Investigating RNA Interference as a Method of Varroa Mite Control

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PROJECT SUMMARY

Objectives:

Investigate the potential for using RNA interference (RNAi) gene silencing as a control strategy for Varroa mite.

- Determine the effect of injecting double stranded RNA of a few selected genes on Varroa mite survival and reproduction.
- Contingent upon the success of the above step, explore ways that dsRNA can be introduced to Varroa mite via the honey bee larvae.

Background and Discussion:

RNA interference (RNAi) is a new technology which interferes with normal gene transcription and the production of proteins needed to carry on normal biological processes. This disruption, also called "gene silencing" via RNAi interference is being investigated as a new and novel means of pest control for several pests. This project is to investigate Varroa mite control using RNAi technology.

The technique being investigated involves introducing a piece of double stranded RNA (dsRNA, 500-600 base pairs) into the mite *Varroa destructor*. The dsRNA is broken up into small pieces (about 20 base pairs). These small base pairs then bind to and disrupt the ability of the target organism messenger (mRNA) to act as a template for protein production. This is a break in the chain of events from gene to protein production. This disruption prevents or reduces the production of proteins or enzymes needed for normal biological functions. Preliminary studies have successfully caused an 87% reduction in gene expression by injecting dsRNA of the sodium channel gene into Varroa mites.

This study will determine the effect of injecting double stranded RNAs of a few selected genes on Varroa mite survival and reproduction. Injecting dsRNA of these genes has been effective in causing death or reduction of egg-laying in ticks. We will try to find the homologs of these genes in the mite genome, construct dsRNA for these genes, and then inject to mites and observe their survival and/or reproduction. If this step is successful, then ways that RNAi can be introduced to mites via the honey bee larvae will be explored.

This past summer we have studied the effect of introducing dsRNA against two genes in the Varroa and the results will be reported in a poster in the upcoming Almond Industry Conference December 2011.

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For More Details, Visit

- Poster location 43, Pollination Pavilion, Session 3; or on the web (after January 2012) at AlmondBoard.com/AICposters