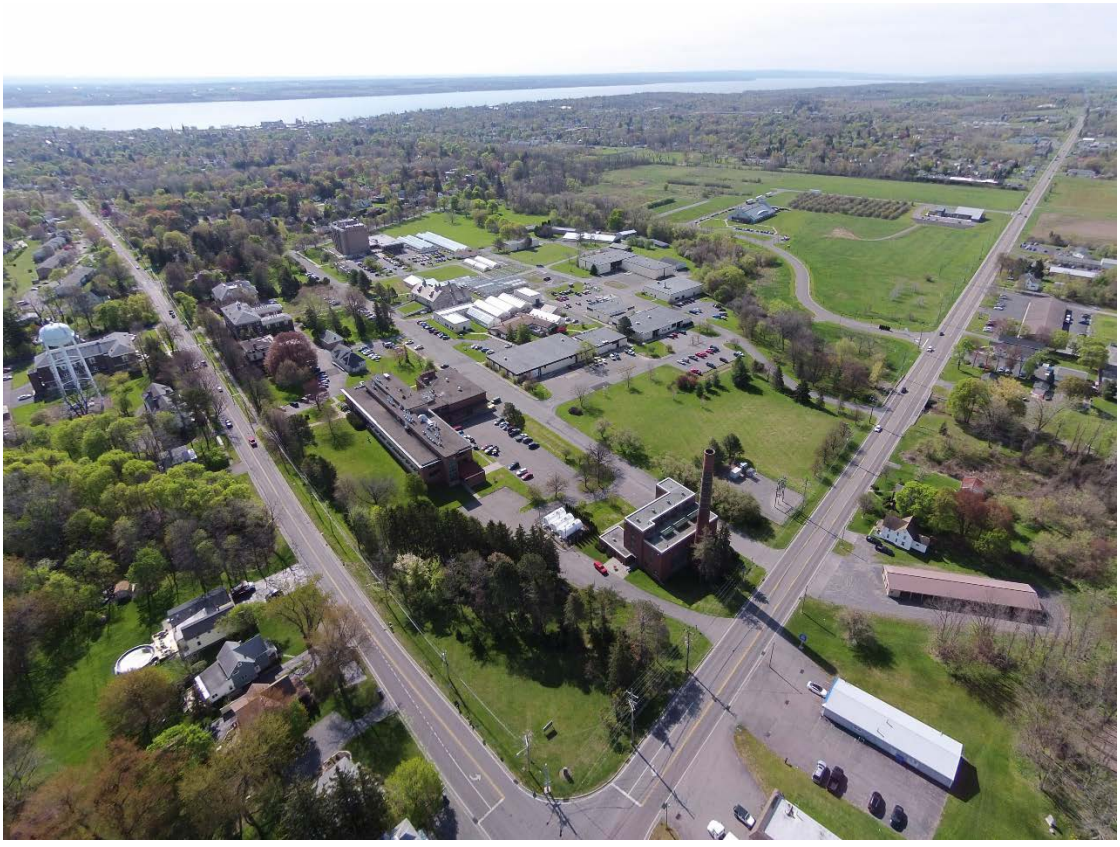
Proceedings of the

2017 Geneva Summer Research Scholars Program

Undergraduate Research Poster Session

July 28, 2017

Geneva, NY



Cornell University
College of Agriculture and Life Sciences
New York State Agricultural Experiment Station

These abstracts report the results of research performed by undergraduate interns participating in the ***2017 Cornell University Geneva Summer Research Scholars Program***

This program was supported by the AFRI Food, Agriculture, Natural Resources and Human Sciences Education and Literacy Initiative, USDA – National Institute of Food and Agriculture, Grant No. 2016-67032-25009.

and

USDA Federal Capacity Funds administered by the NY State Agricultural Experiment Station through a grant entitled *Agriculture and Food Production Summer Internship Opportunities for Undergraduates: A Cross-Departmental Summer Scholars Program at Cornell University's New York State Agricultural Experiment Station.*

Additional funds were provided by

New York State Agricultural Experiment Station Director's Discretionary Fund
Cornell University College of Agriculture and Life Sciences Alumni Association
Marilyn Hicks, Hicks Nursery, Westbury, NY
HM Clause, Inc., Davis, CA
National Science Foundation Plant Genome Research Program grant IOS-1339211 to KX
Support for Summer Scholar research expenses was also provided by grants awarded to individual faculty mentors too numerous to list.

Special thanks to Dr. Patricia Mowery as liaison and Hobart and William Smith Colleges for providing residential housing for summer scholars.

These proceedings can be found on-line at

http://www.scholars.pppmb.cals.cornell.edu/

[11] Analysis of mutations and expression of ABCA1 and ABCA2 genes in cabbage loopers resistant to Bt toxin Cry2Ab

Hannah Chu[1,2], Xiaowei Yang[2], and Ping Wang[2]

[1]Dept. of Science, John Jay College of Criminal Justice, New York, NY 10019
[2]Dept. of Entomology, Cornell University, Geneva, NY 14456

The cabbage looper, *Trichoplusia ni* (Hübner), is a pest of crucifers and other crops that has developed resistance to the microbial pesticide, *Bacillus thuringiensis* (Bt). The resistance to Bt toxin Cry2Ab in *T. ni* has been genetically mapped to the ABCA1 and ABCA2 gene locus. This project aims to identify mutations and analyze the expression of these two genes in the midgut of Cry2Ab-resistant *T. ni.* The cDNAs of the ABCA1 and ABCA2 genes were obtained by RT-PCR of midgut mRNA from the susceptible and Cry2Ab-resistant *T. ni* larvae and were subsequently sequenced to identify mutations in Cry2Ab-resistant *T. ni*. Real-time RT-PCR analysis was used to quantify the expression levels of the two genes in the larval midgut and carcass from both the susceptible and resistant strains of *T. ni*. Results indicated that ABCA2 expression was abundant in the larval midgut compared to that in the carcass. In contrast, ACBA1 was expressed mostly in the carcass while expression in the midgut was rare. Missense and deletion mutations were found in the ABCA2 gene in the resistant strain. These findings provide information for further studies on the association of mutations in the ABCA2 gene with Cry2Ab resistance, which is crucial for management of Bt resistance in insects.

[12] Insect vectors of grapevine red blotch virus in a Napa County, CA vineyard

Anuli Onwumelu[1,2], Elizabeth Cieniewicz[2], and Marc F. Fuchs[2]

[1]Dept. of Environmental and Forest Biology, State University of New York, College of Environmental Science and Forestry, Syracuse, NY 13210
[2]Plant Pathology and Plant-Microbe Biology Section, School of Integrative Plant Science, Cornell University, New York State Agricultural Experiment Station, Geneva, NY 14456

Grapevine red blotch virus (GRBV), the causal agent of red blotch disease, is an emerging virus of grapevine. In 2015 and 2016, insect vector candidates of GRBV were identified in a *Vitis vinifera* Cabernet franc vineyard in Napa County, CA where secondary spread of GRBV was documented. Among the vector candidates, the three-cornered alfalfa treehopper (*Spissistilus festinus* [Say]) was recognized as a vector of epidemiological significance. The objective of this study was to investigate the community of insects in a nearby Cabernet Sauvignon vineyard where GRBV is present, but is not spreading. Sticky card traps were placed in the aforementioned Cabernet Sauvignon vineyard from April to June, replaced weekly, and shipped to us for analysis. Individual insect specimens were identified and removed from the sticky card traps for isolation of DNA. Diagnostic multiplex polymerase chain reaction targeting two regions of the GRBV genomic DNA was performed to determine if insects had ingested GRBV. Previously identified vector candidates comprised less than 0.02% of the total specimens on the traps. Insects that consistently test positive for GRBV will be evaluated for their ability to transmit GRBV from infected to healthy vines. Identifying potential insect vectors of GRBV and understanding their seasonal population dynamics in vineyards is critical for optimal disease management.