



Australian Government
**Cotton Research and
Development Corporation**

TRAVEL & CONFERENCE REPORT

Part 1 - Summary Details

Please use your TAB key to complete Parts 1 & 2.

CRDC Project Number: MQ1401

**Project Title: Gut-content analysis of cotton field predators
using ELISA**

Project Commencement Date: May 16 2014 **Project Completion Date:** May 31 2014

Select Research Program (from CRDC Strategic R&D Plan 2008-2013):
- Please Select One -

Part 2 – Contact Details

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Part 3 – Travel Report

(Maximum two pages)

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

I (Dalila Rendon) visited the US Department of Agriculture Arid-land Research Center during 16 May – 31 May 2014. Supervised by Dr. James Hagler, the purpose of this trip was to learn the protocols for Enzyme-Linked Immunosorbent Assay (ELISA), and how to use this technique to identify the presence of pests in the gut of natural predators in cotton fields.

2. What were the:

a) major findings and outcomes

ELISA is a very sensitive test that detects the presence of a specific protein using antibody tagging. These specific proteins can be used to mark prey items (pests), which can then be identified in the gut-content of a predator (beneficial in cotton fields). We evaluated two methods: indirect ELISA and “sandwich” ELISA; and two protein marks: rabbit and chicken IgG. There was a difference in the detectability of the protein tags in different pest preys. Whitefly marks were difficult to detect, regardless of the method of application, while small topical marks on the tarnished bug *Lygus* spp showed positive in the assays.

b) other highlights

There was no difference in the detectability between chicken or rabbit protein marks on any prey. Likewise, there was no difference in the detectability of any protein mark depending on method of application, topical vs ingested. The presence of predator remains and gut enzymes seem to interfere with indirect ELISA, so a “sandwich” ELISA is recommended for gut-content analysis.

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.)

Dr. Steve Naranjo
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Dr. James Hagler
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The whole duration of my visit (16 May 2014- 31 May 2014) was spent at this facility, and all the assays were done in Dr. Hagler’s laboratory.

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

The main limitation of this technique is the risk of “false negatives”, where a protein mark on a pest is not detected, despite having been consumed by the predator. A pilot experiment before the Australian 2014-2015 cotton growing season will focus on determining for how long can the protein tag be detected after a predator (wolf spider) consumes a 5th instar *Helicoverpa armigera* larva that has been tagged through agar diet.

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

Since Bt-cotton needs less insecticide applications, the diversity of natural enemies in these fields is greater than in conventional cotton fields. Current studies suggest that natural enemies do not only reduce densities of pests, but it can also delay the emergence of resistance to Bt-toxins. Therefore, assessing the impact of natural enemies on pest control is important when designing Integrated Pest Management (IPM) protocols. Molecular techniques for gut-content analysis such as ELISA provide a tool for determining the impact of predators on prey in cotton agroecosystems.

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

For the 2014/2015 cotton growing season at the Australian Cotton Research Institute (ACRI), I intend to assess the predation of wolf spiders on late instar *Helicoverpa armigera* larvae by doing gut-content analysis using the ELISA technique. This will be done by stacking conventional cotton fields with protein-marked *Helicoverpa armigera* larvae, and collecting wolf spiders present in the same fields for gut-content analysis. These experiments will produce two papers for publication. I also intend to present these results in the 2015 annual Cotton Research Conference.

6. Please list expenditure incurred. (Double click inside the table to enter the data)

Please email at least 60 days after travel/conference to: research@crdc.com.au