1992. DAN67C VE

NSW AGRICULTURE

NARS NF:LW

NARRABRI AGRICULTURAL RESEARCH STATION

91/368
to director 30/10

30.10.92

FINAL REPORT ON OVERSEAS TRAVEL

I would like to submit the following final report on overseas travel to the XIX International Congress of Entomology held in Beijing, Peoples' Republic of China, July 1992.

Neil W. Forrester
Special Entomologist
11th September, 1992

To: 1. Regional Director of Research, NEHM, Tamworth.
2. Regional Director of Agriculture, NEHM, Gunnedah.

Copies also sent directly to:
Program Manager (Fibres, Oils & Specialty Crops), Orange.
Director, Overseas Project Section, Orange.
Principal Officer (External Funding), Orange.

COTTON RESEARCH & DEVELOPMENT CORPORATION
FINAL REPORT ON OVERSEAS TRAVEL 1991/92

1. Project : DAN 67C (Attendance at XIX International Congress of Entomology)

2. Organisation : NSW Agriculture

Officer : Dr N.W. Forrester
Special Entomologist
Agricultural Research Station, Narrabri.

Project Supervisors : Dr W.K. Mason, Regional Director of Research
Agricultural Research Centre, Tamworth, NSW.

Dr R. Spurway, Program Manager (Fibres, Oils & Specialty Crops)
Orange, NSW.

3. Itinerary :

27–28 June	Narrabri – Beijing
29 June – 4 July	XIX International Congress of Entomology
5–6 July	Visit Plant Protection Institute in Beijing
7 July	Beijing – Jinan
8 July	Jinan – Liaoceng, visit cotton areas
9 July	Liaoceng – Nanjing
10–11 July	Visit Nanjing Agricultural University, visit cotton areas
12 July	Nanjing – Shanghai
13 July	Visit Shanghai Institute of Entomology
14–19 July	Shanghai – Narrabri

4. Final Report : The main aim of this trip was to accept the invitation of the Organiser of the Symposium on "The Realities of Insecticide Resistance Management" (Dr George Georghiou) to present a paper on "Nine Years of organised pyrethroid resistance management in *Heliothis armigera* in Australia : what has been learned?" at the XIX International Congress of Entomology in Beijing. While in China the opportunity was taken to visit the cotton growing areas of central eastern China and to review the extent and severity of the field resistance problem in cotton insects. Visits were also paid to research Institutes in Beijing, Liaoceng, Nanjing and Shanghai to discuss the latest findings in resistance management.
More detailed notes are given in the accompanying Appendix.

5. Financial Summary :

Allocation		$3,070
Expenses incurred		
Sustenance	1,559	
Airfares/Internal Transport	1,741	
Travel Insurance	100	
Others (Exchange Commissions, Departure Tax, Taxis, Medical Costs, Incidentals, Conference Registration Fee, etc)	367	
	3,767	
Balance of Allocation		$0.00

APPENDIX

XIX International Congress of Entomology – Main points from selected papers.

Melin	–	pH over 8.0 simulates conditions in insect gut. Therefore be careful of high pH water for mixing with Bt.
	–	has an artificial diet for diamondback moth.
	–	bioassays with Bt :– discards if slope less than 1.5; redo if 1.5–2.0; average slope of 2.5 (mosquitoes 2.5 to 6.0).
	–	fenoxycarb makes larvae graze more in apples.
	–	feeding stimulants or masking agents present in crude fermentation products. Therefore, prevent overpurification.
	–	sub lethal low doses of synthetic insecticides pre–dispose insects to Bt.
Devonshire	–	has cloned a gene for *kdr* in houseflies and can identify heterozygous and homozygous *super kdr*.
	–	Lowest resistance to simple benzyl alcohol pyrethroids, higher to bioresmethrin and highest to 3–phenoxybenzyls.
Brown	–	negative cross resistance between monocrotophos and carbamates in AChE resistant *Heliothis virescens*.
Yu	–	maize leaves induce more mfos than silks
	–	insecticide induction is inheritable
	–	cotton leaves activate parathion (more than artificial diet)
Curtis	–	permethrin impregnated bed nets select only females
	–	phoxim/pyrethroid mixtures are synergistic
	–	recommending pyrethroid/pyriproxyfen mixtures for bed nets to sterilise resistant mosquitoes
Yunquin	–	intercropping cotton/wheat increases aphid parasitism
Chiu	–	Derris dust mixed with pyrethroids or Bt against diamondback moth
Georghiou	–	Bt products currently account for about US$90 million of the US$105 million Biocontrol market
	–	*Plodia* and *Plutella* resistant to CryIAb toxin, are not cross resistant to CryIB or CryIC.
Eto	–	mentioned use of a fospargyl synergist
Chen	–	Pix in cotton increased gossypol in leaves, squares, bolls but less tannins. Resulted in reduced egg lay and reduced/slower growth of larvae.

Horowitz – pyriproxyfen is translaminar and has persistent transovarial activity (up to 1.5 months control of whitefly)

Crosby – indicated petal, phloem and pollen/anther specific gene expression in *Brassica napus*

Boulter – cowpea trypsin inhibitor (*cpti*) is up to 1% of soluble protein. Is effective on boll weevil and other coleoptera as well as lepidoptera

– lectins are additive (not synergistic) with the *cpti*

– lipoxygenase lectin from snowdrops is active on brown planthopper

Whalon – Bt resistant Colorado potato beetles are initially smaller, later no differences

– one major dominant gene, several minor genes

– on transgenic potato plants, beetles feed on the stems rather than leaves

– some interaction of Bt and benzoylphenylureas (chitin inhibitors) which prevent renewal of the peritrophic membrane

Shelton – migrant diamondback larvae on transplants is the major cause of spread of resistance in the USA

– no cross resistance between *Bt azawaii* and *Bt kurstaki* strains

Gould – Selection with CryIAc in *Heliothis virescens* resulted in a semi-dominant resistance with –
- 50x R to CryIAc
- 50x R to CryIIA
- 12x R to CryIAb
- low R also to CryIAa

– resistance mechanism is not target site binding insensitivity

Rong-sen Li – *Bt* low to absent in alluvial soils

– most commonly found in muddy or paddy soils

Patil – monocrotophos is the most widely used OP in India

Xia – working on IPM in the Yellow river valley (two thirds of China's cotton)

– uses dynamic thresholds 1st gen on cotton – 200–250 eggs/100 plants
2–4th gens on " – 100–150 eggs/100 plants

Visit to Plant Protection Institute in Beijing

Dr Cen Wei outlined the present situation in cotton:–

- very heavy pressure of first generation of *Heliothis* on wheat due to a warm winter, followed by a dry spring and no cultivation of overwintering pupae.
- very heavy pressure of second generation *Heliothis* on cotton (up to 20 eggs/plant). No less than 10 eggs/plant every day for 10 days in June.
- Chinese monitor moth numbers in dried poplar branch traps. The peak catch in one village was 18 kg moths on one night (19 June) (5,000 moths/kg). For the first time in nearly 20 years, the Chinese government is paying farmers (100 yuan for 1 kg moths) to aid in control.
- sprays (often 4–5 way mixes) were applied every 2–3 days (total of 5) with about 80% control of the first generation on cotton.

Visit to Liaoceng Cotton Growing Area (Yellow River Valley)

- Liaoceng county is 8,600 square kilometres with 500,000 ha of cultivated land.
- 4 million population (1 person/2 mu). (One mu = 660m^2 = ^{1}/15 ha).
- only 3 crops (267,000 ha cotton; 300,000 ha wheat; 166,000 ha maize).
- Cotton is intercropped with wheat.
- 4–5 generations of *Heliothis* per year (30% enter 5th generation)

Visit to Nanjing Agricultural University

- designated as the National Monitoring Centre for 24 pest species.
- for *Heliothis*, test 6–13 mg 3rd instar larvae.

Mr Wu (PhD student) presented results on his research:–

- *Heliothis armigera* is 2,000x resistant to fenvalerate with

cross R to	deltamethrin	20x
	cypermethrin	10x
	lambdacyhalothrin	10x
	esfenvalerate	100x

- Pbo (4 micrograms per larva) reduces 2,000x fenvalerate resistance to 17x
- TPP has no effect
- SV_1 synergist not as good as Pbo
- Selected a population for 15 generations with fenvalerate to find:–

fenvalerate	120x
deltamethrin	5.2x
cyhalothrin	0.7x
cypermethrin	2.5x
permethrin	0.9x

fenpropathrin	30.5x
monocrotophos	1.5x
methamidophos	1.9x
methylparathion	0.3x
methomyl	0.7x

Visit to Shanghai Institute of Entomology

Professor Du – explained his work on control of *Heliothis* using viruses dispensed via self–dosing pheromone traps.

- claimed 15 days residual activity of virus in traps
- dosed moths resulted in 70–80% kill of small larvae
- is now attempting to isolate the attractive agent from dried poplar branches so that he can dose both male and female moths
- also explained his work on mating inhibiting compounds isolated from hair pencils of male *Heliothis armigera* moths

Professor Li

- working on pyrethroid resistant pink bollworm
- in charge of sterile moth release programme

ACTION FOR FOLLOW UP ON RETURN

1. Research phoxim as a pyrethroid synergist.
2. Research interaction of benzoylphenylureas and fenoxycarb with Bt.
3. Advise NSW Agriculture vegetable entomologist on the role of infested transplants in the distribution of diamondback moth resistance problems.
4. Advise Cotton R & D Corporation of the desirability to keep up to date with the research findings coming from the Shanghai Institute of Entomology (particularly the pheromone and chemical ecology research units). The work on the attractive agents in *Populus* spp. is particularly interesting as it may lead to a simple, clean and effective method of trapping both female and male moths.