

Final report: Plain english summary

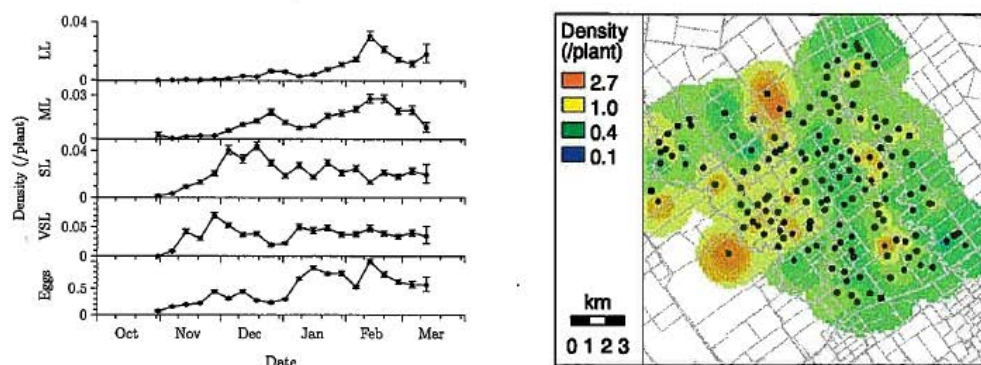
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Over-reliance on conventional insecticides for heliothis control induces resistance in the pest, disrupts beneficials and contaminates the environment. However, despite the introduction of transgenic cotton, conventional chemicals will continue to be important in the foreseeable future. The cotton industry is therefore taking steps to better manage the use of these chemicals. For example, field-level integrated pest management minimises insecticide use while maintaining profitability under the prevailing levels of pest abundance and resistance. It does not attempt to control regional abundance or resistance. For this we use area-wide management (AWM) and insecticide resistance management (IRM).

Although IRM has effectively maintained the efficacy of insecticides such as synthetic pyrethroids, AWM is still in the trial stage. Because AWM treats the pest at a regional level, its methods (e.g. trap cropping and pupa busting) rely on assumptions about the movement of moths within, into and out of the region. We can predict the likely effects of moth movement from what we know of moth behaviour. Our project tested whether the infestation patterns we see in the field are consistent with these predictions. We determined infestation patterns from crop scouting data obtained from the QDPI Darling Downs AWM trial (CRDC project DAQ85C), Auscott Midkin, Dr Richard Sequeira at Emerald, and the SIRATAC database. Our analysis methods included digital mapping, graphing, conventional and spatial statistics and simulation modelling.

Infestation patterns agreed with the theory that heliothis moths move freely among crops and lay more eggs on the most attractive hosts. Oviposition 'hotspots' multiple kilometres across were common. They appeared to be related to the attractiveness of crops or their surroundings rather than to moth production by individual fields. The hotspots often persisted across generations, but were not permanent. The results are consistent with a system in which AWM could *potentially* work, but further research is required to determine whether it *actually* works. The results also support research into manipulation of crop attractiveness (e.g. using behaviour modifying chemicals) as a method for reducing oviposition in crops.

The project developed a large information base and methods for analysing large, imperfect datasets. We hope to use these resources to help analyse data from other AWM projects and to provide ecological information to help collect and interpret data of the genetic markers project.



Heliothis abundance and example egg distribution at Brookstead in 1997-98