

7/1990 to 6/1993

***Cotton* Research & Development Corporation**

FINAL REPORT

Project Title:

Population dynamics and migration of *Heliothis* spp. in inland Australia: Towards the development of an early warning system (forecasting) of *Heliothis* migration into eastern Australia.

Project Number:

DAQ 55C

Research Organisation:

Queensland Department of Primary Industries

Principal Investigators:

Dr David Murray
Division of Plant Protection
Department of Primary Industries
PO Box 102
TOOWOOMBA Q 4350
Phone: 076-314200
Facsimile: 076-347421

Dr Gary Fitt
Division of Entomology
CSIRO
P O Box 59
NARRABRI NSW 2390
Phone: 067-991500
Facsimile: 067-931186

Dr Peter Gregg
Department of Agronomy
and Soil Science
University of New England
ARMIDALE NSW 2351
Phone: 067-732954
Facsimile: 067-723262

Dr Myron Zalucki
Entomology Department
University of Queensland
BRISBANE Q 4072
Phone: 07-3651563
Facsimile: 07-3651199

A final report prepared for the Cotton R&D Corporation

1. Executive Summary

1. A workshop convened by the Cooperative Research Centre for Tropical Pest Management at Narrabri on 7-8 December 1992 examined the feasibility, benefits, and funding implications of providing an operational forecasting service for heliothis. The workshop participants represented grower organisations, insecticide suppliers, pest-control services, and rural-industry research funding bodies, along with state-government, CSIRO, and university scientists.

2. The workshop focussed especially on the question of forecasting spring infestations of the native budworm *Helicoverpa punctigera*, a serious pest of various legume crops (especially lupins in Western Australia and field peas in Victoria), and the main early-season pest of cotton. It is now known that these infestations are initiated by immigrants from the far inland, where a research programme now approaching completion has located very large numbers of caterpillars on native vegetation during 3 of the last 4 winters. These inland populations emerge as moths in August-September, and are carried into cropping regions by the wind; damage is caused either by the offspring of these moths (in legume crops), or by the subsequent (second) generation (in cotton).

3. The magnitude of the early-spring influx of *H. punctigera*, and the consequent potential of this pest to cause economic damage, varies significantly from year to year. Now that the source regions are known, surveys can be undertaken to estimate the size of inland populations in winter, and a forecast of the damage potential issued several weeks/months before control action needs to be taken in legume crops and cotton respectively.

4. Tentative forecasts of *H. punctigera* damage potential, based on observations made during the course of the current research programme, have been issued by the researchers for the last 3 years. These forecasts have both proved reasonably accurate, and been received with considerable interest by growers, insecticide suppliers, and pest controllers. The workshop was convened primarily to determine the utility of continuing (and improving on) these forecasts, and, if continuation is merited, to recommend how the provision of forecasts should be funded.

5. Following extensive discussions, the workshop participants reached a general consensus on the following points:-

- Although the prospects for routine forecasting of early-season heliothis infestations were good, it would be premature to attempt this now without some additional research. This should include further trials with the methods currently in use, some assessment of new and potentially less expensive remote sensing methods, and an economic evaluation of forecasting.

- Forecasts of the magnitude of early-season heliothis infestations were potentially valuable to growers, insecticide suppliers, and pest controllers. All of these users considered the forecasts had some utility for them.

- There are four major user groups for heliothis forecasts: cotton growers, grain-legume growers, insecticide suppliers, and agricultural pest-control services. Until better information becomes available, the benefit to each of these groups should probably be considered to be equal. Grain-legume growers, estimated at about 6000 across Australia, are by far the most numerous potential beneficiaries.

- The size of the benefit to potential users is uncertain. A careful cost-benefit analysis is required before the utility of a service can be properly assessed.

- The cost of providing operational forecasting of the magnitude of the early-spring *H. punctigera* influx for both eastern and western Australia would be of the order of \$0.6M p.a. Additional costs might be incurred in providing local, crop-specific, interpretations of this information: these could most appropriately be met by local user organisations or state governments.

- An operational forecasting service would require its own staff and facilities. The scientists currently working on heliothis forecasting would have no more than an advisory role. Some may undertake further research or development projects related to heliothis forecasting, but others will probably move on to new topics.

- The spring influx of *H. punctigera* frequently extends across state boundaries. A national approach to forecasting it is required.

- The Australian Plague Locust Commission provides one possible model for the type of organisation required for an operational *H. punctigera* forecasting service. However, despite considerable commonality of mission, infrastructure, and expertise, it would not be straightforward for the APLC to take on this task: there are both administrative and logistical/resource constraints on the Commission assuming additional functions. Surveys could be undertaken on a contract basis, but they could not be given priority over locust work and therefore might have to be abandoned during locust outbreaks.

- Once a forecasting service becomes operational, funding other than that provided by Rural Industry Research and Development Corporations is needed. These bodies can, of course, continue to support research and development projects aimed at improving forecast accuracy, reducing costs, etc.

- Costs cannot be recouped by selling the forecast product to individual users, because the information cannot be kept confidential. SIRATAC provides an unfavourable example in this respect. Participants identified a levy (e.g. on crop yield, or on sales or applications of insecticide), and provision from government (federal and/or state) consolidated funding, as the only practicable means of paying for an operational forecasting service. Forecasts would then be broadcast freely.

6. There was a consensus on the following:-

- The heliothis-forecasting research program should be renewed for another 2 years. Funding from rural industry research and development corporations is