



Monitoring Resistance Levels in *Heliothis* Spp. 1984-1987.

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Introduction

*Heliothis* spp are arguably the most important agricultural pests in Australia. There are two pest species *Heliothis armigera* (the cotton bollworm) and *Heliothis punctigera* (the native budworm). *H. armigera* has a long history of insecticide resistance in Australia, first to DDT in the early 1970s (Wilson 1974). High level DDT resistance was widespread throughout Australia and *H. armigera* could not be controlled by DDT. DDT resistant *H. armigera* caused a severe economic threat to the Australian cotton industry. More recently, in 1983, *H. armigera* were diagnosed as resistant to the pyrethroid insecticides (Gunning *et al* 1984). A pyrethroid resistance management strategy was successfully implemented and up to the present, resistance although widespread, is of a low order and commercial rates of pyrethroids can still be successfully used to control *H. armigera*.

In 1974, following the occurrence of DDT resistant *H. armigera*, a resistance monitoring program for *Heliothis* spp. was started at the Tamworth laboratories of the Department of Agriculture, NSW. All insecticide management decisions require a solid platform of reliable data and this can only be achieved by a long-term commitment to pesticide studies. Resistance monitoring has involved obtaining of baseline susceptibility data for *H. armigera* and *H. punctigera*, monitoring of changes in resistance levels and cross resistance patterns. The routine monitoring and testing programs at Tamworth has extended naturally to studies in depth of resistance mechanisms and genetics, since they are basic to a fuller understanding of resistance problems, and to the development of practical responses.

The function and goals of the *Heliothis* resistance monitoring program have been:

- (a) to establish baseline data for variation in, and susceptibility to insecticides in natural populations
- (b) to check for cross resistance patterns
- (c) to anticipate field resistance problems

Specific achievements of the Tamworth *Heliothis* resistance testing centre 1984-1987 have been:

1. Monitoring of pyrethroid resistance levels in non-sprayed populations of *H. armigera*.
2. Provision of a pyrethroid monitoring service for the Queensland DPI and extension officers of the Department of Agriculture, New South Wales
3. To monitor the resistance status in *H. armigera*, of currently used and potential control chemicals. During the three year period of this project larval resistance to endosulfan and some carbamate insecticides have been diagnosed.
4. Innovative bioassay methods are being developed for chemicals with novel modes of action or unusual methods of entry into *Heliothis*.
5. A solid platform of baseline data to several chemicals has been accumulated for the native budworm, *H. punctigera*.