

What are damsel bugs doing in cotton? — implications for IPM

By Mark Wade, Myron Zalucki and Bernie Franzmann¹

Damsel bugs (*Nabis kinbergii*) are predatory insects that feed on a range of insects including aphids and heliothis eggs and larvae. They generally occur in densities of less than five per metre in crops such as cotton, lucerne and soybean. The bugs are moderately tolerant of insecticides such as endosulfan, Fulfill and Steward.

Unfortunately little is known about the impact of predation by damsel bugs on pest densities in the field. We have been studying damsel bugs for the past few years to find out more about their behaviour and ecology. The aim of the present study was to use direct observational methods to investigate their behaviour in cotton.

WHAT WAS DONE?

The behaviour of 330 damsel bugs was observed on 11 days in cotton fields at Bye (South Burnett, Queensland) from late December to mid-February during the 2000–01 and 2001–02 growing seasons. Observations on each bug lasted 10–15 minutes and were conducted between first light and total darkness (5.00 am to 7.00 pm). Data was converted to a percentage of time spent on each activity at each location, then averaged to develop a profile of damsel bug behaviour.

WHAT WERE THEY DOING?

Bugs generally remained stationary (range 64–70 per cent of the time) or were walking (24–29 per cent) (Figure 1). There was slight variation over a day in their activities. Bugs were only seen feeding for two per cent of the time on 10 prey items comprising mainly cotton jassids and green vegetable bugs.

This suggests they are opportunistic feeders and use a sit-and-wait or ambush strategy to locate their prey. This foraging strategy should make them good at locating mobile prey items that 'move past' them. It would also help them hide from other predators and reduce contact with insecticide residues.

Average daily predation rates per bug

FIGURE 1: Variation over a day in the mean percentage of time damsel bugs were observed doing various activities

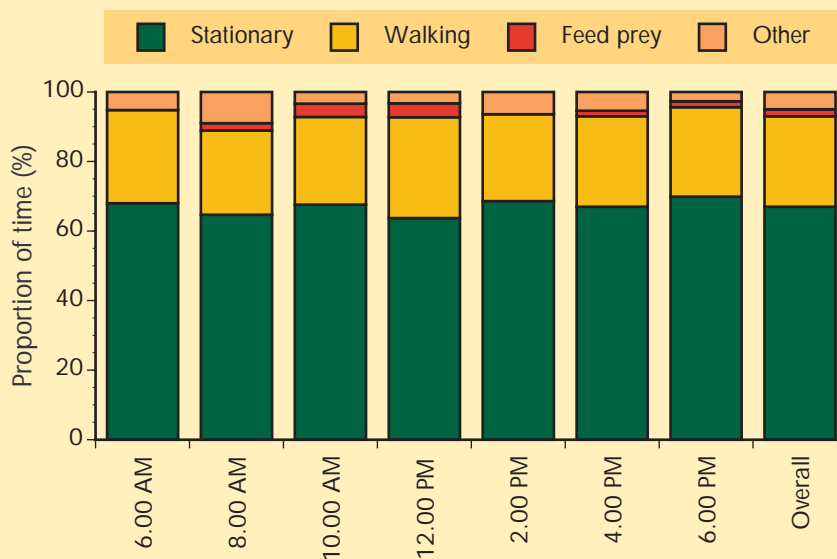
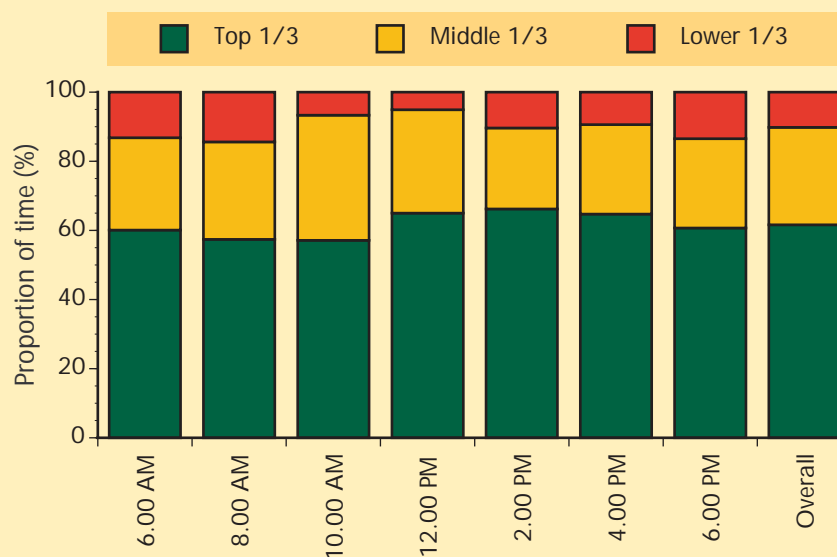


FIGURE 2: Variation over a day in the mean percentage of time damsel bugs were observed at various plant canopy locations



Damsel bug (Photo: C Mares).

were estimated at 0.6–2.9 prey items. This estimate considers that two per cent of time spent feeding is equivalent to 29 minutes in 24 hours, and assumes 10–45 minutes of feeding per prey item and that all times of the day are available for feeding. This information on feeding rates can be used to adjust pest densities when making spray decisions as part of an integrated pest management (IPM) strategy.

During the 24–29 per cent of time bugs were observed walking they covered an

average distance of 16.6 cm (effective straight-line distance) or 31.6 cm (actual cumulative distance) in 13.4 minutes. This equates to 17.8 metres (effective) or 34.0 metres (actual) per day.

WHAT WAS THEIR LOCATION IN THE PLANT CANOPY?

Damsel bugs were mainly encountered in the upper-third of the plant (57–66 per cent) followed by the middle-third (23–36 per cent) — Figure 2. This location within the plant canopy varied little over a day.

The strong tendency to inhabit the upper-third of the plant was despite the relatively smaller amount of foliage available in this region compared to the middle-third.

The within-plant location of the bugs would influence their prey selection. Prey that commonly inhabit terminal regions such as heliothis are more likely to be targeted. Where bugs are found would influence sampling results, particularly for those based on suction sampling and visual

observation techniques that bias collection from the upper part of the plant.

WHAT PARTS OF THE PLANT WERE THEY ON?

Damsel bugs were most commonly found on leaves and petioles (42–69 per cent) followed by squares and bolls (18–39

per cent), although the relative availability of squares and bolls appeared low compared to leaves and petioles (Figure 3).

The location of bugs on the various plant parts would influence their prey selection. Prey that commonly occupy leaves, squares and bolls such as aphids and whitefly would be at risk of predation. There was moderate variation in location of the bugs on the

various plant parts over a day.

The overall low-moderate variation in damsel bug behaviour over a day suggests their densities would remain relatively constant at various times of the day. This is contrary to earlier findings from beat-sheet sampling studies where damsel bug abundance varied five-fold (0.13–0.65 per metre) over a day. A further implication of consistent bug behaviour is they would be equally susceptible to insecticides applied at different times of the day.

In conclusion, direct observations of damsel bug behaviour in the field revealed they were mostly stationary and occupied leaves in the upper-third of the plant. This information can be used to improve IPM strategies for cotton. Further studies on bug behaviour should focus on their response at night and other times of the year. Similar studies on other key beneficial and pest species are warranted.

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FIGURE 3: Variation over a day in the mean percentage of time damsel bugs were observed on various plant structures

