Project Title	Ecological genetics of endosulfan resistance in *Helicoverpa armigera*
Project No	CSE18C
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Introduction

The cotton industry is heavily dependent on the use of insecticides for pest management, particularly of *Helicoverpa armigera* and *H. punctigera*. Reduction in the use of these chemicals is a CRDC goal. This is achievable through the preservation of susceptibility to existing insecticides such as endosulfan. This insecticide is the most commonly used pesticide in spring and early summer (stage 1) in cotton because of its high efficacy, low cost and short-term impact on predators and parasites. Loss of this insecticide to resistance would reduce seriously the options for pest control in cotton in spring.

Resistance to endosulfan was widespread in New South Wales and Queensland during the 1970's and field failures were reported. Resistance was lost from field populations after the introduction of the synthetic pyrethroids in the late 1970's. It reappeared in the mid-1980's as the usage of endosulfan increased under the *Resistance Management Strategy*. Frequencies, however, have not raise rapidly but have averaged 10-30% and widespread problems with pest control have not been reported.

This project studied the factors responsible for frequency changes in endosulfan resistance in populations of *H. armigera* in cotton. From these results it should be possible to predict under what conditions resistance could reduce the efficacy of endosulfan for the control of *H. armigera* and lead to field failures.

Objectives and Summary of Results

(1) To isolate a strain of H. armigera *highly resistant to endosulfan and determine the inheritance of this resistance.* Resistance to endosulfan is sex-linked character, with full dosage compensation in the female. Expression of resistance is at low level in larvae and higher in adults.

(2) To determine the factors important in the development of endosulfan resistance in the field and to predict under what conditions field failures will occur. Commercial applications of endosulfan can discriminate only poorly between susceptible and resistant larvae. However, it is predicted that resistance can lead to field failures or poor control when insecticide applications are below recommended rates, where deposit residues are poorly distributed or reduced, or applications occur under adverse weather conditions.

(3) To complete studies in the biology of pyrethroid resistance. There is little evidence that pyrethroid resistant *H. armigera* are less able to survive diapause than susceptible ones. Expression of pyrethroid resistance appears to decline in adults after a period of pupal diapause.