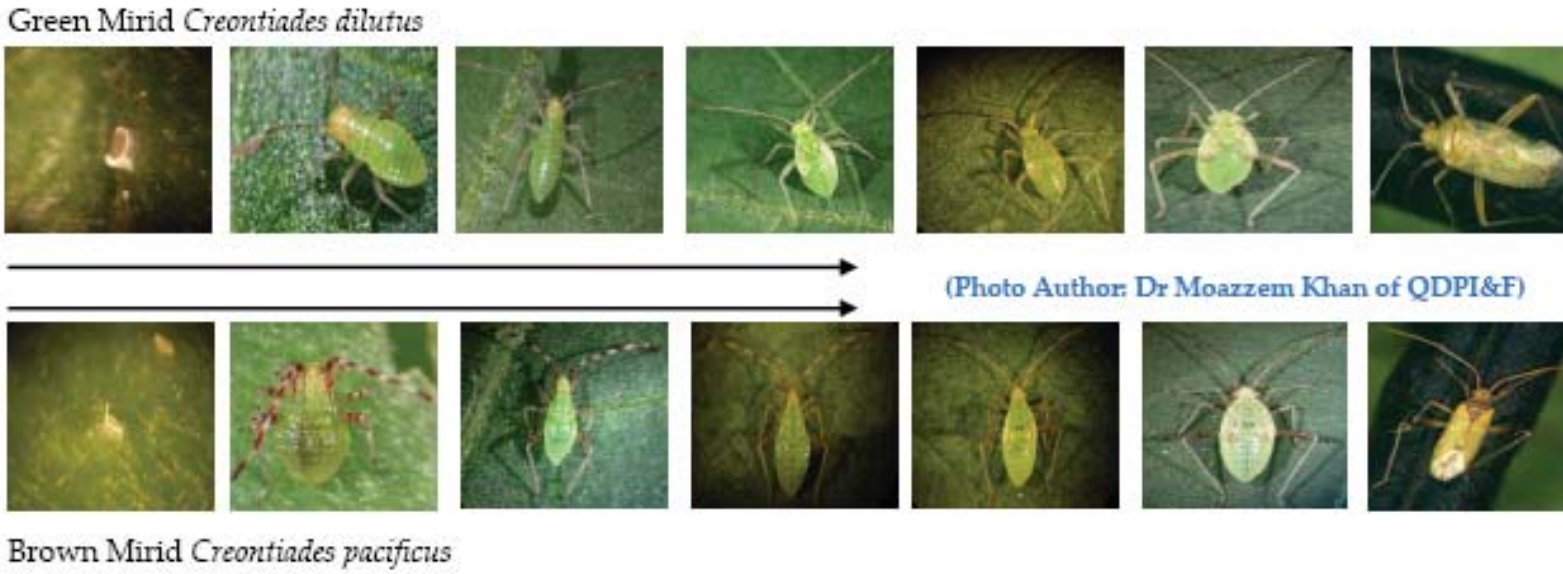
Mirids

On Farm Series: Produced by Cotton Catchment Communities CRC

Pictorial Identification of Mirids Life Cycle



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Mirids are important sucking pests in cotton, particularly in Bollgard II®, and 2 to 4 sprays are usually required to manage them during the growing season. In Bollgard II®, mirids are found throughout the season, causing damage to seedlings, squares and bolls. However, in conventional cotton, mirids are mainly a problem in early squaring cotton. This is partly because broad–spectrum chemicals applied to control *Helicoverpa* towards the mid to late part of the season coincidentally control mirids. For better management decisions, it is important to know about mirid biology, particularly their life cycle, and to identify the mirids correctly so that the right assessment can be made before spraying.

Two species of mirids, green mirid (*Creontiades dilutus*) and brown mirid (*Creontiades pacificus*), are found in cotton. Of these, the green mirid is the dominant species in cotton, particularly in cotton monoculture cropping systems, representing more than 95% of the mirid population. The proportion of brown mirids on cotton is higher in mixed cropping (soybean, mungbean, pigeon pea, cotton) systems than in monoculture systems, though it is still far less common than green mirid (see Figure 1).

LIFE CYCLE OF MIRDS

Both green and brown mirids have an egg and 5 nymphal stages before moulting to adult. Temperature is an important driver of mirid development. Optimum temperatures for both green and brown mirid development are 30 to 32°C. At these temperatures, the development from egg to adult takes 15.6 and 18 days in green and brown mirids respectively (Table 1). At 30°C, green mirids take 9 to 11 days to develop from 1st instar to adult. When the weather remains cloudy and temperatures are around 32°C for a few days, green mirid populations will explode within a short time frame, faster than when temperatures are cooler or hotter. Though warmer conditions generally lead to faster development, temperatures much beyond the optimum tend to reduce survival, and prolonged periods of very hot weather can reduce mirid abundance. Under summer conditions, a generation of green and brown mirids (egg to adult) can be completed in about 2 and 3 weeks respectively. Adults of both mirids can live for 3-5 weeks and a female can lay up to 80 eggs in her life time.

IDENTIFYING MIRIDS

Adults of both green and brown mirids are elongated, about 7 to 9 mm in length, with long legs and antennae. Green mirids are a light yellow-green colour and brown mirids are a light yellow-brown colour. Green and brown mirid nymphs are similar in size. The major distinguishing features for green and brown mirids are shown in the pictures below (Figure 2).

Figure 1. Species composition of green mirids (GM) and brown mirids (BM) in Bollgard II for a mixed cropping system (Byee) and cotton monoculture cropping systems (Dalby, Macalister).

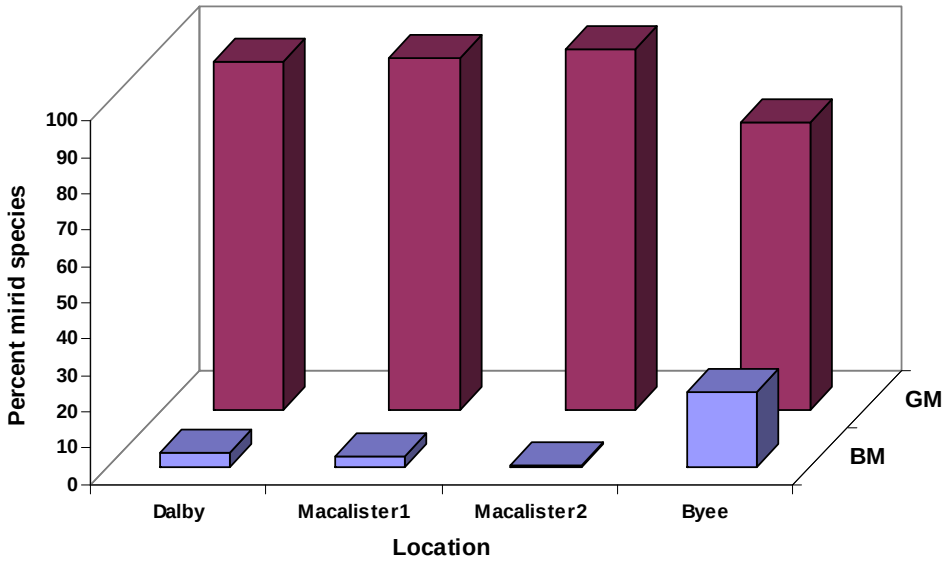


Table 1. Mean development time (days) of green and brown mirid at 30°C

Stage	Mean developmental time (days)	
	GM	BM
Egg	4.9	6.0
1st Instar	1.6	2.0
2nd Instar	2.1	2.0
3rd Instar	1.7	2.0
4th Instar	2.0	3.0
5th Instar	3.3	3.0
Egg - Adult	15.6	18

Eggs of both mirids are laid singly within plant tissue, making them virtually impossible to see. The only visible evidence is an oval shaped operculum (egg cap) used to 'breathe'. Immediately after being laid, the operculum is a light brown colour, but as the egg develops the brown mirid egg cap turns black. The respiratory horns on the egg caps of brown mirids are longer and thinner than those on egg caps of green mirids.

Newly hatched nymphs of both mirid species are very pale green in colour and about 1.4 to 1.6 mm in length with long antennae and legs. Antennae are four segmented, there is a distinctive red and green stripe on the brown mirids antennae and the green mirids antennae has a red tip. In brown mirids, two reddish bands are present on the distal end (furthest away from the body) of the femur of the hind legs. As nymphs grow, their colour changes from light green to yellowish green. The wing pads start to develop at the 3rd instar. In the 4th instar, brown mirids develop two black spots between the wing pads, the brightness of the stripe on the antennae diminishes to some extent and the reddish bands on the femur coalesce. In the 5th instar, green mirids develop a light brown tinge on the hind legs while the hind legs of brown mirids becomes a dark brown.

Figure 2. Different stages of green and brown mirids showing distinguishing features

Green mirid adult

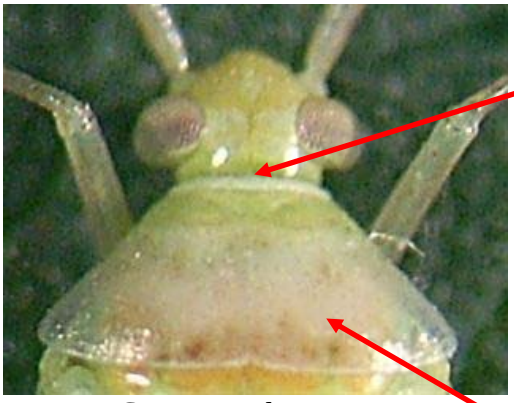
Brown mirid adult

Distal half of the femur of the hind legs in the green mirid are tinged with light brown while those in the brown mirid are dark brown.

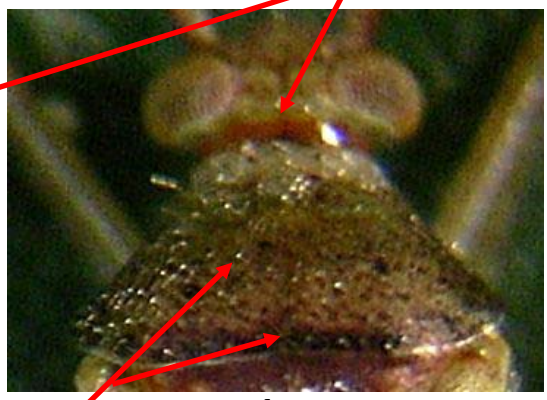
Green mirid

Brown mirid

The ring behind the head (collar) in the green mirid is white while that of the brown mirid is reddish brown

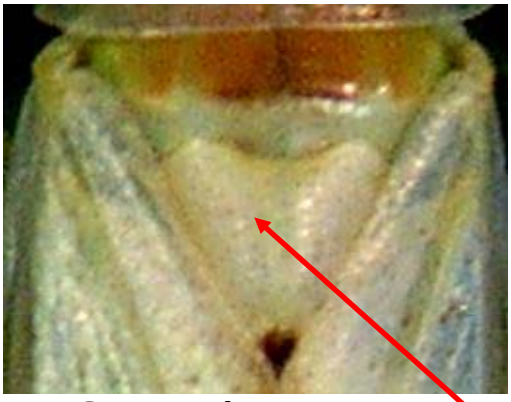


Green mirid

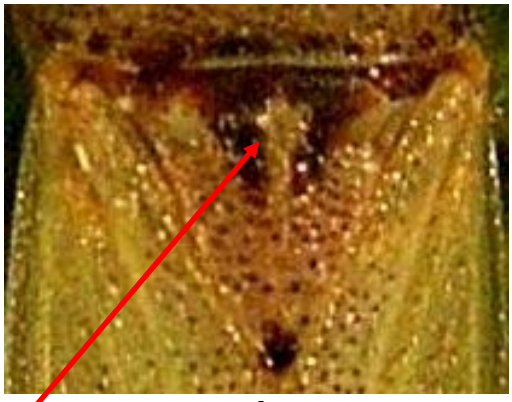


Brown mirid

Pronotum in green mirids is uniform light yellowish green while in the brown mirid there are dark brown marks on the pronotum and a dark brown band on the base of the pronotum.

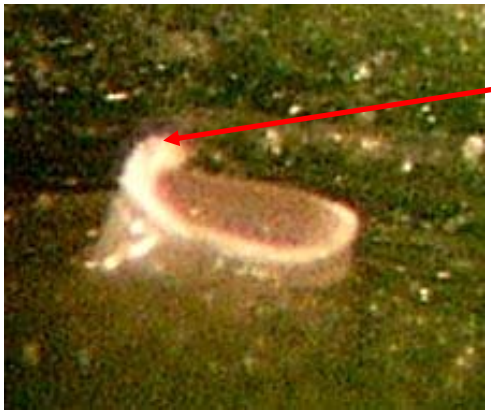


Green mirid

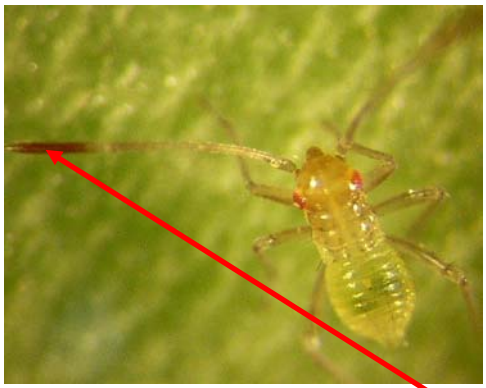


Brown mirid

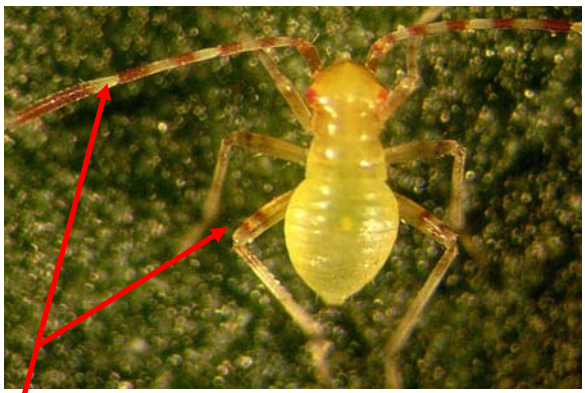
The scutellum in the green mirid is heart-shaped while that in the brown mirid is deeply lobed and looks more like trident (three pronged fork)



The respiratory horn on the egg cap is shorter and stouter in green mirid and longer and thinner in brown mirid

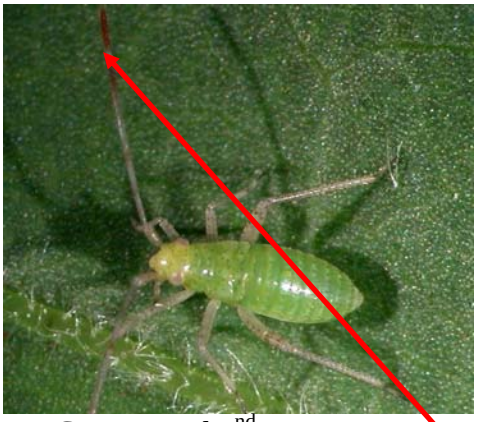


Green mirid 1st instar

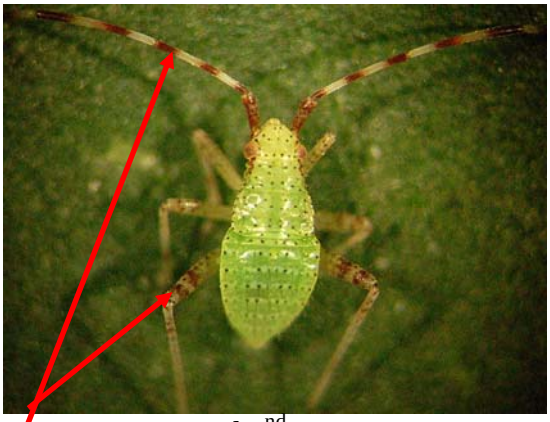


Brown mirid 1st instar

The tips of the antennae in green mirids are red, whereas the antennae of the brown mirid are striped (red and green). The femur of hind legs of the brown mirid also has two reddish bands. Both mirids are 1.4 to 1.6 mm long. Photos taken immediately after hatching.



Green mirid 2nd instar



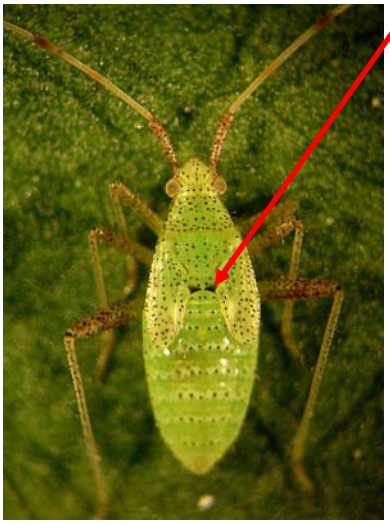
Brown mirid 2nd instar

Distinguishing features for 2nd and 3rd instar are the same as for 1st instar. Second instars are 2.1 to 2.4 mm and 3rd instars are 3 to 3.2 mm long.

Green mirid 3rd instar

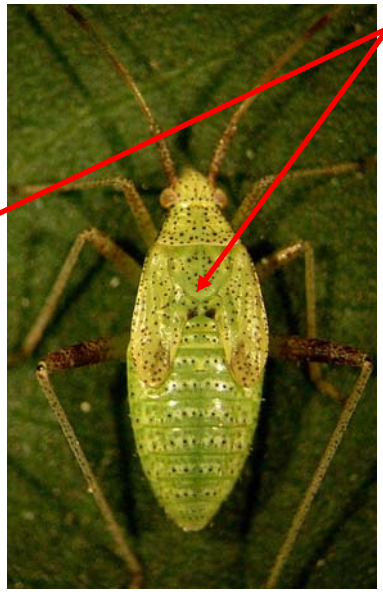
Brown mirid 3rd instar

Green mirid 4th instar



Brown mirid 4th instar

In the 4th instar brown mirids develop 2 black spots between the bases of the wing pads, the reddish bands on hind legs coalesce and the colour of the striped antennae becomes lighter. Both mirids are 4.4 to 4.6 mm long.



In the 5th instar a tinge of light brown colour develops on the hind legs of green mirids, whereas in brown mirids the colour of the femur on hind legs is dark brown and the black spots between the wing pads remains. Both are 5.7 to 5.9 mm long.

Green mirid 5th instar

Brown mirid 5th instar

OTHER INSECTS THAT APPEAR SIMILAR TO MIRIDS

Adult green and brown mirids may be confused with adult broken backed bugs and crop mirids. Adult broken backed bugs are shorter, about 4 mm, and have a defined kink in the back, and crop mirids are shorter, about 5 mm, stouter and darker.

Nymphs of the green mirid may be confused with nymphs of broken backed bugs, apple dimpling bugs, aphids and predatory black mirids. Nymphs of these species are much smaller (e.g. 5th instar broken backed bugs and black mirids are about 3 mm, apple dimpling bugs are 1.5 mm and aphids are about 0.5-1.5mm). Aphids also have two siphunculi (look like exhaust pipes) at the rear which mirids do not. As well as being smaller, nymphs of black mirids have red eyes, are black and have green striped antennae.

Nymphs of crop mirids may be confused with brown mirid nymphs. Crop mirid nymphs are smaller (e.g. 5th instar crop mirid nymphs are 3-4 mm) and they have a black spot on the middle of the abdomen.

Crop mirid (5 mm)

Broken backed bug (4 mm)

Black mirid (5th instar)

Broken backed bug (5th instar)

Aphid

Apple dimpling bug (3rd instar)

Crop mirid (4th instar)

ACKNOWLEDGEMENTS

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