# Bioassay of new insecticides for the control of the green mirid *Creontiades dilutus* (Stål)

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## Introduction

The green mirid, *Creontiades dilutus* (Stål) (Hemiptera: Miridae), is an important but sporadic pest of cotton which destroys small squares on cotton plants (Pyke and Brown, 1996). Destruction of the squares occurs during feeding when mirids insert their stylets into the plant tissue and release pectinase, causing desiccation and death of the surrounding cells (Pyke and Brown, 1996).

Green mirids are often controlled in conventional cotton crops by the same broad-spectrum sprays used to control heliothis. Specific sprays of organophosphates or pyrethroids are sometimes necessary to control green mirids, but these products disrupt beneficial organisms. Their use should be limited in order to conserve beneficial numbers during the pre-flowering period of crop growth. The pest status of the green mirid is expected to increase on INGARD cotton for two reasons. Firstly, fewer sprays are required to control heliothis in INGARD cotton, so coincidental control of green mirids is less likely. Secondly, INGARD cotton produces a protein that is highly toxic to caterpillar pests, but the toxin has no effect on green mirids. Alternative products for green mirid control are essential.

Two new chemical products with promise for mirid control were bioassayed with standard products currently used to control green mirids in cotton and other crops. Knowledge of the required doses of these insecticides can be used to determine doses for field testing of the products.

## Methods

### Mirid culture maintenance

Mirids were collected from flowering roadside lucerne (*Medicago sativa* L.) near Toowoomba using a standard suction sampler machine. Mirid adults were kept in large plastic containers at 26 ± 1°C, 60% RH and natural lighting. Fresh green beans were provided for food and moist cotton dental wicks supplied additional moisture.

### Bioassay techniques

Four standard, commercially registered products or experimental compounds were used (Table 1). A 1% stock solution of technical grade insecticide in acetone was made. Serial dilutions for range finding, from $10^{-2}$ to $10^{-6}$%, were made using acetone, and refrigerated to prevent evaporation.

After two days of laboratory rearing, 10 healthy unsexed adults were placed in a small plastic container and anaesthetised by placing a tissue soaked with diethyl ether over the container's opening. The mirids were then arranged on a circular piece of filter paper.

Each mirid was dosed by placing a drop of test solution on its ventral thorax using a microapplicator. Treated mirids were returned to the plastic cage containing a fresh green bean and a moist dental wick. After 24 h the mirids were examined. Obviously healthy, active adults were counted as live; all others were deemed dead. This method was repeated for each concentration of insecticide.

## Results and Discussion

Probit analysis results for dimethoate, omethoate, fipronil and imidacloprid are listed in Table 1. The 99% lethal dose for the new products are some 10 to 48 times as lethal as dimethoate, and 1.3 to 5 times as lethal as omethoate.

Table 1. Probit analysis data for the insecticide doses of dimethoate, omethoate, fipronil and imidacloprid to *Creontiades dilutus* adults.

| Insecticide | LD50† | UFL* | LFL** | LD99 | UFL* | LFL** |
|---|---|---|---|---|---|---|
| Dimethoate | 17.6 | 47.0 | 6.57 | 72.8 | 230.0 | 23.0 |
| Omethoate | 2.51 | 4.63 | 1.36 | 9.01 | 24.8 | 3.28 |
| Fipronil | 0.45 | 0.70 | 0.29 | 1.53 | 0.49 | 4.85 |
| Imidacloprid | 0.68 | 6.48 | 0.07 | 7.26 | 18.81 | 2.80 |

† Values are $10^{-4}$ g active ingredient / L
* Upper fiducial limit
** Lower fiducial limit

The broad spectrum organophosphates (dimethoate, omethoate) had higher concentrations for a given LD value than the new products fipronil and imidacloprid. The organophosphates are currently used to control mirids but are very disruptive to the beneficial insects in the crop at a crucial early stage of the season. Fipronil and imidacloprid are potential candidates for mirid control, as lower rates than the standards should be effective on mirids. These products, if used at lower rates than the standards, could have a place within a cotton IPM system depending on their effects on beneficial insects. They also have a place within INGARD cotton given its greater chance of conserving beneficial populations to naturally control minor pests. As there is limited information on the effects of fipronil and imidacloprid on beneficial insects, future field studies should compare these new products against the standards.

## Acknowledgements

This study was completed as part of a Cooperative Research Centre for Tropical Pest Management Vacation Scholarship. Additional support was provided by the Cotton

Research and Development Corporation. Claudina Rodriguez collected the mirids used in this study. We gratefully acknowledge these contributions.

## Reference

Pyke B.A. and Brown, E.H. (1996). The Cotton Pest and Beneficial Guide. Pp. 51. CRDC, Narrabri and CTPM, Brisbane.