

## **NEWA (Network for Environment and Weather Applications) 2016: A Year in Review**

**Project Leaders:** Juliet Carroll, Dan Olmstead, Tim Weigle, Abby Seaman, and Jennifer Grant; NYS IPM Program, Cornell University, Geneva, NY and Portland, NY

**Collaborators:** Art DeGaetano, Keith Eggleston, and Bill Noon, Northeast Regional Climate Center (NRCC), Department of Earth and Atmospheric Sciences, Cornell University, Ithaca, NY

### **The NEWA State Coordinators (year joined)**

Terence Bradshaw, University of Vermont, Burlington, VT - Vermont (2010)

Jon Clements, University of Massachusetts Extension, Belchertown, MA - Massachusetts (2011)

Peter Oudemans, Rutgers, The State University, Chatsworth, NJ - New Jersey (2011)

Robert Crassweller, Pennsylvania State University, University Park, PA - Pennsylvania (2013)

Mary Concklin, University of Connecticut Extension, Storrs, CT - Connecticut (2014)

JP Jacobson, Minnesota Apple Growers Association, White Bear Lake, MN - Minnesota (2015)

Michael Parker, North Carolina State University, Raleigh, NC - North Carolina (2016)

Mizuho Nita, Virginia Polytechnic Institute and State Univ., Winchester, VA - Virginia (2016)

Cheryl Smith, University of New Hampshire, Durham, NH - New Hampshire (2016)

Beth Bishop, Michigan State University, East Lansing, MI - Michigan (2017)

Matthew Wallhead, The Ohio State University, Wooster, OH - Ohio (2017)

### **Abstract**

The Network for Environment and Weather Applications (NEWA) provides IPM and crop management tools based on weather data collected from over 500 weather stations distributed across the Northeast, mid-Atlantic and Midwestern states. In November, Dan Olmstead was hired to fill the position of NEWA Coordinator beginning January 2017. NEWA uses the data from each weather station site to serve 37 IPM and crop production tools to growers. A total of 14 different degree-day tools are also available. In 2016, North Carolina, New Hampshire and Virginia became statewide members of the NEWA. Onion, tomato, potato and apple models were upgraded. State-by-state access to NEWA tools was developed and a new version of the website's content management system is being trialed. Twenty-seven NEWA presentations and workshops were given by NYS IPM Program staff, reaching 1306 people.

### **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.

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

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

Dan Olmstead was hired as an Extension Associate in the New York State IPM Program to serve as NEWA Coordinator. He started in his new position January 1, 2017.

#### ***Data transmission to NEWA.***

Assistance with weather station data transmission and troubleshooting is accomplished via an automated email alert system that identifies data outages in the NEWA weather database on the

NRCC servers. In addition, daily reports for each member state of stations reporting, stations disconnected and stations that are not reporting and the date the outage began are sent to the appropriate state NEWA coordinator. Daily suspected precipitation error reports are sent to the state NEWA coordinator.

NEWA personnel have made fewer maintenance and trouble-call field visits and phone calls due to implementation of internet retrieval and transmission of data from Rainwise instruments. Two field visits made in 2016 were to assist with or maintain NYSIPM-owned instruments. A new API (applications program interface) was developed by Rainwise Inc. and tested by the NRCC database programmer. This API will allow weather station owners to set their stations to upload data at 1-minute intervals, which is the default. This will further streamline weather station installations. A few NEWA station owners in NY continue to use file transfer protocol (ftp) to send data to NEWA. The ftp program will be phased out in 2017.

### ***Weather station locations & NEWA Expansion Networks.***

As of 31 December 2016, there were 431 weather stations in the NEWA. In 2016, New Hampshire, North Carolina and Virginia joined the NEWA bringing the total number of participating states to 10. Other member states in 2016 included Connecticut, Massachusetts, Minnesota, New Jersey, New York, Pennsylvania and Vermont. The NEWA in Minnesota and North Carolina are industry-driven partnerships with the Minnesota Apple Growers Association and the North Carolina Apple Growers Association, respectively. In Illinois, Iowa, Maryland, Nebraska and Wisconsin individual growers have weather stations connecting to NEWA.

We began exploring collaborations with Michigan State University, where the state climatology office operates a mesonet and delivers similar tools via Enviro-Weather, and with The Ohio State University, which, in addition to wanting to build a network with Rainwise Inc instruments, has a few Campbell instruments on research stations. Both Michigan and Ohio joined NEWA in January 2017. Michigan's network added over 80 locations to the NEWA.

Inquiries about joining the NEWA from outside the network coverage area continued to come in. The relative ease with which a weather station can be installed, the low cost of the Rainwise Inc., NEWA-configured instruments, and the ability to retrieve data via the internet contribute to the continued growth in the number of weather stations. The NRCC has worked with the state climatology mesonet in Delaware to ingest their data, so this state is poised to join NEWA. The challenge is sustaining a statewide membership fee for this state, as well as others in the Northeast.

The state NEWA coordinators, including NY, help guide the direction and development of the NEWA. We have focused on ways to generate revenue including requesting donations via the website and subscriptions for NEWA premium products (email alerts, alarms, grower information cache). Our current priorities include a survey on NEWA, a mobile-ready website, data quality control, and weather station locations built from NWS gridded data. A USDA CPPM ARDP proposal was submitted by Carroll, Grant and DeGaetano, but was not selected for funding. We plan to resubmit in 2017.

The NYS Mesonet at the University at Albany, SUNY finished installing 126 FEMA-funded weather stations throughout NY. We are working on a collaboration with the NYS Mesonet to provide data from some of these weather stations to run the NEWA tools.

## 2) TRACK AND PROMOTE NEWA USAGE

**Table 1.** 2016 Google Analytics for selected NEWA tools.

NEWA tool iframe	Visits (#)	Duration (h:m:s)
Apple disease tools (no further engagement)	4753	6:16:36
Apple scab	6113	132:25:07
Ascospore maturity and weather summary	302	15:27:59
Apple leaf wetness events log	554	15:27:12
Fire blight	2739	67:10:15
Sooty Blotch & Flyspeck	842	24:12:32
<b>Total apple disease tools</b>	<b>15,303</b>	
Apple insect tools (no further engagement)	554	24:12:32
Apple maggot	278	6:08:52
Codling moth	583	12:49:07
Oblique-banded leaf roller	166	5:04:14
Oriental fruit moth	203	5:50:11
Plum curculio	408	9:25:24
Spotted tentiform leafminers	57	1:02:16
<b>Total apple insect tools</b>	<b>2,249</b>	
Apple irrigation	1007	3:55:17
Apple carbohydrate thinning	2320	16:46:40
<b>Total apple production tools</b>	<b>3,327</b>	
Grapevine downy mildew (DMcast)	947	24:41:52
Grape diseases	3035	44:02:58
Grape berry moth	1753	26:08:05
<b>Total grape IPM tools</b>	<b>5,735</b>	
Onion disease models (no further engagement)	369	11:59:50
Onion blight alert log	28	0:14:13
Onion disease log	24	0:07:54
Onion modified alert log	22	0:08:58
Onion maggot	32	1:35:45
<b>Total onion IPM tools</b>	<b>475</b>	
Blightcast	244	5:52:44
Early blight P days	138	3:23:19
Late blight simcast	180	3:23:19
Potato disease forecast	185	6:00:12
Tomato disease forecast (TOMCAST)	1219	29:02:30
<b>Total potato and tomato disease tools</b>	<b>1,966</b>	
Cabbage maggot	361	16:55:21
Alfalfa weevil	93	1:57:46
Hourly data summary	33540	883:21:20
Daily data summary	13948	293:39:12
<b>Total weather data pages</b>	<b>47,488</b>	
Degree-day forecasts	5862	26:34:15
Growing degree-days (Base 50F)	1750	55:15:19
Growing degree-days (Base 50 BE)	218	5:49:54
Growing degree-days (Base 86/50F)	147	3:51:32
<b>Total degree days</b>	<b>7,977</b>	

In 2015, Google Analytics was placed on all the webpages in the NEWA, newa.cornell.edu, and tools in the NRCC. This now allows comprehensive analysis of website usage, providing insight on NEWA webpages of greatest utility to growers. A preliminary summary of the tool visits is given in Table 1.

NEWA weather, pest forecast and crop management information is also multiplied via extension newsletters and email alerts in NY and other states, reaching many farms. In 2016, at various meetings, 22 presentations, seminars, and workshops were given on NEWA topics reaching 1100 people (Table 2). This included organizing the 2<sup>nd</sup> Annual IPM Conference, *Climate, Weather, Data: Protecting Our Crops and Landscapes*, which was held in Voorheesville, NY.

Weigle coordinated delivery of a daily email message alert, eNEWA, including weather information and grape forecast model results was provided to several grape growers and educators in NY and PA in 2016, marking the fourth year of field testing this delivery method.

In 2016, we began offering yearly subscriptions to location-specific data feeds from NEWA weather stations into RIMpro, a third-party software simulation program for apple scab, which has a few other tools for apples and grape. Twenty-six apple growers, educators and private consultants signed up for the NEWA data feed for RIMpro. This beta test was done in collaboration with Jon Clements, UMass, who coordinated the grower sign-ups and Marc

Trapman, RIMpro, who provided a free one-year subscription to the software. A small amount of revenue was generated. RIMpro data feeds from NEWA will be offered to growers again in 2017.

**Table 2.** Presentations on NEWA given in 2015 by IPM educators.

<b>Presenter Organizer</b>	<b>Date</b>	<b>Presentation Title</b>	<b>Location</b>	<b>Audience</b>	<b># people</b>
Carroll	1/6/2016	Weather-Driven Tools for Agriculture: NEWA, the Network for Environment & Weather Applications	Upper Midwest Apple Show, La Crosse, WI	Apple growers	100
Carroll	1/6/2016	NEWA: How to Use the Apple Tools to Your Advantage	Upper Midwest Apple Show, La Crosse, WI	Apple growers	100
Seaman	1/20/2016	Staying on top of the weather: Tomato disease forecasts on NEWA	Empire State Producer's Expo, Syracuse, NY	Vegetable growers	115
Lamb	1/28/2016	Forecasting insect and disease pressure in 2016 on woody ornamentals	2016 Southeast Regional Conference, NYS Turfgrass Association	Green Industry producers	50
Carroll	2/6/2016	Weather Tools for Ag: NEWA	Western NY Farm Show, Hamburg, NY	Producers	15
Carroll	2/9/2016	What is NEWA and how can it benefit apple growers	Southeastern Apple Growers Association Meeting, Asheville, NC	Apple growers	125
Carroll	2/9/2016	Using NEWA to maximize your apple thinning dollar and effectiveness	Southeastern Apple Growers Association Meeting, Asheville, NC	Apple growers	90
Carroll	2/15/2016	NEWA, how to get the most out of it	NE NY Winter Fruit School, Lake George, NY	Apple growers	80
Carroll	2/18/2016	NEWA workshop for apple growers	Hudson Valley Winter Fruit School, Kingston, NY	Apple growers	11
Weigle	2/18/2016	NEWA workshop for grape growers	Hudson Valley Winter Fruit School, Kingston, NY	Grape growers	19
Lamb	3/2/2016	Forecasting insect and disease pressure in 2016 on woody ornamentals	2016 Education Day, Southern Tier Nursery and Landscape Association	Green Industry producers	45
Carroll	3/8/2016	NEWA, the Network for Environment & Weather Apps: crowd sourced, open access IPM decision support	AMS Forum: Observing the Environment from the Ground Up, Washington, DC	Scientists	75
Lamb	3/16/2016	Forecasting insect and disease pressure in 2016 on woody ornamentals	2016 Adirondack Regional Conference, NYS Turfgrass Association	Green Industry producers	30
Carroll	3/24/2016	Exploiting the vagaries of weather: NEWA	Crops and Soil Science Seminar Series, Ithaca, NY	Scientists	50
Seaman	3/29/2016	Late blight forecasts on NEWA	Late blight DSS training, Canandaigua, NY	Vegetable growers	12
Carroll	5/18/2016	IPM Weather Apps and NEWA	IPM Toolbox Webinar Series, Ithaca	Online	8
Lamb	5/19/2016	Monitoring tools for Christmas tree pests	Conifer Pest Management Program and Tour, NYS IPM	Christmas tree growers	21
Carroll	8/15/2016	Organizer, 2nd Annual IPM Conference - Climate, Weather, Data: Protecting Our Crops and Landscapes	Climate, Weather, Data: Protecting Our Crops and Landscapes, Voorheesville	Educators and growers	52
Carroll	8/15/2016	Exploiting the vagaries of weather with open access tools on the Network for Environment and Weather Apps (NEWA)	Climate, Weather, Data: Protecting Our Crops and Landscapes, Voorheesville	Educators and growers	52
Carroll	9/12/2016	Arthropod phenology models provide IPM decision support apps on NEWA	Jugatae Seminar, Ithaca with polycom to Geneva	Scientists	30
Carroll	9/20/2016	The Network for Environment and Weather Apps (NEWA)	CENICAFE visiting scientists, Geneva	Coffee growers	5
Lamb	9/20/2016	Monitoring Tools and Helpful Resources for Your IPM Program	Christmas Tree IPM In-depth, Suffolk CCE	Christmas tree growers	60
Carroll	10/5/2016	Disease forecasts in the cloud, in real time for real growers	Seminar Plant Pathology & Plant-Microbe Biology (PPPMB) Section, Ithaca	Scientists	45

Presenter Organizer	Date	Presentation Title	Location	Audience	# people
Carroll	10/11/2016	The Network for Environment and Weather Apps (NEWA)	CCE EDEN annual meeting tour of NYSAES, Geneva	Educators	50
Carroll	11/1/2016	Resources to help growers deal with climate change effects	November Ag In-Service, Fruit Track, Ithaca	Educators	6
Carroll	11/7/2016	Horticulture apps on the Network for Environment and Weather Apps (NEWA)	Seminar Horticulture Section, Ithaca	Scientists	40
Carroll	11/29/2016	Disease forecasts in the cloud, in real time for real growers	Seminar Plant Pathology & Plant-Microbe Biology (PPPMB) Section, Geneva	Scientists	20
<b>Total number of people reached</b>					<b>1306</b>

As of February 2017, there were **488** subscribers to the NEWA blog “*You’re NEWA*”. Posts inform members of the NEWA network about newsworthy items relating to NEWA, pest forecast tools, and weather data (see publications.)

### **3) UPDATE THE NEWA WEBSITE AND PEST FORECAST MODELS.**

The current NEWA website, launched in 2009, proved highly user-friendly, facilitating and promoting NEWA use among growers, extension educators, consultants, and researchers, ultimately contributing to the growth of NEWA. Comparing the number of weather stations in NY in 2003 to the number in the network in December 2016 showed a 10-fold increase in weather station locations across the coverage area. There is now widespread interest among extension and research faculty in delivering NEWA tools to growers in their regions and states and in developing crop-, pest-, and disease-phenology models in NEWA as tools for IPM and crop management.

#### ***NEWA website updates.***

NEWA tools are increasingly sought on smart phones and other devices that are easier to carry into the field. We are actively engaged in working towards a responsive website design (RWD) that would display seamlessly on any device, from desktop computer to smart phone.

Unfortunately, our plans to achieve this goal in 2016 were not realized, but we will continue to seek funding for this effort in 2017. The NEWA website does display on smart phones, but the end user must pinch and stretch the display to use the tools.

A menu drop-down function for selecting the state of interest in NEWA tools was developed and implemented. This improved navigation to NEWA weather station choices and addressed logistics that NEWA serves data from 25 states (though some only have airport locations). The new drop-down menus to select a state were found to not update automatically as designed. NEWA and NRCC worked with ITX, the website hosting company and resolved the issue.

The version of the open-source content management system, CMS Made Simple, used for editing content on the NEWA website, newa.cornell.edu, was found to be out-of-date. We are working with ITX, the website hosting company, to test if the latest CMS version will be compatible with the NEWA website before moving forward with an upgrade.

#### ***New forecast tools***

Abby Seaman updated and improved the onion disease and onion maggot tools. She also completed potato and tomato disease model upgrades. Art Agnello, Entomology, upgraded the apple insect tools, adding weather forecasts to all and creating a new tool for San Jose scale.

Agnello and Carroll worked with NRCC to reprogram the NEWA Degree Day Calculator to allow end users to query the accumulation of degree days for a specified range of dates. The choices of degree day base temperatures available reflect all the degree day calculations being used in the NEWA tools.

In 2016, Carroll, Greg Loeb, Entomology, and Kerik Cox, Plant Pathology and Plant-Microbe Biology, received funding to develop berry tools in NEWA. In 2017, they will work with the NRCC to develop strawberry root weevil, blueberry maggot, cranberry fruitworm insect tools and gray mold, anthracnose and mummyberry disease tools.

Carroll, Cox and Agnello met with Glen Koehler, University of Maine, to plan a collaboration using NEWA weather data with Koehler's AgRadar tools for apples in 2017.

#### **GRANTS SUPPORTING NEWA ACTIVITIES**

Carroll, Apple Research & Development Program, Building expertise and capacity for accurate Integrated Fruit Production models in the Network for Environment and Weather Applications (NEWA), year 2. \$16,612.

Grant, Carroll, DeGaetano, Federal Capacity Funds, Smith-Lever, Building the Network for Environment and Weather Applications (NEWA) Supporting Sustainable Farming, \$75,000.

Grant, et al. 2014-2017. USDA NIFA, Crop Protection and Pest Management, An Integrated Pest Management Program for New York State, (contributed section on Precision IPM with NEWA).

Lamb and Eshenaur, Insects On-Line: Forecasting insect management for nursery and Christmas tree growers, NYFVI, \$70,665

Loeb, Weber, Pritts, Cox, Carroll, NYS AG & MKTS, 2016 Cornell Berry Research, \$260,000.

Seaman, 2014-2017. Improving and Enhancing Vegetable Pest Forecast Models on the Network for Environmental and Weather Applications (NEWA). Smith-Lever \$69,614

#### **NEWA PUBLICATIONS**

Agnello, A. and Carroll, J. Apple Insect Tools Improved. You're NEWA. Cornell University, 26 April 2016. Web. Accessed 8 July 2016.

<http://blogs.cornell.edu/yourenewa/2016/04/26/apple-insect-tools-improved/>

Carroll, J. Dan Olmstead starts as NEWA Coordinator Jan 1, 2017. You're NEWA. Cornell University, 5 December 2016. Web. Accessed 9 January 2017.

<https://blogs.cornell.edu/yourenewa/2016/12/05/dan-olmstead-starts-as-newa-coordinator-jan-1-2017/>

Carroll, J. National Forum on Climate and Pests, Oct 4-6. You're NEWA. Cornell University, 29 September 2016. Web. Accessed 10 October 2016.

<http://blogs.cornell.edu/yourenewa/2016/09/29/national-forum-on-climate-and-pests-oct-4-6/>

Carroll, J. IPM Climate & Weather Conference. You're NEWA. Cornell University, 1 August 2016. Web. Accessed 10 October 2016.

<http://blogs.cornell.edu/yourenewa/2016/08/01/ipm-climate-weather-conference/>

Carroll, J. Job Announcement – NEWA Coordinator. You're NEWA. Cornell University, 27 July 2016. Web. Accessed 10 October 2016.

<http://blogs.cornell.edu/yourenewa/2016/07/27/job-announcement-newa-coordinator/>

- Carroll, J. NEWA webinar in The IPM Toolbox series. You're NEWA. Cornell University, 5 May 2016. Web. Accessed 8 July 2016.  
<http://blogs.cornell.edu/yourenewa/2016/05/05/newa-webinar-in-the-ipm-toolbox-series/>
- Carroll, J. NEWA upgrade – possible downtime. You're NEWA. Cornell University, 14 April 2016. Web. Accessed 8 July 2016. <http://blogs.cornell.edu/yourenewa/2016/04/14/newa-upgrade-possible-downtime/>
- Carroll, J. Apple Carbohydrate Thinning Model & Freeze Events. You're NEWA. Cornell University, 12 April 2016. Web. Accessed 8 July 2016.  
<http://blogs.cornell.edu/yourenewa/2016/04/12/apple-carbohydrate-thinning-model-freeze-events/>
- Carroll, J. NEWA upgrade downtime – plan accordingly. You're NEWA. Cornell University, 11 April 2016. Web. Accessed 8 July 2016.  
<http://blogs.cornell.edu/yourenewa/2016/04/11/newa-upgrade-downtime-plan-accordingly/>
- Carroll, J. New Degree Day Calculator on NEWA. You're NEWA. Cornell University, 8 April 2016. Web. Accessed 8 July 2016. <http://blogs.cornell.edu/yourenewa/2016/04/08/new-degree-day-calculator-on-newa/>
- Carroll, J. Enter your “green tip” date. You're NEWA. Cornell University, 29 March 2016. Web. Accessed 7 April 2016. <http://blogs.cornell.edu/yourenewa/2016/03/29/enter-your-green-tip-date/>
- Carroll, J., Weigle, T., Seaman, A., and Grant J. 2016. NEWA (Network for Environment and Weather Applications) 2015: A Year in Review. New York State IPM Program Project Report. Geneva, NY. 7 pp.
- DeGaetano, A. and Carroll, J. Historical Apple Blossom Kill Risk Maps. You're NEWA. Cornell University, 21 March 2016. Web. Accessed 7 April 2016.  
<http://blogs.cornell.edu/yourenewa/2016/03/21/historical-apple-blossom-kill-risk-maps/>
- Spaccio, J. and Carroll, J. Drought in the Northeast. You're NEWA. Cornell University, 18 July 2016. Web. Accessed 10 October 2016.  
<http://blogs.cornell.edu/yourenewa/2016/07/18/drought-in-the-northeast/>
- Sweet, S. and Carroll, J. 2016 Drought Survey – NY & Northeast. You're NEWA. Cornell University, 10 August 2016. Web. Accessed 10 October 2016.  
<http://blogs.cornell.edu/yourenewa/2016/08/10/2016-drought-survey-ny-northeast/>
- Weigle, T., NEWA – Not just for the Growing Season. The Crop Update. March 3, 2016
- Weigle, T., 2016 eNEWA Grape Project Sign Up. LERGP Vineyard Notes. April, 2016
- Weigle, T., eNEWA for Grapes. The Crop Update. April 28, 2016
- Weigle, T., Network for Environment and Weather Applications (NEWA). 2016 Harvest Edition. LERGP Vineyard Notes. December, 2016