FINAL PROJECT REPORT

Project Title: Identification of Bt toxin targets in codling moth larvae

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Other funding Sources - none

Total Project Funding:

Budget History:

Item	**Year 1: 2007**	**Year 2: 2008**	**Year 3:**
Salaries			
Benefits			
Wages	6,240		
Benefits	150		
Equipment			
Supplies	28,110		
Travel	500		
Miscellaneous	5000		
Total	40,000	0	

ORIGINAL OBJECTIVES

The specific objectives of this proposal include:

1) Determine the potencies of 10 Bt toxins against codling moth larvae and cell line.
2) Determine the mode of action of the most potent Bt toxins.
3) Identify key molecules affected by the bioactive Bt toxins
4) Clone transcripts encoding the key molecules affected by Bt toxins
5) Develop a cell-based assay system to search for novel insecticides that alter key molecules affected by Bt toxins

Revised Objectives converting original objectives from a 3 year to 2 year time line as requested by Jim McFerson.

Year 1

1) Determine the toxicity of Bt toxins against codling moth larvae and a codling moth cell line
2) Using the codling moth cell line as a model, determine Bt toxin effects on signal transduction pathways using established assays that monitor chemical signals and cell response.
3) Determine Bt toxin membrane receptors in codling moth larvae and cell line.

Year 2

1) Determine the effects of Bt toxins on signal transduction pathways in codling moth larvae.
2) Identify the key molecules affected by the bioactive Bt toxins.
3) Clone genes encoding key signal transduction proteins affected by the Bt toxins.

SIGNIFICANT FINDINGS

This project got off to a slow start and a no cost extension was requested last year. The findings of this project regarding codling moth are minimal. We have spent much of the past year developing procedures to 1) extract and purify Bt toxins and 2) determine cell line toxicity. We will be using the remaining funds to complete work on the codling moth over the next year.

While the above procedures were being developed, we used our time to characterize a phenomenon observed in a *Helicoverpa zea* colony (corn earworm/cotton bollworm) that is resistant to the affects of Bt toxin. Because our hypothesis is that Bt toxins exert their affects on signal transduction pathways, we started to explore the resistance mechanism of the Bt resistant H. zea colony. The following findings have been made:

1) Males of the Bt resistant *H. zea* line do not recognize females. We have verified this observation using synthetic pheromones in the flight tunnel. This study is ongoing.

2) A member of the pheromone receptor family expressed in Bt susceptible *H. zea* has not yet been detected in the Bt resistant colony.

3) The G-protein that mediates signal transduction of odorant receptors in the antenna has not yet been detected in the Bt resistant colony.

RESULTS AND DISCUSSION

Currently we do not have completely analyzed data for this project. We would respectfully request an extension for submission of this section and the EXECUTIVE SUMMARY until June of 2009, to give us the opportunity to verify, by repetition, the results that we do have and to finish the work on analyzing the affects of Bt toxins on signal transduction molecules.