NEWA (Network for Environment and Weather Applications) 2009: A Year in Review

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Abstract: NEWA operated and maintained the weather station network in 2009 with funding from the NYS IPM Program. Six grant projects are underway on a potato late blight simulation model, an apple IPM website, upgrades to grape models, NEWA risk management education and broad-band data transmission. Twelve Rainwise MKIII stations were added to the network and airport weather data was made available from the Northeast Regional Climate Center (NRCC). Twenty-five talks on NEWA were given, reaching an estimated audience of 1140. The newly upgraded web site was launched November. Improvements were based on input from extension educators who will train growers on using the new website in 2010. The NRCC continued quality control and data archiving in their ACIS database, running IPM forecast models, providing hourly data, daily weather summaries, and degree days. The apple disease models now utilize NWS forecasted data to predict model results for the next five days.

Objectives:
1) Operate and maintain the NEWA electronic weather network.
2) Track and promote NEWA usage.
3) Update the NEWA website and pest forecast models.
4) Collaborate with the Northeast Regional Climate Center (NRCC).

Procedures, Results, and Discussion:
1. OPERATE AND MAINTAIN THE NEWA ELECTRONIC WEATHER NETWORK.

During 2009, NEWA successfully maintained and operated a network of 57 weather stations collecting and delivering data to server sites in Geneva and Canandaigua. The addition of airport weather data from the NRCC continued in 2009 and increased the number of weather stations to 108. Most NEWA weather stations provided data year-round. Winter data was used for Stewart's wilt forecasts on sweet corn and to track low temperature in vineyards and orchards. Other models planned to use winter data include tracking chilling hours and critical temperatures.

The year 2009 featured cool wet conditions for the entire growing season. There was a late blight epidemic in the Northeast on tomatoes and potatoes. Many tomatoes in home gardens and organic farms were destroyed. Apple scab and grapevine downy mildew were also challenging.

NEWA personnel made over 72 visits for maintenance, troubleshooting, and repair in 2009. Thunderstorm activity caused problems with weather equipment and lightning damaged Pavilion and Groveland stations. Other damage occurred to modems and cables.

Weather stations. Twelve grower-owned and one replacement IPM-owned Rainwise MKIII stations were installed in the NEWA network. These were located in Albion, Appleton (South), Ashwood, Fayette (3 Brothers), Harbor Creek, Highland, Ithaca (Cornell Orchards),

Lodi (Standing Stone), Somerset, Varick (Swedish Hill), Water Mill (Long Island), and Williamson.

The Harbor Creek, Pennsylvania station is the first grower-owned instrument located out-of-state and Water Mill is the first on Long Island. The Appleton, NY area now boasts four weather stations: Appleton (South), Appleton (North), Somerset and Ashwood, underlining the utility of weather data and IPM forecasts to apple growers. The Hudson Valley Laboratory, Highland, NY purchased a Rainwise MKIII unit and set it up in their research vineyard to support fruit research.

This year, three Sensatronics instruments, Albion, Appleton and Ithaca, were damaged beyond repair (two due to lightning strike) and were replaced with Rainwise MKIII instruments. NEWA personnel assisted the grower in setting up the weather station in Appleton.

Constellation Wines no longer manages the vineyards in which the Dresden, Valois, Pulteny, and Naples weather stations were located. The new vineyard owners and managers plan to move the Naples station to Hammondsport in early 2010.

A grant secured by the Seneca County Soil and Water Conservation District will defray grower costs for nine weather stations in Seneca County vineyards. To date, three are collecting data. The nine participating vineyards are Thirsty Owl Wine Company, Hosmer Winery, Three Brothers Winery, Shalestone Vineyards, Lamoreaux Landing Wine Cellars, Standing Stone Vineyards, Zugilbe Enteprise LLC, Swedish Hill Winery, and Wagner Winery.

Data transmission to NEWA. A grant was secured to fund a contract with Rainwise Inc. to create hardware and software to transmit data from the MKIII weather stations directly to the NEWA or NRCC servers via an internet connection. The broad-band transmission device will send data at regular, predetermined intervals for nearly real-time availability of data on the NEWA website. The creation of this device will pave the way for developing data transmission using cellular IP protocol. Initially, broad band technology was chosen over cellular IP because of poor cell coverage and cost of cell reception in some remote locations where weather stations are located. Target date for testing is in early 2010.

2) TRACKING AND PROMOTING NEWA USAGE

A new website (see section 3) created by Spider ITX was launched in November with two urls: newa.cornell.edu and www.newa.cornell.edu. Because of the change in website, accurate statistics on users and hits is not available for 2009. The new website has a web statistics utility that will allow us to accurately track NEWA user information and specific web page usage.

In April and June, meetings were held in Geneva NY with NEWA, NRCC, and National Weather Service (NWS) office personnel from Buffalo, Binghamton, and Albany. Topics discussed were frost predictions and their applications to agriculture, using relative humidity data from airport weather stations in pest forecast, and ways that the NWS could use data from NEWA to improve forecasts. NWS personnel also demonstrated some new NWS forecast products. Of particular interest was the NWS Activity Planner which allows the user the set weather criteria and query future dates when those criteria are met in the predicted seven-day forecast period. This could be very useful to growers for planning spray activities when wind speeds are in the proper range. We now link to the NWS Activity Planner on the NEWA website.

NEWA weather and pest forecast information is also distributed in regional and county Cornell Cooperative Extension newsletters and email alerts that reach many farms. At various meetings

25 talks were given describing NEWA, the new website, RainWise weather instruments, applying NEWA weather data to farming, and using the pest forecast models, reaching a total of 1140 people (Table 1).

Upon completion of the new website, training sessions were held in western NY and eastern NY. Extension Educators and Cornell faculty learned how to use the new web site and received training information. In 2010 these educators will hold training sessions with growers to train them on using the new web site.

Table 1. Presentations on NEWA given during 2009.

Date	Title	Location	Audience	# of people
7-Mar	Weather Information for Vineyards – Available on NEWA	Finger Lakes Grape Growers Conf, Waterloo, NY	CCE educators, faculty and growers	60
16-Mar	Using NEWA in Onion Production	Orange County Onion School, Middletown, NY	Onion Producers	44
18-Mar	NEWA Weather Information for Vineyard IPM	Lake Erie Regional Grape Growers Conf, Fredonia, NY	CCE educators, faculty, processors, & growers	150
24-Mar	Poster- The Network for Environment and Weather Applications (NEWA) Delivers IPM Forecasts for Fruit and Vegetable Crops	International IPM Symposium, Portland, OR	Scientists	50
10-Apr	Collaborations for Agriculture – NWS, NRCC, NEWA	NYSAES, Geneva, NY	NWS, NRCC ,& Cornell scientists	10
10-Apr	NEWA – Network for Environment and Weather Applications	NYSAES, Geneva, NY	NWS, NRCC ,& Cornell scientists	13
6-May	Information about using NEWA in early season	LERGP Coffee Pot meeting/Forestville, NY	Growers, members of grape industry	34
12-May	Using NEWA in developing a Vineyard IPM Strategy	New Grower Workshop	Persons interested in grape growing	14
13-May	Information about using NEWA in the early season	LERGP Coffee Pot meeting/Cambria, NY	Growers, members of grape industry	12
19-May	Use of NEWA in developing a scouting protocol	Finger Lakes Spring IPM Meeting	Growers, members of grape industry	150
20-May	Information about using NEWA in early season	LERGP Coffee Pot meeting/North East, PA	Growers, members of grape industry	33
3-Jun	Information about using NEWA in prebloom	LERGP Coffee Pot meeting/Westfield, NY	Growers, members of grape industry	22
4-Jun	Collaborations for Agriculture – NWS, NRCC, NEWA	NYSAES, Geneva, NY	NWS, NRCC ,& Cornell scientists	11
10-Jun	Information about using NEWA in prebloom	LERGP Coffee Pot meeting/North East, PA	Growers, members of grape industry	13
17-Jun	Information about NEWA for grape growers	LERGP Coffee Pot Meeting/Ransomville, NY	CCE & PSUE educators, faculty, & grape growers	21
24-Jun	Information about using NEWA at bloom	LERGP Coffee Pot meeting/Perrysburg, NY	Growers, members of grape industry	13
8-Jul	Using NEWA to calculate Growing Degree Days for GBM management	LERGP Coffee Pot meeting/Burt, NY	Growers, members of grape industry	12
19-Jul	Using NEWA in developing a vineyard IPM strategy	Cliffstar Growers Picnic	Growers	200
22-Jul	Using NEWA to calculate Growing Degree Days for GBM management	LERGP Coffee Pot meeting/Ripley, NY	Growers, members of grape industry	33

Date	Title	Location	Audience	# of people
29-Jul	Using NEWA for downy and powdery mildew management	LERGP Coffee Pot meeting Silver Creek, NY	Growers	11
6-Aug	Using NEWA and scouting records to plan next season's vineyard IPM strategy	LERGP Twilight Meeting	Growers	150
12-Aug	Using NEWA to calculate Growing Degree Days for GBM management	LERGP Coffee Pot meeting Portland, NY	Growers, members of grape industry	36
10-Nov	Additions to the NEWA weather network in Seneca County	CRAVE, CCE Ag & Food Inservice, Ithaca, NY	Research and Extension faculty and educators	20
7-Dec	NEWA Train-the-Trainer Workshop	Hudson Valley Laboratory, Highland, NY	Eastern NY Extension educators & researchers	7
16-Dec	NEWA Train-the-Trainer Workshop	NYSAES, Geneva, NY	Western NY Extension educators & researchers	7

3) UPDATE THE NEWA WEBSITE AND PEST FORECAST MODELS.

Based on a comprehensive review of the NEWA website by Cornell Cooperative Extension educators, growers, and consultants a new NEWA website was crafted by Spider ITX. The new website was unveiled in November 2009. Figure 1 shows an image of the Home Page. The new website uses a content management system, CMS Made Simple, to edit and update content within the site and NEWA personnel were trained on using CMS. The server hosting the NEWA website is located at Spider ITX which provides 24/7 technical support.

The new website makes use of a three templates in which the content is framed. The headers, footers, and menu structure or each template is displayed with each web page to maintain continuity and improve navigation. New this year is the use of Google maps to show the locations of the weather stations which can zoom and move to allow users to see their precise location, established through latitude and longitude from the NRCC ACIS database. This is especially useful in areas where there are more instruments than can be displayed on the regional map. The maps default to terrain display, but will also display street and satellite display type.

Station Pages for each weather station were revised significantly and now are generated automatically from the ACIS database as new weather stations are added, greatly facilitating scale-up of the network. The Station Pages now display quick links to hourly weather data, degree days and location-specific pest forecasts.

Web pages "About NEWA" were developed to communicate our contact information, mission statement, history, news, reports, partners, funding sources, pest forecast model references, and information about the weather stations in the network. We also now have a "Questions and Comments" box with email and phone number. This has assisted growers in contacting us with questions about sourcing weather information.

All the information from the old website was migrated into the new structure. This transition was relatively smooth because many of the web pages already resided in the programming structure created by the NRCC in 2008. In addition, we had thoroughly mapped the old web pages and reviewed them with apple, grape, onion and potato growers and Cornell Cooperative Extension educators to determine the best way to maintain, organize and develop content and navigation.

Figure 1. The NEWA Home Page of the new website launched November 2009, find it at newa.cornell.edu or www.newa.cornell.edu.

Improvements to the apple pest forecasts were finished this year and went live, providing apple scab ascospore maturity and infection events, fire blight infection risk and shoot blight symptom development, and codling moth, oriental fruit moth, obliquebanded leafroller, plum curculio, spotted tentiform leafminer, and apple maggot IPM predictions. These models are interactive, allowing the user to enter plant phenology and biofix information to adjust the model results to local conditions. The disease models also utilize NWS forecasted weather data to push pest forecast results five days into the future. Forecasts can now be used in other pest forecast models.

Harvey Reissig, Pesticide Management and Education Program, links pesticide information with results from NEWA apple pest forecast models on a tree fruit IPM website. The site displays comprehensive, pest-specific pesticide information from the *Cornell Pest Management Guidelines for Commercial Tree Fruit Production* along with NEWA apple IPM forecast models where available.

William Fry has introduced a new late blight simulation model which was reviewed by two growers this summer. The model was also demonstrated at several meetings this year and will be highlighted at winter meetings in early 2010. The potato late blight simulation model tracks and predicts disease severity and epidemic progress based on data collected from weather stations as well as forecasted weather data. Due to the extreme late blight epidemic this summer more attention to this disease was generated. Although the model's utility proves greater in low to moderate disease pressure, the two growers commented on what they would like and need for model improvements. Other potato growers showed interest in purchasing weather equipment for their farms. Gary Mahany, a potato grower in Steuben County, relayed that this program can save him thousands of dollars on fungicides even if just one less spray is applied and he has purchased a Rainwise MKIII which will be installed in spring.

Carroll and Weigle secured funding for revisions to the NEWA grape web pages. This project will improve disease model pages, reprogram the code for the DMCast model, and develop insect phenology models and viticulture tools. See the report, *Weather-driven grape IPM forecast models and decision aids from the Network for Environment and Weather Applications*, for this Smith-Lever-funded project.

4) COLLABORATE WITH THE NORTHEAST REGIONAL CLIMATE CENTER.

The Northeast Regional Climate Center (NRCC) and NEWA continued to collaborate in 2009, recognizing the benefits of building a stronger weather information collective at Cornell University. NRCC data is compiled from information provided by airport observations and the Cooperative Observer Network and they now have access to 57 additional sources of weather data from the NEWA network. There is interest from Pennsylvania, Massachusetts and Vermont to become part of the NEWA network and this would not be possible without our strong collaboration with NRCC.

The weather data secured by NRCC from the NEWA servers was archived into the ACIS database which is now updated at hourly intervals, improving user access to the data on the NEWA website. The data is also now routinely put through a quality control subroutine that extrapolates up to three hours of missing data and sources longer intervals of missing data from designated neighboring weather stations.

NRCC personnel write the programming the code for essentially all the weather data and pest forecast models displayed on the NEWA website. NRCC continues to provide NEWA with links

to the Stewart's wilt forecast maps, evapotranspiration (ET) maps, degree-day maps and NWS degree day forecasts. As of November 2009, the NEWA hourly data, daily weather summaries, degree days, and pest forecast models are now being queried from the website server hosted by Spider ITX, generated by the NRCC, and then displayed within the new web page templates on the NEWA website.

NEWA PUBLICATIONS

Carroll, J., Petzoldt, C., DeGaetano, A., and Weigle, T. 2009. The Network for Environment and Weather Applications (NEWA) delivers IPM forecasts for fruit and vegetable crops. 6th International IPM Symposium, Portland, OR.
http://www.ipmcenters.org/ipmsymposium09/019_Carroll_Network.pdf

Gibbons, J., Carroll, J., TenEyck, C., Petzoldt, C., and Weigle, T. 2009. NEWA (Network for Environment and Weather Applications) 2008: a year in review. Cornell Univ., NYS IPM Program Project Reports 2008-2009, NYS IPM Pub No. 509. pp. 220-223.
http://nysipm.cornell.edu/grantspgm/projects/proj08/pgm_wide/gibbons.asp

NEWA GRANTS - FUNDED