

Northeast Regional IPM Grants Program Interim Project Report

A. Grant Data

- Grant #: 2004-41530-01856
- Title: Promoting Apple IPM Implementation in Eastern New York Orchards by Expansion of the Northeast Weather Association System
- Lead investigator (name, title, institution, address, phone, fax, email): Juliet E. Carroll, Senior Extension Associate, Cornell University, NYS IPM Program, 630 W. North St., Geneva, NY 14456-0462, 315-787-2430, 315-787-2360, jec3@cornell.edu
- Team members (name, title, institution):
 - Michael J. Fargione, Senior Resource Educator, Hudson Valley Fruit Program, Cornell University
 - Kevin A. Iungerman, Extension Associate, NE NY Fruit Program, Cornell University
 - Cheryl TenEyck, Programmer/Analyst, NYS IPM Program, Cornell University
 - John Gibbons, Extension Community Educator, Ontario County Cornell Cooperative Extension, Cornell University
 - Derrick Doubrava, Apple Grower, Minard Farms
 - David Fraleigh, Apple Grower, Rose Hill Farm
 - Donald Green, Apple Grower, Chazy Orchards, Inc.
 - Kevin Bowman, Apple Grower, Bowman Orchards
- State(s) involved: New York
- Years funded: 5/1/2004 to 4/30/2007
- Funding amount: \$15,000

B. Nontechnical Summary. To conduct integrated pest management (IPM) for eight major pests, apple growers must use weather information and pest forecast models. The Northeast Weather Association (NEWA) can provide both for free, fostering IPM implementation, environmental conservation, and land stewardship. To expand NEWA into Eastern NY, four growers are committed to purchasing weather stations, connecting to NEWA, and serving as grower educators to promote IPM implementation and the sustainability of apple production in their region. In this critical steps project cooperating growers will learn how to use NEWA, source weather data, interpret weather data and pest forecast models, and integrate weather data with scouting and monitoring to improve IPM practices. The outreach plan will target all other apple growers in Eastern NY who will benefit from the expansion of NEWA into their region. The NEWA system will be upgraded to deploy the oriental fruit moth model and to use a weather database to improve data collection and web delivery. The project will be evaluated through feedback during the growing season, grower satisfaction with the NEWA system, and analysis of IPM practice implementation. Because current apple IPM practices require the use of pest forecast models and not every grower has a weather station, the advantages of the NEWA system's instantaneous outreach potential to all growers in Eastern NY are considerable.

C. Introduction. The importance of the apple crop in New York is significant, being the second largest producer of apples in the USA, having a market value of \$102 million in 2002. In 175 Eastern NY fruit farms, 13,000 acres of apples are grown. This project partners with four Eastern

NY growers of 1216 acres of apples to expand NEWA to reach all 13,000 acres of apples in the region. The NEWA weather data and pest forecast models generated in Eastern NY will be available via the Web to all growers throughout Eastern NY and the adjacent areas of VT, MA, CT and Quebec.

The problem is the unavailability of NEWA in the apple-growing regions in Eastern New York. This is critical because, to conduct integrated pest management (IPM), apple growers must use weather information and pest forecast models. NEWA can provide both for free, fostering IPM implementation, environmental conservation, and land stewardship.

The insects and diseases of apples for which forecast models are delivered via NEWA include eight major direct and indirect pests. Apple IPM practices require the use of pest forecast models for codling moth, obliquebanded leafroller, oriental fruit moth, plum curculio, San Jose scale, spotted tentiform leafminer, fire blight, and apple scab, all of which can be delivered via NEWA to enhance environmental stewardship and risk management by growers and their advisors. Apple pesticide programs are targeted specifically to manage these pests and implementing NEWA pest forecast models will improve risk management and minimize pesticide inputs.

Because the expansion of NEWA and implementation of pest forecast models is built on the commitment of the Commercial Tree Fruit Extension Educators and four apple growers in Eastern NY it has a high probability of success in being widely implemented. The project to expand NEWA was undertaken to enhance the ability of apple growers to conduct IPM and for Cooperative Extension Educators to deliver timely IPM pest forecast information to growers in the region since the weather information collected via NEWA is freely shared via the Web.

Beyond just benefitting the apple industry, NEWA weather data and pest forecast models benefit other commodities being grown in the regions that NEWA covers. In addition, this project will benefit NEWA directly in modernizing and updating the current network and web-delivery systems.

D. Objectives.

1. Expand NEWA with at least four, grower-owned, weather stations located in Eastern NY apple orchards to collect weather data and disseminate IPM pest forecast model information via NEWA to the apple industry in Eastern NY.

This objective will be undertaken in the second year of the project. A grant was obtained from NE SARE for this objective in year one. It is currently underway.

2. Educate apple growers on using NEWA, weather stations, sourcing weather data, and integrating weather data with scouting and monitoring to improve IPM practices.

Because of technical difficulties with changing weather station manufacturers, less progress was made on this objective than anticipated. This work is continuing in year two.

3. Upgrade NEWA to a database system to enhance web output and flexibility in deploying pest models and deploy the oriental fruit moth degree-day model developed by Dr. Larry Hull, Department of Entomology, Pennsylvania State University.

We continued to share a weather database with a research lab and continued to refine NEWA web output. We developed three tools for NEWA users, a Spectrum Data Conversion program, Degree Day Calculator and an Apple Pest Degree Day Calculator.

E. Approach. Under Objective 1 - our approach is to install at least eight weather stations on apple growers' farms in Eastern NY, four in year one and four in year two. In year one, with funding from a grant from NE SARE, weather stations purchased by the four participating growers were connected to NEWA, as listed in the Table below.

| Apple Grower | Farm Name | City | NEWA Web Page |
|------------------|----------------------|--------------|---|
| Derrick Doubrava | Minard Farms | Clintondale | http://newa.nysaes.cornell.edu/clnton.htm |
| David Fraleigh | Rose Hill Farm | Red Hook | http://newa.nysaes.cornell.edu/redhook.htm |
| Donald Green | Chazy Orchards, Inc. | Chazy | http://newa.nysaes.cornell.edu/chazy.htm |
| Kevin Bowman | Bowman Orchards | Clifton Park | http://newa.nysaes.cornell.edu/clifton.htm |

Five additional NEWA weather stations will be installed in Eastern NY this fall and winter. RainWise Inc. has developed a consumer line of weather stations for the NEWA system that includes a leaf wetness sensor and compatible software. Growers will be trained in the use and application of the NEWA weather network.

Under Objective 2 - Mike Fargione, Kevin Iungerman, and I gave talks about NEWA at winter fruit schools. The weather stations installed in 2005 were utilized to drive pest forecast models during the 2005 growing season.

Under Objective 3 - the NEWA system continues to use a weather database created with NEWA weather data by Kyurang Kim and Robert Seem, Department of Plant Pathology, Cornell University to drive the Spectrum Data Conversion, the Degree Day Calculator, and the Apple Pest Degree Day Calculator. The calculators were de-bugged during the past year.

Given the delicacy of a database transition, we developed a detailed technical and conceptual plan for transition of the complex NEWA data and web content to a new website and database structure with Spider Graphics Corp., Ithaca, NY. This plan has been shared with the leadership of the NYS IPM Program and NEWA committee members.

F. Progress. We continued working with RainWise and developed their MK III weather stations for the NEWA network. These weather stations are less expensive, standardized, and were retro-fitted with leaf wetness sensors. RainWise developed software to interface with the NEWA data system and to potentiate FTP-delivery of weather data to eliminate the need for lightning-sensitive modems. One of these new weather stations was installed in the network replacing an obsolete station and this prototype is functioning. To date three apple growers in Eastern NY have agreed to purchase a weather station and connect to NEWA.

Weather data from Clifton Park (April 2004), Clintondale (September 2004), Chazy (October 2004), and Red Hook (April 2005) was available on the NEWA web site. Participating growers collected biofix data for pest forecast models on apple scab, fire blight (Cougar Blight), codling moth, oriental fruit moth, obliquebanded leafroller, and spotted tentiform leafminer. A table of apple biofix dates for 2006 was posted at <http://nysipm.cornell.edu/fruits/AppleBiofix.pdf>. Collected weather data was used to inform eastern NY growers about weather patterns associated with apple scab outbreaks and control failures in their orchards.

The weather database maintained by Kyurang Kim for the DMCAst model of grapevine downy mildew continued to be used for NEWA weather data. The Degree Day Calculator <http://www.nysipm.cornell.edu/specware/newa/> and the Apple Pest Degree Day Calculator

<http://www.nysipm.cornell.edu/specware/newa/appledd.php> were debugged. The Apple Pest Degree Day Calculator provides the user with predictions and suggested actions based on the accumulated degree days and insect phenological models.

Spider Graphics developed a comprehensive, 30 page, NEWA data process planning report to serve as an overall guide for the next steps needed in changing from a text-based system to a database system. We now have a clear perspective on the necessary steps to upgrade NEWA to a database system to enhance web output and flexibility in deploying pest models and increasing the number of networked weather stations.

Presentations:

- NEWA-IPM's Network of Weather Stations, National Association of County Agricultural Agents, Geneva, NY (NYSAES), July 2005.
- NEWA – New York's Network for Environment & Weather Awareness, Weather & IPM Conference, East Lansing, MI, October 2005.
- Utilizing NEWA Information to Inform IPM Intervention, Hudson Valley Fruit School, Kingston, NY, February 2006.
- Utilizing NEWA Information for Informed IPM Intervention, NE NY Fruit School, Lake George, NY, March 2006.

Publications:

- Carroll, J., Fargione, M. and Iungerman, K. 2006. Delivering weather-related information to apple growers via the NYS IPM Program's NEWA system. 5th National Integrated Pest Management Symposium, St. Louis, MO.
<http://www.ipmcenters.org/IPMsymposiumV/posters/006.pdf>.
- Gibbons, J., Carroll, J., TenEyck, C., Petzoldt, C.P. and Weigle, T. 2006. NEWA (Network for Environment and Weather Awareness) 2005: A Year in Review. In: Annual Report 2005-2006, New York State Integrated Pest Management Program, Agriculture and Community IPM, Cornell University. NYS IPM Publication No. 503: 136-140.
- Gibbons, J., Carroll, J., TenEyck, C., Petzoldt, C.P. and Weigle, T. 2005. NEWA (Northeast Weather Association) 2004: A Year in Review. In: Annual Report 2004-2005, The New York State Integrated Pest Management Program, Agriculture and Community IPM, Cornell University. 6 pp. http://nysipm.cornell.edu/reports/ann_rpt/AR05/projects/gibbons.pdf.