SUMMARY OF MAJOR FINDINGS

This study determined the genetic basis of pyrethroid resistance in *Heliothis armigera* and characterised those factors that lead to cyclical fluctuations in the frequency of resistance in field populations. The major findings were:

(1) A single major semi-dominant gene, associated with mixed function oxidases, is responsible for most pyrethroid resistance in field populations.

(2) The nerve insensitivity mechanism, which appeared to be important in field failures with pyrethroids in the early 1980's, no longer contributes significantly to the expression of resistance in field populations.

(3) Field application rates kill resistant larvae < 4-days old.

(4) Very small resistant larvae can survive field exposure to pyrethroids as the pesticide decays or is diluted by plant growth.

(5) Field application rates kill susceptible but not resistant adults.

(6) Pupae overwintering under cotton crops have high levels of resistance and high survival.

These findings have been integrated into the resistance management strategy for control of spring/summer pests in broadacre crops in eastern Australia. In particular, these results led to, or validated, recommendations about the commercial use of pyrethroids:

. use pyrethroids only on larvae < 5 mm,

. do not use pyrethroids at low rates against non-*Heliothis* pests,

. do cultivate cotton crop stubble to destroy overwintering populations of *Heliothis*,

. use a synergist, piperonyl butoxide, with pyrethroids to reduce selection pressure for resistance.