are damaged by mirids will be shed, so it is important to monitor bolls for mirid damage.

Thresholds

Research by Dr Moazzem Khan, DEEDI, has confirmed that yield loss due to mirid feeding varies with crop stage. Different thresholds apply at different times of the season, depending on the crop's capacity to compensate for the damage incurred. When applying the thresholds, always use the crop damage component together with the mirid numbers.

The highest risk stage is mid season when bolls are young. From first flower until the time when ~60% of bolls are 20 days old, the crop is most susceptible to fruit loss from mirid damage that will impact on yield. The crop has greater capacity to recover from earlier fruit loss during the squaring stage provided plants do not suffer from any other stress such as water stress. Once bolls are 20 days old the boll wall is hard enough to deter mirid feeding and minimal damage occurs.

		Planting to 1 flower/m	Flowering to 1 open boll/m	1 open boll/m to harvest
Adults or nymphs/m				
Visual Sampling	cool region	0.7	0.5	–
	warm region	1.3	1.0	–
Beatsheet Sampling	cool region	2	1.5	–
	warm region	4	3	–
Sweep net Sampling*	cool region	2 adults + 1.1 nymphs	1.5 adults + 0.8 nymphs	–
	warm region	4 adults + 2.1 nymphs	3 adults + 1.6 nymphs	–
Crop damage				
Fruit retention		60%	60–70%	–
Boll damage		–	20%	20%
Tip damage (% of plants affected)				
(light**)		50%	–	–
(heavy***)		20%	–	–

* After 9–10 nodes
** Light tip damage – embryo leaves within the terminal are black.
*** Heavy tip damage – terminal and 2–3 uppermost nodes are dead.

The use of a beatsheet is recommended for counting the numbers of mirid adults and nymphs present in the crop. The relative importance of the % fruit retention and % boll damage reverses as the season progresses. From the start of squaring through until cut-out, place the emphasis on fruit retention. Not all bolls that are damaged by mirids will be shed. Bolls that are damaged between 10 and 24 days of age will be retained but develop with reduced boll size and lint yield. As the season progresses, the proportion of the retained bolls that are damaged becomes more critical.

Key beneficial insects

There are no beneficial species that are recognised to be regulators of mirid populations in cotton, however damsel bugs, big-eyed bugs, predatory shield bugs, as well as lynx, night stalker and jumping spiders are known to feed on mirid adults, nymphs and eggs.

Selecting an insecticide

The insecticide products registered for the control of green mirid in cotton in Australia are presented in Table 3 on page 17. The use of more selective insecticide options will help to conserve beneficial insects (see Table 17 on page 58–59). For last few years research by DEEDI entomologists has showed that salt mix with low rate of chemical increase efficacy against mirid and stinkbug but reduce impact on beneficials. However, to date, only one chemical (Steward) has registration to mix with salt. Early season use of dimethoate for the control of green mirids may inadvertently select for carbamate resistance in aphids.

Survival strategies

Resistance profile

No resistance to insecticides has been detected in Australia as there is no resistance monitoring program for green mirids. It is possible that resistance to insecticides could develop if a proactive approach to preventing resistance is not taken.

Overwintering habit

Mirids are known to survive on weeds and native plant hosts surrounding cotton fields. They are also known to breed on native hosts in inland (central) Australia in winter and can migrate to cotton growing areas in spring in a similar way to the native budworm (see section on Native Budworm, page 9).

Alternative hosts

Mirids distinctly prefer lucerne to cotton. Lucerne strips or blocks can be used as trap crops to prevent the movement of mirids into cotton crops. If using lucerne to manage green mirids, the lucerne should not be allowed to flower, seed or hay-off. Slashing half the lucerne at 4 weekly intervals and irrigating will ensure that fresh lucerne regrowth is constantly available for mirid feeding, thus preventing the movement into cotton. Other crop hosts include soybeans, mungbeans, pigeon pea, safflower and sunflowers. It is assumed that mirids migrate between these crops. Weeds hosts include turnip weed, noogoora burr, variegated thistle and volunteer sunflowers.

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Adult brown mirid. (Moazzem Khan, DEEDI)

TABLE 3: Control of mirids

Active ingredient	Concentration and formulation	Application rate of product	Comments
Mirids (Green mirid *Creontiades dilutus* and Yellow mirid or Apple dimpling bug *Campylomma liebknechti*)			
Acetamiprid	225 g/L SC	0.1 L/ha	Apply with 0.2% Incide penetrant. Target nymphs and/or adults. On above threshold or increasing populations, suppression only may be observed.
Aldicarb	150 g/kg G	5.0 kg/ha	Apply into the seed furrow at planting.
Alpha-cypermethrin	16 g/L ULV 100 g/L EC	2.0–2.5 L/ha 0.3–0.4 L/ha	Apply at recommended threshold levels as indicated by field checks. Use the higher rate when pest pressure is high and increased residual protection is required.
Beta-cyfluthrin	25 g/L EC	0.6 L/ha	When Helicoverpa spp. are present follow Helicoverpa spp. instructions. Otherwise apply at threshold levels as determined by field checks.
Bifenthrin	100 g/L EC 250g/L EC	0.6–0.8 L/ha 0.24-0.32L/ha.	Apply at recommended threshold levels as indicated by field checks. Use the higher rate for increased pest pressure and longer residual control.
Chlorpyrifos-methyl	500 g/L EC	1.0–2.0 L/ha	Apply when pest numbers approach threshold levels.
Clothianidin	200g/L SC	0.125-0.25L/ha + Maxx Organsilicone Surfactant 0.02L/L of water	Apply when numbers reach threshold levels requiring treatment
Deltamethrin	27.5 g/L EC	0.18 L/ha	Suppression only.
Dimethoate	400 g/L EC	0.34–0.5 L/ha	Apply when pests appear.
Emamectin benzoate	17 g/L EC	0.55–0.7 L/ha	For suppression only. Apply to developing populations that are predominantly nymphs.
Fipronil	200 g/L SC 800 g/kg WG	0.0625–0.125 L/ha 15.5–30 g/ha	Apply spray to achieve thorough coverage. Use higher rate under sustained heavy pressure.
Gamma-cyhalothrin	150 g/L CS	0.05 L/ha	Apply at recommended threshold levels as indicated by field check.
Imidacloprid	200 g/L SC	0.25 L/ha	Add Pulse penetrant at 0.2% v/v (2 mL/L water). See withholding period.
Indoxacarb	150 g/L EC	0.65 L/ha or 0.85 L/ha	Under high populations suppression only may be observed.
Indoxacarb + Salt	150 g/L EC	0.3 or 0.4L/ha + Salt (NaCl) at 5 g/L spray volume by ground (100 L/ha) or 10 g/L spray volume by air (30 L/ha).	For controlling green mirids ONLY. Use the higher rate on infestations exceeding economic spray threshold levels and/or large canopy crops.
Lambda-cyhalothrin	250 g/L ME	0.06 L/ha	Apply at recommended threshold levels as indicated by field checks.
Omethoate	800 g/L SL	0.14–0.28 L/ha	Use high rate where population exceeds 1/m row.
Paraffinic Oil	792 g/L SL	2–5% v/v or 2–5 L/100 L of water	Apply low rate for suppression of fewer than 0.5 mirids/m. Apply high rate if population reaches threshold of 0.5 mirids/m or apply 2 successive low rate sprays not more than 7 days apart.
		1–2% or 1–2 L/100 L of water	Suppression only. Include Canopy in tank-mix when applying any other insecticide by ground rig.
Phorate	200 g/kg G	50 g/100 m row	QLD only. Suppression only. Apply into seed furrow at planting.