

## Final Project Report to the NYS IPM Program, Agricultural IPM 2005

### **Title: NEWA (Network for Environment and Weather Awareness) 2005: A Year in Review**

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**Project location(s):** all counties in New York, some in Pennsylvania. Website accessible internationally

**Abstract:** NEWA operated and maintained the electronic weather network in the 2005 growing season with funding support from the NYS IPM Program. New in 2005, users were asked to fill in a brief survey and create usernames on the system. This was initiated to help keep track of users. There are now 526 users in the database. As a result of continued free access, NEWA usage in 2005 rose by 62% compared to 2004. The number of people receiving NEWA information is larger than that measured by web hits because information from NEWA is disseminated by Cornell Cooperative Extension Educators and private consultants in crop updates and newsletters. The National Weather Service (NWS) provided weather forecasts and new forecast products and NEWA created daily degree day forecasts based on these NWS forecasts. In addition, in 2005, the Northeast Regional Climate Center continued to provide daily evapotranspiration (ET) information, links to ET maps from sites in the cooperative network, and a map depicting the Stewarts Wilt forecast for New York. The NEWA network installed and supported four new weather station locations in Eastern NY (Chazy, Clintondale, Red Hook and Clifton Park). Two degree day calculators were created to determine accumulated degree days. New weather stations are being sourced from RainWise, Inc. NEWA has collaborated with RainWise to develop a less expensive consumer line plus software for Internet delivery of data to the NEWA network.

#### **Objectives:**

- 1) Operate and maintain the NEWA electronic weather network.
- 2) Track usage via user log-in and brief initial survey to support free access to NEWA.
- 3) Collaborate with the Northeast Regional Climate Center.
- 4) Expand NEWA into Eastern NY.
- 5) Implement two new degree day calculators.
- 6) Source and develop more affordable weather stations and state-of-the-art data delivery.

#### **Procedures, Results, and Discussion:**

##### 1. OPERATE AND MAINTAIN THE NEWA ELECTRONIC WEATHER NETWORK.

During the 2005 growing season, NEWA successfully maintained and operated the electronic weather network of over 40 weather stations collecting and delivering data to server sites in Geneva and Canandaigua. In February, the hard drive in the Geneva NEWA server was replaced with one that is faster and has greater capacity. The NEWA Home Page was redesigned and a new map of NY showing weather station locations based on GIS information was posted. Latitude and longitude coordinates of the stations are provided for more precise location information. Most NEWA weather stations provided data year-round and winter data was used for Stewart's wilt forecasts on sweet corn and to track low temperature in vineyards and apple orchards. NEWA continued investigating how best to expand the network into Eastern NY and to trouble-shoot, as needed, four new installations in this region (Objective 4).

The network was operational on 100 percent of the days between April 1 and October 31, although individual instruments experienced limited down time from lightning strikes, etc. The

year 2005 featured abnormally hot and dry conditions and thunderstorm activity continued to cause sporadic problems to the network. Down time was remedied within one or two days of occurrence unless damage to the instrument required its repair by the manufacturer. Five Hobo weather monitors (Onset Corp.) were purchased in 2005 for backup units, should a weather station fail, and to calibrate temperature and relative humidity readings of existing weather stations.

Collected data were summarized daily and used to operate pest forecast models for potatoes, onions, apples, grapes, cabbage, sweet corn, and tomatoes and to calculate degree-day accumulations for different base temperatures using several degree-day formulas as needed by different stakeholder groups. Two degree day calculators that use the Baskerville-Emin formula were implemented in 2005 (Objective 5). A new Tomcast model iteration that now uses relative humidity as well as leaf wetness data was programmed into the system. This new model was not deployed this year, but is now ready for field testing under New York conditions prior to implementation.

The National Weather Service provides forecast information, radar information and other products that can be useful to growers. Links to new NWS products are added as they become available. In 2005, NEWA continued to calculate degree day forecasts based on information provided by National Weather Service forecasts. These forecasts were provided Monday – Friday, by 7AM each morning. These degree day forecasts of base 50F, 48F, 43F, 40F and 4C were determined for all weather stations in the NEWA network.

## 2) TRACK USAGE VIA USER LOG-IN AND BRIEF INITIAL SURVEY.

Since May 29, 2002 access to the NEWA website and NEWA information is provided free of charge by the NYS IPM Program with funding from the NYS Department of Agriculture and Markets. In 2004, the NEWA, Northeast Weather Association was dissolved and the acronym given a new name, Network for Environment and Weather Awareness. This allowed the homepage to remain the same: [newa.nysaes.cornell.edu](http://newa.nysaes.cornell.edu). The NYS IPM Program assumed a leadership role with overall responsibility for funding the network. Announcements about free access to NEWA were again placed in local Extension newsletters. NEWA usage continued to increase in 2005 (Table 1 and Fig 1). NEWA usage was up 62% in 2005, compared to 2004. NEWA information is also redistributed in several newsletters which reach many farms.

**Table 1:** NEWA web access for 2001, 2002, 2003, 2004, 2005.

| <b>NEWA Hits</b> | <b>2001</b>  | <b>2002</b>  | <b>2003</b>  | <b>2004</b>  | <b>2005</b>   |
|------------------|--------------|--------------|--------------|--------------|---------------|
| January          | 791          | 1960         | 3131         | 6260         |               |
| February         | 1891         | 769          | 3515         | 2986         | 11535         |
| March            | 1860         | 2330         | 2933         | 2695         | 6697          |
| April            | 3022         | 4272         | 3967         | 5902         | 8341          |
| May              | 6105         | 9432         | 9533         | 9969         | 14759         |
| *June            | 4940         | 11323        | 9286         | 8810         | 11422         |
| July             | 5082         | 6472         | 6934         | 7590         | 10542         |
| August           | 3592         | 5309         | 5846         | 6371         | 9899          |
| September        | 1853         | 4469         | 4060         | 4627         | 8515          |
| October          | 1428         | 3240         | 3104         | 3423         | 9028          |
| November         | 1040         | 1895         | 2776         | 3296         | 9151          |
| December         | 636          | 1420         | 2088         | 4210         | 7438          |
| <b>Total</b>     | <b>31604</b> | <b>51471</b> | <b>57173</b> | <b>66139</b> | <b>107327</b> |

In 2005, based on decisions of the NEWA Web Committee, all NEWA users must create a username and password when first accessing the system and complete a short survey. As a result NEWA now has catalogued 526 users which include 109 farmers, 96 research and extension people, 9 consultants, 9 food industry (i.e. BirdsEye Foods, Motts, etc.), 2 homeowners, 2 chemical industry and 122 users who did not fill out the survey. The remaining users had accounts already set up in the system. Free access to NEWA promotes expansion of the network in Eastern NY (Objective 4) and into other regions.

3) COLLABORATE WITH THE NORTHEAST REGIONAL CLIMATE CENTER.

In 2004 the Northeast Regional Climate Center (NRCC) continued to provide links to evapotranspiration (ET) maps, degree-day maps, daily ET readings, and a seasonal log was prepared and displayed on the NEWA web site. The data is compiled through information provided by airport observations and the Cooperative Observer Network. The NRCC also provided a map of New York showing the Stewart’s Wilt forecast for 2005. Other types of applications are being explored that the NRCC can assist NEWA with in subsequent years.

4) EXPAND NEWA INTO EASTERN NEW YORK

NEWA continued investigating how best to expand the network into Eastern NY and to trouble-shoot, as needed, four new installations in this region as a result of NE IPM and NE SARE grants. One of these sites used an existing Field Monitor from Sensatronics. The other three installations used industrial weather stations manufactured by RainWise, Inc. which were the least expensive and most NEWA-compatible “off-the-shelf” available. RainWise equipment was selected because Sensatronics stopped manufacturing the Field Monitor formerly used at many NEWA sites. Sensatronics will still continue to service our existing Field Monitors in the

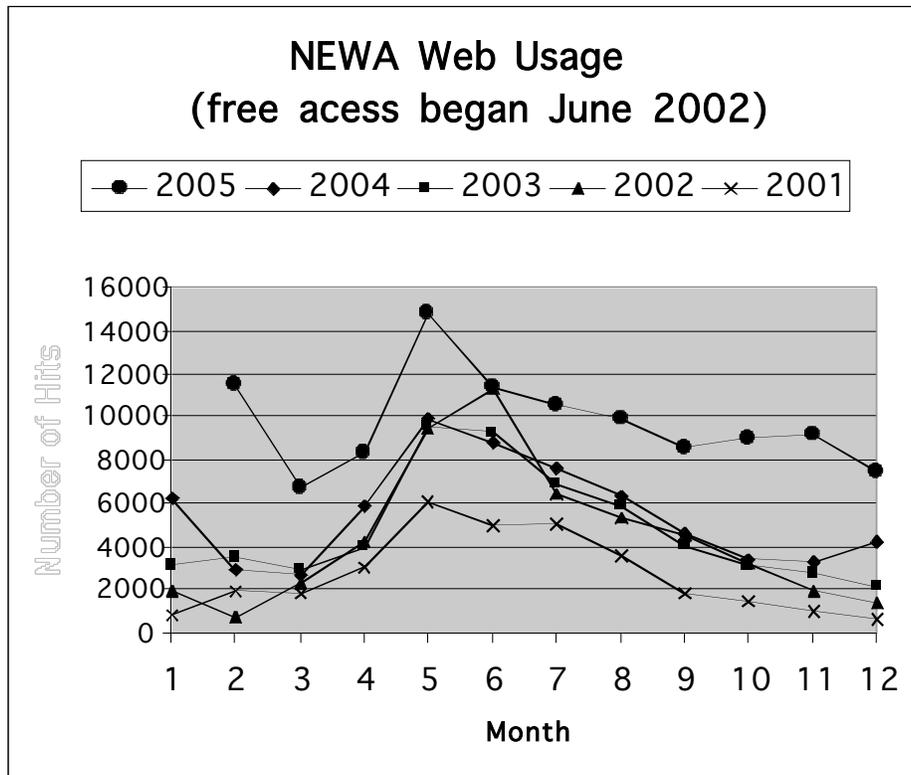


Figure 1. Hits to the NEWA website for each of the years 2001 – 2005.

future. The RainWise staff have written software to create NEWA-compatible data output from their weather stations, matching the output from the Field Monitors.

The project goal is to support IPM for eight major apple pests that relies on weather information which NEWA can provide. Four growers, two in the Hudson Valley and two in NE NY have purchasing weather stations, with help from the grants, that are connected to NEWA. These growers collect insect trap catch data and orchard phenology information for the various model biofix dates. In this critical steps project, cooperating growers are learning 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. Four to five additional weather stations are slated for the NEWA system in 2006 under these grants. Cooperating apple growers will serve as educators to promote IPM implementation using NEWA. The outreach plan will target all other apple growers in Eastern NY who will benefit from the expansion of NEWA into their region.

#### 5) IMPLEMENT TWO NEW DEGREE DAY CALCULATORS.

In addition to the degree day tables which exist on NEWA currently, two degree day calculators, created under the NE IPM grant (Carroll), were implemented and de-bugged in 2005. The Degree Day Calculator, [www.nysaes.cornell.edu/ipm/specware/newa/](http://www.nysaes.cornell.edu/ipm/specware/newa/), allows users to select the base temperature, weather station location, and start and end dates. After pressing the "Calculate" button, the accumulated amount of degree days for that query is returned along with the daily values for each of the last five days and information on any possible dates with missing data.

The Apple Pest DD Calculator, [www.nysaes.cornell.edu/ipm/specware/newa/appledd.php](http://www.nysaes.cornell.edu/ipm/specware/newa/appledd.php), calculates the accumulated degree days for specific apple insect pest degree day models. Users select the pest of interest, weather station location, input their own biofix date or use the default biofix date (based on the 20-yr. average collected at the NYS Agricultural Experiment Station). After pressing the "Calculate" button, the accumulated amount of degree days for that query is returned along with the daily values for each of the last five days and information on any possible dates with missing data, as for the Degree Day Calculator. But in addition, the Apple Pest Degree Day Calculator operates like a mini-expert system and returns guidelines based on the accumulated degree day value for the particular pest model. Also being developed is a way to collect apple insect and disease biofix information for each weather station located in the main apple-growing regions of NY.

#### 6) SOURCE AND DEVELOP MORE AFFORDABLE WEATHER STATIONS AND STATE-OF-THE-ART DATA DELIVERY.

Under Objective 4, new RainWise weather stations were deployed to take the place of the equipment previously used in the network that was manufactured by Sensatronics Company. The industrial weather stations of RainWise deployed have proven to be expensive, non-standardized, complicated to install and include sensors for data not normally collected and delivered by NEWA. NEWA and RainWise forged an arrangement to customize their consumer line weather stations so as to be compatible with the NEWA network. This NEWA RainWise consumer line was standardized with the inclusion of a leaf wetness sensor (not normally included but critical for disease forecasting models) along with air temperature, wind speed and direction, solar radiation, relative humidity, precipitation and barometric pressure sensors.

Each consumer line weather station is powered by solar energy and relays data via radio wave frequencies, eliminating the danger of lost data due to battery failure and vulnerability of the stations to lightning, respectively. One of the radio frequencies can send data to a receiver up to 7 miles away (line of site). In addition, RainWise is creating software so that data format is compatible with NEWA (as for the industrial line) and to automate FTP delivery of data to the NEWA server directly from the growers' computer over the Internet. RainWise is proving to be

an important collaborator and other possibilities for collecting and delivering data from their instruments are being investigated (i.e. satellite link). One of these consumer line weather stations will be field tested in the near future. Several growers and food industry personnel are interested in acquiring these weather stations and associated software.