

2004 Northeast IPM Project Progress 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**

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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 4/30/2006

§ 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.

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 will continue and be expanded 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 achieved this objective. The oriental fruit moth model was deployed in NEWA. We developed two tools for NEWA users, a Spectrum Data Conversion program and a Degree Day Calculator. However, we did not upgrade NEWA to a database system because we found this to be beyond the reach of this project given the complexity and delicacy of the current system. Instead we developed a detailed technical and conceptual plan for the NEWA system and web site transition.

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>

In addition, a list of 11 other potential Eastern NY grower collaborators has been developed and they will be contacted during year two about participation in the NEWA project.

Because the supplier of weather stations that NEWA used, Sensatronics, dropped agricultural data loggers from their product line this caused setbacks in the project. Year one was spent sourcing weather stations from another company, RainWise Inc., and developing software compatibility with the NEWA network. We also collaborated with a grower in Central NY who uses Spectrum weather equipment to initiate steps to develop an interface for data delivery from Spectrum to NEWA.

Under Objective 2, Mike Fargione, Kevin Iungerman, and I gave talks about NEWA at a winter fruit school and a petal fall meeting and wrote articles in extension newsletters. Unfortunately, due to the difficulty in getting the weather stations installed, we were unable to utilize the weather data for the pest forecast models during the 2004 growing season.

Under Objective 3, the NEWA system is using a weather database created with NEWA weather data by Kyurang Kim and Robert Seem, Department of Plant Pathology, Cornell University. We utilized this weather database for NEWA improvements including the Spectrum Data Conversion, the Degree Day Calculator, and the Apple Pest Degree Day Calculator. The oriental fruit moth degree day calculations were created in the current text-based system and posted as monthly text charts. Given the delicacy of a database transition, we chose to develop a comprehensive website plan for NEWA with Spider Graphics Corp., Ithaca, NY. Carroll formed a committee of people familiar with NEWA, including growers, consultants, NEWA staff, extension educators and faculty to meet with Spider Graphics to develop the plan.

F. Progress. We were successful in working with RainWise weather stations for the NEWA network. RainWise extended to participating growers a 30% educational discount for collaborating with Cornell University, assisted us in developing software to interface with the NEWA data system, and are working with us to develop modem-less data transfer systems. The weather station data from the RainWise stations at Clintondale (September 2004), Chazy (October 2004), and Red Hook (April 2005) was available on the NEWA web site. The Clifton Park weather station was a Sensatronics data logger that the grower upgraded and connected to NEWA last year (April 2004). This grower, Kevin Bowman, said he accessed the weather station online every day until harvests started. He really likes NEWA, especially how he can access weather data from his desk on a rainy day. His primary uses have been for apple scab and apple maggot IPM.

The weather data from the above four weather stations is run through the apple scab ascospore maturity model <http://www.nysaes.cornell.edu/pp/extension/tfabp/ascomatb.shtml>, the apple scab

leaf wetness and dryness tables <http://newa.nysaes.cornell.edu/apples/applefor.htm>, the Cougarblight model for fire blight <http://www.nysaes.cornell.edu/pp/extension/tfabp/cougarbl.shtml>, and the degree day tables <http://newa.nysaes.cornell.edu/2005dday.htm> for which insect development predictions relating to IPM-decision-making are given on the NEWA Apple Home Page at http://newa.nysaes.cornell.edu/apple_home.htm.

Two presentations on NEWA were given in Eastern NY reaching 150 growers at the Hudson Valley Winter Fruit School and 20 growers at a Saratoga County petal fall meeting. Two newsletter articles were written by Kevin Iungerman on weather monitoring and forecasting in 2004. The NEWA web site and apple-related web pages were demonstrated to each of the cooperating growers in one on one meetings this spring.

The weather database maintained by Kyurang Kim for the DMCAst model of grapevine was used to develop improvements to NEWA. A programmer was hired to develop the Spectrum Data Conversion program to convert NEWA data to-SpecWare-compatible format. Growers who have SpecWare software can now use NEWA data to run pest models in their SpecWare software. A web page for the NEWA Spectrum Data Conversion program was posted this spring at <http://www.nysipm.cornell.edu/specware/nysaesQuery.html>. We contracted Done Right Web Design, Moravia, NY, to create a Degree Day Calculator and an Apple Pest Degree Day Calculator that also query the weather database. The Calculators are posted at <http://www.nysipm.cornell.edu/specware/newa/> and <http://www.nysipm.cornell.edu/specware/newa/appledd.php>, respectively. The Apple Pest Degree Day Calculator provides the user with predictions and suggested actions based on the accumulated degree days.

Spider Graphics developed a comprehensive 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. The 30 page report and planning document contains a Navigation Plan, included as an Appendix in the accompanying pdf file <new_sitemap.pdf>. We held three planning meetings to thoroughly discuss NEWA and its web presentation. Phase 1 of 4 phases in website redesign and restructuring was completed. 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.