NEWA (Network for Environment and Weather Applications) 2017: A Year in Review

Project Leaders: Dan Olmstead, Juliet Carroll, 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

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, Penn 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 Tech., 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

NEWA delivered insect, disease, and crop management forecasts to 605 locations across 26 US states in 2017. NEWA database and tools were moved to new servers eliminating a high-usage crash problem. Automated station outage alerts and daily status reports were sent to NEWA state coordinators to improve data quality. Ohio and Michigan joined NEWA. An important data sharing agreement was reached with the NYS Mesonet. NEWA was promoted in 20 presentations and 24 publications. Total website usage increased 15.2%. Fruit and vegetable tool usage was higher in 2017. Seven grants supported NEWA and model development. A USDA-funded website redesign and data quality control project began. Graduate students from the Cornell School of Information Science completed a research project on grower website needs. A website content management system upgrade improved web security. Fire blight and apple scab models were improved. Model development continued for Cercospora leaf spot on table beet, ornamental insect pests, blueberry maggot, strawberry anthracnose, strawberry Botrytis, cranberry fruitworm, mummy berry, western bean cutworm, and weed emergence.

Introduction

The Network for Environment and Weather Applications (NEWA) is a collection of online insect pest and plant disease management tools built to provide growers with short-term crop risk assessments. Each tool or resource uses real-time weather data streamed from 605 weather stations across the Northeast, Midwest, and Mid-Atlantic United States and can be accessed at newa.cornell.edu. NEWA is part of the New York State IPM Program (NYSIPM) at Cornell University.

Objectives:
1) Operate and maintain NEWA
2) Track and promote NEWA usage
3) Update the NEWA website and pest forecast models

Procedures, Results, and Discussion:

1) OPERATE AND MAINTAIN NEWA

NEWA was moved to servers in Rhodes Hall, Cornell University, and Amazon in May 2017. Prior to the move, average page load time was 130 seconds and after the move page load time was reduced to 0.01 seconds, eliminating server inefficiency, page load delays and request timeouts.

A new application program interface (API) from Rainwise, Inc. was implemented to enable one-minute interval data uploads from Rainwise weather stations to be pulled into the NEWA database. Rainwise weather station owners will now be able to use the full range of products available from RainwiseNet such as text alerts and customized alarms.

Use of an automated weather station outage alert system continued in 2017. NEWA sent email notifications to weather station owners about gaps in data transmission to improve data continuity and communication between station owners and NEWA staff. Daily weather station status reports to NEWA State Coordinators identify active, inactive, and deactivated stations for respective states to facilitate contacting owners and resolving data issues. In 2017, the NRCC began work on an improved data quality control system, which will also identify and flag out-of-range data.

NEWA expansion

The number of NEWA-linked weather stations increased 29% in 2017. 605 locations deliver NEWA tools and resources in 12 member states (Connecticut, Massachusetts, Michigan, Minnesota, New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Vermont, Virginia, Wisconsin), five non-affiliated states represented by independent growers (Illinois, Iowa, Kentucky, Maryland, Nebraska), and eight states represented by National Weather Service locations only (Alabama, Delaware, Missouri, Nebraska, Rhode Island, South Carolina, South Dakota, West Virginia). The sustained growth of NEWA demonstrates its value and importance to growers.

NEWA finalized a data sharing agreement with the New York State (NYS) Mesonet, University at Albany, SUNY. Based on requests from Cornell Cooperative Extension and growers, 10 mesonet weather station locations will begin streaming data to NEWA in 2018 providing access to NEWA's insect, disease, and crop management tools. We plan to build on this collaboration in the future, bringing more of the 126 NYS Mesonet locations into NEWA and providing opportunities for research.

2) TRACK AND PROMOTE NEWA USAGE

NEWA use

Website contact totaling 2,821 outreach hours were provided to 14,331 users accessing NEWA tools and resources, an increase of 15.2% from 2016.

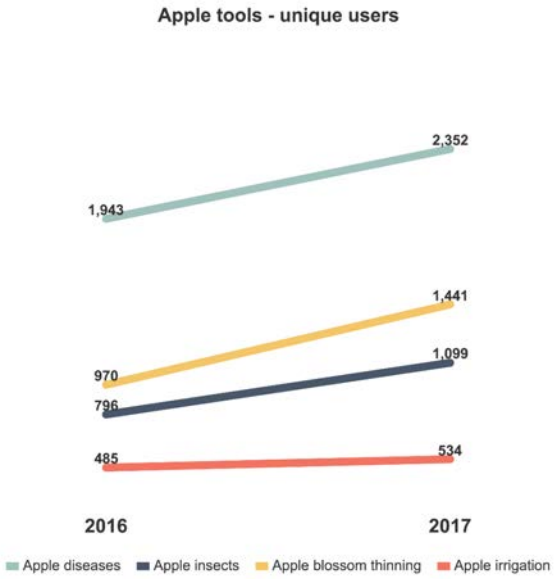

Figure 1. 2016 and 2017 NEWA apple tool users.

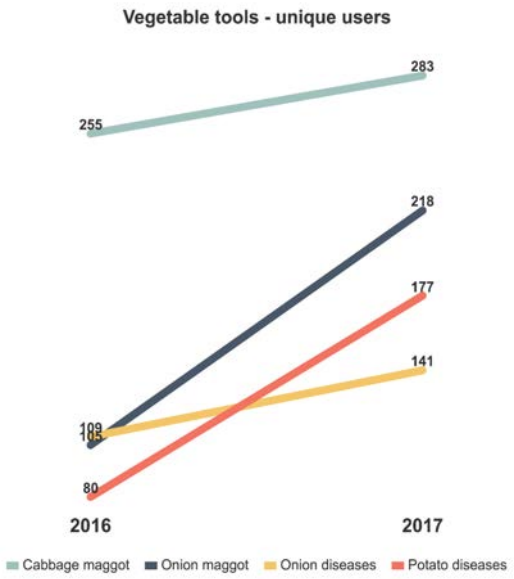

Figure 2. 2016 and 2017 NEWA vegetable tool users.

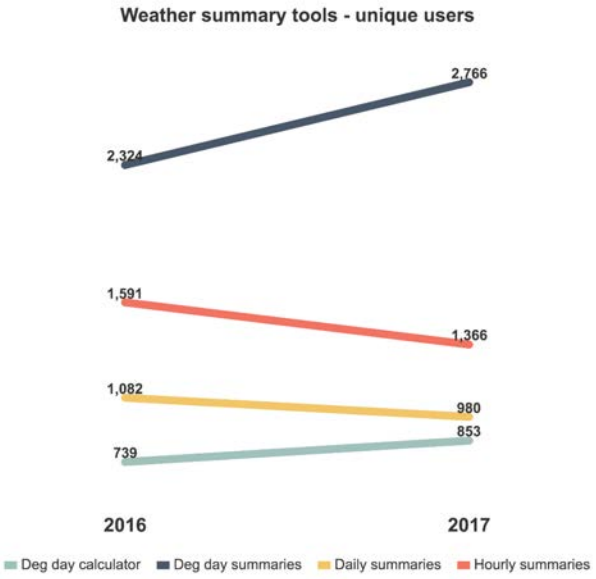

Figure 3. 2016 and 2017 unique users of NEWA weather summary tools

Fruit tool use

Apple disease, insect, and crop management tools showed growth in 2017. Disease models were most used followed by the carbohydrate thinning model, apple irrigation tool, and insect models (Figure 1). 952 unique users accessed grape disease and insect tools, a 19% increase compared to 2016.

Vegetable tool use

Vegetable disease and insect tools also showed growth in 2017. Cabbage maggot was most popular followed by onion maggot, onion diseases, and potato diseases (Figure 2).

Weather tools summary

Weather tools showed mixed trends compared to 2016. Use of degree day summaries and the degree day calculator increased, while hourly and daily summaries use decreased (Figure 3).

Presentations

Presenter	Date	Title	Location
Carroll	1/17/2017	Weather-based decision support tools on NEWA (talk and demo)	Empire State Producers Expo, Syracuse, NY
Carroll	1/20/2017	There's an app for that, NEWA tools for pest/disease management	NOFA NY Winter Conference, Saratoga Springs, NY
Weigle	3/2/2017	NEWA - where we are and where we are heading	LERGP Growers conference, Fredonia, NY
Carroll	3/7/2017	Weather-based decision support tools on NEWA (talk and demo)	Protected Berry Culture Workshop, LIHREC, Riverhead, NY
Carroll	3/28/2017	Co-organizer of NEWA Workshop	NEWA workshop for apple growers, Chazy, NY
Carroll	3/28/2017	NEWA Home page, menu, weather tools, and weather stations	NEWA workshop for apple growers, Chazy, NY
Olmstead	4/11/2017	Introduction to NEWA Lab	Cornell University, Entomology Dept, Ithaca, NY
Olmstead	5/9/2017	Agricultural Decision Tools from the Cornell Climate Smart Farming Program and NEWA	USDA NRCS/USDA Forest Service, Northeast Climate Hub, online webinar
Olmstead	5/23/2017	What's next for NEWA?	Finger Lakes Grape IPM meeting, Prattsburgh, NY
Olmstead	7/14/2017	What can NEWA do for you?	NYS Christmas Tree Farmers Association meeting, Pompey, NY
Weigle	7/21/2017	How NEWA can be used to improve your vineyard IPM practices	Wine grape disease, insect, and weed diagnostic workshop, Kingsville OH
Weigle	8/11/2017	Using the grape berry moth model on NEWA	LERGP summer growers conference, Portland, NY
Carroll	8/29/2017	Using computer models to improve berry pest management	Berry Crops Field Workshop, Stephentown, NY
Olmstead	8/30/2017	Update on NEWA	Sustainable and Organic Vegetable Pest Management field day, Portland, NY
Carroll	9/14/2017	NEWA IPM strategy workshop	NEWA IPM strategy workshop, Geneva, NY
Carroll	10/30/2017	NEWA: past, present, and future	NEWA internal strategy workshop, Ithaca, NY
Carroll	12/5/2017	Berry models on NEWA and SWD monitoring network	NYS Berry Growers Association Board Meeting, Geneva, NY
Olmstead	11/14/2017	NEWA: the Network for Environment and Weather Applications	CCE Ag In-service, Ithaca, NY
Olmstead	12/13/2017	NEWA update	Vegetable processors annual meeting, Batavia, NY
Olmstead	12/13/2017	Project update: NEWA western bean cutworm model	Vegetable processors annual meeting, Batavia, NY

NEWA data access

32 NEWA data licenses were provided to RIMPro (http://rimpro.eu) software owners in 2017 at the request of Extension area specialists, NEWA state coordinators, and apple growers.

NEWA blog

As of January 2018, there were 468 subscribers to the "Your NEWA" blog (http://blogs.cornell.edu/yourenewa). 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

Website updates

Carroll, Grant and DeGaetano received USDA NIFA CPPM ARDP funding to redesign the NEWA website. Data quality control will be improved and a responsive website will be built to improve user experience. Grower needs will be assessed with an online survey, a series of workshops, and interviews. Work began in October 2017 and will end September 2019.

A three-month collaboration with the Cornell School of Information Science was completed in December 2017 to document website primary user needs. Four graduate students organized a series of grower interviews to research user experience/user interface needs. They found that user profiles, multiple station access, downloadable data, and customized sets of tools were high priority.

The website content management system (CMS) for NEWA was updated in August 2017 to correct a security risk and improve functionality.

Pest forecast models

Apple diseases. Fire blight and apple scab (http://newa.cornell.edu/index.php?page=apple-diseases) models were updated by Kerik Cox (Plant Pathology and Plant-Microbe Biology, Cornell University (PPPMB)) and Carroll before the 2017 growing season to include epiphytic infection potential from the Maryblyt™ model and ascospore release and depletion for primary infection, respectively.

Cercospora leaf spot of table beets. A model for Cercospora leaf spot infection risk was built by Sarah Pethybridge (PPPMB, Cornell University), Olmstead, and NRCC staff. Pethybridge will validate the model in 2018 and 2019.

Ornamental insect pests. A collection of ornamental insect pest development models for white pine weevil, spruce spider mite, balsam twig aphid, Douglas-fir needle midge, elongate hemlock scale, balsam wooly adelgid, bronze birch borer, boxwood leafminer, and apple blotch leafminer are being developed by Elizabeth Lamb (NYSIPM) and NRCC staff.

Berry models. Blueberry maggot, strawberry anthracnose, strawberry Botrytis, cranberry fruitworm and mummy berry models were built by Carroll, Cox, Greg Loeb (Cornell University, Entomology) and DeGeatano and will be validated during the 2018 growing season.

Western bean cutworm. New York Western bean cutworm flight periods were compared to calculated flight periods to validate a model being built by NRCC staff. Ken Wise (NYSIPM), Marion Zuefle (NYSIPM) and Darcy Telenko (Cornell Cooperative Extension Vegetable Program) completed field work and Olmstead completed model validation.

Corn earworm. Adult flight data and chemical efficacy data were collected by Olmstead and Brian Nault (Entomology, Cornell University) to inform a future damage prediction model. Additional research is needed to proceed with modeling in the future.

Weed emergence. Emergence models for large crabgrass, giant foxtail, yellow foxtail, common lambsquarters, eastern black nightshade, smooth pigweed, common pigweed, common ragweed, and velvetleaf are being built by Tony DiTommaso (Soil and Crop Sciences, Cornell University), Bryan Brown (NYSIPM), John Wallace (Horticulture, Cornell University), and Seaman. Additional research is needed before validation can be completed.

GRANTS SUPPORTING NEWA ACTIVITIES

PI(s)	Term date	Title	Grantor
Weigle, Martin, Olmstead, Amidon	3/31/2018	Increasing the reliability and scope of NEWA weather and pest model information in the Lake Erie region	LERGP Inc. and NY Wine and Grape
Olmstead, Zuefle, Telenko	3/31/2018	Validation of a hyper-local developmental model to predict western bean cutworm adult emergence in sweet corn	New York State Vegetable Research Council
Loeb, Pritts, Weber, Gomez, Carroll	9/30/2018	2017 Cornell berry research	NYS Dept. of Ag. and Markets
Lamb, Eschenaur	2018	Insects on-line: forecasting insect management for nursery and Christmas tree growers	New York State Farm Viability Institute
Grant, Carroll, DeGaetano	9/30/2019	Building the Network for Environment and Weather Applications (NEWA) Supporting Sustainable Farming	Federal Capacity Funds, Smith-Lever
Carroll, Grant, DeGaetano	8/31/2019	Building a responsive network of integrated pest management applications that supports grower access and communication	USDA NIFA CPPM ARDP
Grant, Lamb, Gangloff-Kaufmann, Seaman, Carroll, Wise	6/31/2020	An integrated pest management program for New York State 2017-2020	USDA NIFA CPPM EIP

NEWA PUBLICATIONS

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