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COTTON RESEARCH COUNCIL
FINAL REPORT ON OVERSEAS TRAVEL 1989/90

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1. Project : DAN 49L (Attendance at the First Asia Pacific Conference of Entomology, Chiang Mai, Thailand)

2. Organisation : NSW Agriculture & Fisheries

   Officer : Mr N.W. Forrester
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3. Itinerary :

Nov 7, 1989	Sydney - Chiang Mai
Nov 8-13, 1989	1st Asia Pacific Conference of Entomology Chiang Mai Plaza Hotel.
Nov 14-15, 1989	Visit Lop Buri, Tak Fa cotton and vegetable areas
Nov 16-17, 1989	Visit Dept. Agriculture labs at Bangkhen
Nov 18, 1989	Bangkok - Sydney

4. Final Report : The main aim of this trip was to report to the international scientific community on the progress of the Insecticide Resistance Management Strategy that has been implemented in Australia to contain pyrethroid and endosulfan resistance. Two papers were presented on aspects of this research:

   a) Pyrethroid and endosulfan resistance in *Heliothis armigera* in Australia - 6 years experience with a management strategy.

   b) Countermeasures for mfo mediated pyrethroid resistance in *Heliothis armigera* in Australia.

After the conference, a short field trip was undertaken to gauge the extent of the insecticide resistance problem in *Heliothis* and *Plutella* in Thailand.

More detailed notes are given in an Appendix.

5. Financial Summary:

Allocation		$2,500
Expenses incurred		
Sustenance	612.04	
Airfares/Internal Transport	1,669.73	
Travel Insurance	100.00	
Others (Exchange Commissions, Departure Tax, Expenses on route, Incidentals, Medical costs, etc.)	137.63	
	$2,519.40	
Balance of Allocation		$0.00.

Dybas, R.A. **-MK243 : A novel second generation avermectin insecticide for control of Lepidoptera on vegetables.**
Has an epimethyl amino substitution on the base abamectin molecule. 40x more active on *Heliothis virescens* than abamectin. Active at 5-10 g ai/hectare. Most effective by ingestion, limited contact activity.

Casida **-The Gaba - gated chloride channel as a target for insecticide action.**
Gaba increases Cl^- flux. Gave structures of bicyclooctanes as examples of a possible new chemical group acting at the Gaba site. They have a positive temperature co-efficient and are as potent as synthetic pyrethroids. They can be made selective proinsecticides by adding protective groups which can be more actively cleaved by housefly mfo than mouse mfo. The question of possible cross resistance from cyclodienes (eg. endosulfan) has yet to be answered.

Kern & Knauf **-Endosulfan susceptibility in coffee berry borer.**
Examined various populations of this pest for endosulfan resistance but could find none. Brun claimed resistance in this pest in New Caledonia but this finding was disputed by Hoechst.
Kern produced a draft of the new Hoechst technical manual for Thiodan (endosulfan). This will be a very useful document when eventually widely available.

Kohyama **-Teflubenzuron resistance of diamondback moth and its inheritance.**
This resistance was shown to be completely recessive and monofactorial. This explains the relatively quick reversion to susceptibility on relaxation of selection pressure.

McCaffery **-Mechanisms of resistance to synthetic pyrethroids in *Heliothis* spp.**
Reviewed the main mechanisms of pyrethroid resistance in *Heliothis virescens* from USA and *H. armigera* from India and Thailand. Suggested low level nerve insensitivity and penetration resistance but the dominant mechanism in all instances appears to be mfo (mixed function oxidase) mediated metabolic resistance. This appears very similar to the situation with *Heliothis armigera* in Australia. Therefore this may encourage commercial initiatives to pursue light stable synergists and resistance breaking pyrethroids to overcome mfo mediated pyrethroid resistance.

Collins **-Organophosphorous insecticide resistance and its management in the banana weevil borer.**
Described another insecticide resistance management strategy from Australia.

Charoenying *et al.* **-Efficacy of synthetic pyrethroids and other insecticides against *Heliothis armigera* on sunflowers.**
This paper indicated poor control of *Heliothis armigera* on sunflowers in Thailand with all conventional synthetic pyrethroids. However bifenthrin (Talstar) with a methylated biphenyl alcohol moiety, gave a significantly improved kill over other pyrethroids, but still not as good as other chemical groups. This intermediate result

developed resistance to virtually all insecticides used against it including DDT, cyclodienes, OPs, carbamates, pyrethroids and chitin inhibitors. Currently *Bacillus thuringiensis* is being used with barely acceptable control. Hoechst Thai have just started to commercialise abamectin against *Plutella* in Thailand. They are very conscious of the resistance threat and are taking great pains to release only limited quantities into the market. Their aim is for 2 to 3 of the 8 sprays normally applied for *Plutella* control in one growth cycle. Despite its high cost, growers would still overuse abamectin, if it was readily available. It remains to be seen if this strategy is strict enough or enforcable. The strategy sounds good but I believe that this high price/low availability strategy will encourage growers to cut rates to allow more sprays to be applied. Obviously, this would be disastrous for resistance management.

The use of meshed enclosures to physically exclude *Plutella* moths from cabbage beds was discussed. Although this had been evaluated over the past few years, it had now been virtually abandoned. The nets blew over, got dirty, cut down on light and increased humidity under the nets. This resulted in lower yields, shorter shelf life of harvested cabbages, increased disease problems and less desirable working conditions.

If resistance develops to abamectin in *Plutella*, then the Thai cabbage industry will be in severe trouble. Traditional vegetable growing areas around Bangkok will stop growing cabbages which will have to be grown further inland or imported. Unless some sort of resistance management programme is adopted, then these new areas will also be at risk. The possible introduction of the Ciba-Geigy thiourea insecticide (Polo), may introduce a new chemical group to rotate with abamectin.

The second area visited was a cotton growing area at Tak Fa, some 200 km north of Bangkok. The area of cotton in Thailand this season is around 5,000 ha. At its peak, over 150,000 ha was grown. This drop in area is attributed mainly to the advent of pyrethroid resistance in *Heliothis armigera*, the main pest of cotton in Thailand. I visited field trials which had been sprayed weekly (up to 11 applications) with Decis or Karate at rates around 50% higher than those applied in Australia. These plots had cotton bushes close to 3 metres high with little or no fruit. The best treatments were those sprayed with endosulfan, chlorfluazuron (a chitin inhibitor) and some OP's. The few commercial crops had only moderate yields despite the high costs of insect control. There is no doubt that pyrethroid resistance has been the prime reason for the demise of the cotton industry in Thailand.