Determining the Route of Detoxification of Insecticides Used to Control Navel Orangeworm (NOW)

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PROJECT SUMMARY

Objectives:

- Sequence the navel orangeworm (NOW) genome using Illumina sequencing and manual annotation.
- In addition, continue research on characterizing cytochrome P450 genes that may potentially influence insecticide resistance, as well as research on manipulating the rate of detoxification using phytochemicals present in almonds.

Background and Discussion:

This research effort is using affordable next-generation sequencing techniques to characterize the entire genome of the navel orangeworm, *Amyelois transitella*, and in doing so provide an immense and useful set of tools for identifying gene targets for biorational chemical control of this pest.

The sequencing and annotation of the navel orangeworm genome is well underway. With a projected genome size of 400 Mb, the NOW genome is comparable in size to other sequenced lepidopteran genomes*).* Manual gene annotation of detoxification and chemosensory genes is in progress. To complement this effort we performed larval midgut Illumina RNAseq and are now querying the database with annotated lepidopteran cytochrome P450 detoxification genes. We have identified 12 NOW-specific P450 transcripts in the CYP6A family, 6 in the CYP6B family, and 4 in the CYP321 family, all of which are related to genes involved in phytochemical, pesticide, and aflatoxin detoxification in other lepidopterans. Work will begin soon to characterize chemosensory protein genes (e.g., odorant binding proteins, olfactory receptors, gustatory receptors) that mediate host finding and larval feeding.

Ultimately this research should be useful for the development of oviposition and larval feeding disruption strategies to reduce insecticide input; we hope that this work, once completed, will be of use to the entire almond industry and to associated researchers.

As well, work continues from our 2011 project (11.ENTO1.Berenbaum) using bioassays to characterize detoxification systems in NOW contributing to insecticide and phytochemical metabolism.

Project Cooperator: Joe Siegel, USDA/ARS, Parlier

For More Details, Visit

- Poster location 41, Exhibit Hall A and B during conference; or on the web (after January 2013) at www.almondboard.com/researchresports
- 2011.2012 Annual Report CD (11.ENTO1.Berenbaum); or on the web (after January 2013) at www.almondboard.com/researchreports
- Related Projects: 12.ENTO11.Siegel/Walse