Final Report

Part 1 - Summary Details

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Project Title: Travel and Conference Participation - Pacific Rim Conference on the Biotechnology and Environmental Impact of *Bacillus thuringiensis*, Victoria, British Columbia

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Part 2 – Contact Details

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TRAVEL REPORT

1. A brief description of the purpose of the travel.

To participate in the 5th Pacific Rim Conference on the Biotechnology and Environmental Impact of *Bacillus thuringiensis* and present a paper on our research into the fitness costs associated with Cry1A resistance in *H. armigera*.

2. What were the:

a) major findings and outcomes

The evidence points to the Cry toxins having to bind more than one receptor molecule to create the pores that lead to death of the host. In each species tested, a cadherin-like molecule has been identified as one of the receptors. However, the co-receptor may vary between species. Aminopeptidase N, which was the first Cry receptor identified, is important in species like *Manduca sexta* but in other species (e.g. *Heliothis virescens*) alkaline phosphatase appears to be important. Glycolipids may also play a role but in what manner is uncertain.

Tabashnik's group has detected Cry2Ab resistance in pink bollworm. No details were available.

A significant shift in target specificity of a Cry protein has been demonstrated. The putative binding loops of Cry1Aa were modified by protein engineering, converting a lepidopteran-toxic to a dipteran toxin.

Some preliminary work on developing markers through microsatellites for Cry1A resistance in *H. armigera* was reported. It was not evident that this approach had a great deal to offer.

A value adding approach to Bt transgenic rice was presented. After separating the grains, the rice stems were dried, powered and formulated as a sprayable bioinsecticide for use on other crops.

Herculex®RW, a transgenic maize expressing the Cry34/35 binary toxins, has full regulatory approval for food and stock feed in the USA. Herculex was developed by Dow AgroSciences.

b) other highlights

Further information on the safety of Bt sprays was presented in papers discussing the use of sprays over urban areas in British Columbia to control gypsy moth incursions. No adverse health findings were attributed to the use of sprays.

Sharon Downes presented a paper on Cry2Ab resistance in *H. armigera*, Robin Gunning presented her findings on the esterase model for Cry resistance, Oliver Knox presented a poster on the evaluation of the impact of Bt cotton on the soil biota and I presented a paper on the fitness costs associated with cry1A resistance in *H. armigera*. The conference was also attended by Stewart Addison, Monsanto.

3. Detail the persons and institutions visited, giving full title, position details, location, duration of visit and purpose of visit to these people/places. (NB:- Please provide full names of institutions, not just acronyms.)

The conference was the sole activity undertaken on this trip. The Biocontrol Network, Canada had planned to run a workshop after the conference. However, priority shifts meant that the workshop will be held at a later time.

4. a) Are there any potential areas worth following up as a result of the travel?

The role of alkaline phosphatase as a co-receptor for Cry1A in *H. armigera* will be worth pursuing as a step towards providing a sensitive and efficient diagnostic for resistance monitoring.

b) Any relevance or possible impact on the Australian Cotton Industry?

No immediate impacts, though the Tabashnik group's work on Cry2Ab resistance in pink bollworm may be useful.

5. How do you intend to share the knowledge you have gained with other people in the cotton industry?

The outcomes of this conference are of most immediate interest to researchers working on resistance to transgenic cotton, notably the CSIRO groups at ACRI and in Canberra and Robin Gunning at Tamworth. I will meet with the members of these groups to discuss the issues addressed and findings reported at the conference.