Supporting Fruit Production

OHIO FRUIT NEWS

Research and Recommendations from Experts at The Ohio State University

April 2025

An Introduction to Pawpaws

By Dan Lima, Extension Educator, Belmont county

Pawpaws (*Asimina triloba)* are a native North American tree in the Annonaceae family. The pawpaw tree has a natural habitat in every county in Ohio. The distribution of pawpaw trees extends from Missouri to New York, curving around the Great Lakes region. They also grow as far south as Louisiana and the Florida Panhandle. Pawpaws belong to the Annonaceae family, a diverse group of trees and shrubs commonly found in tropical and subtropical regions around the world. This family includes approximately 107 genera and around 2,400 known species. Notable relatives of the pawpaw include the sugar apple and cherimoya (also known as custard apple), which are valued for their sweet, custard-like fruits. What makes the pawpaw unique amongst this vast family is that it is one of the very few plants that can grow in a temperate environment such as Ohio. In fact, pawpaw like many temperate fruiting trees, require at least 400 hours of temperatures below 45 ºF to vernalize (initiate flower production) and produce viable flowers for fruit production.

Pawpaws have many common names such as wild banana, Hoosier banana, West Virginia banana, Appalachian banana, and hillbilly mango. These common names often reflect how individuals perceive the flavor of the pawpaw. Taste and flavor studies conducted at The Ohio

State University indicate that most people describe the taste as a banana-mango flavor, but the intensity of the flavor depends on palate and maturity of the fruit at the time of consumption.

Many pawpaw varieties have been developed in the recent decades. Pawpaw varieties are often named after Native American regions where the fruit naturally occurs. For example, cultivars like

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Shenandoah, Wabash, and Susquehanna reflect the geographic origins of the species.

Historically, pawpaw have been documented as far back as the American forefathers. George Washington was a fan of the pawpaw fruit, and planted pawpaw trees at his Mount Vernon estate, while Thomas Jefferson included pawpaw trees in his historically famous garden at Monticello. Even though it is an old-world, native fruit tree, agricultural cultivation of the tree has been slow.

Pawpaw trees are planted at the Mount Vernon Estate in Virginia.The location of the trees are shown in yellow on the map. Images courtesy of www.mountvernon.org/the-estate-gardens/gardens-landscapes/plant-finder/item/pawpaw

The tree is commonly found in the forest understory and tends to thrive along stream banks. Trees can be 20-35 feet in height and reproduce through sprouts on underground rhizome roots forming clusters of plants around the parent tree. This clonal way of propagation is also known as “suckering”. Pawpaws are thought to be self-incompatible, possibly due to differences in the timing of pollen and stigma maturity. Genetic variation is thought to be the solution to this pollination barrier. Pawpaws flower in May-June and fruit is typically ready to harvest by September-October.

The pawpaw fruit has a very short shelf life (48 to 72 hours) and fruit maturity is typically completed on the tree. Off the tree, maturation time is variable, and pawpaw enthusiasts are competing with wildlife for this delicious treat!

According to USDA studies smaller trees transplant and survive better than larger trees. Pawpaw trees have a tap root that is very important for viability, therefore deep pots (9 inches or greater) and young trees are recommended when purchasing plants from a

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Grower’s Corner

Is a preventative fungicide application recommended after pruning and training blackberries in the spring?

A preventative fungicide application is generally recommended after spring pruning and training of blackberries to protect pruning wounds from fungal infections such as anthracnose, cane blight, and Botrytis (gray mold). These diseases can enter through fresh cuts, especially in moist, humid conditions common in spring. It's best to prune on dry days and apply fungicides promptly if wet weather is expected. Recommended fungicides include Captan, Pristine, or Merivon. Following up with a dormant application of lime sulfur (i.e., Sulforix) is recommended to prevent inoculum that is present in the planting from building up. Always check the label for the recommended rate and timing.

Image courtesy of D. Becker and N. Gauthier, Univ. Kentucky

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nursery or garden center.

Although pawpaw thrive in the understory, many backyard gardeners and commercial producers have planted them in full sun for fruit production. When planting in the open, irrigation (by hand or using drip tubes) is important for tree establishment. Once the tap root has developed it will penetrate deep into the soil for water accessibility reducing the need for routine irrigation.

The pawpaw tree is considered a low maintenance tree with few predators and low disease pressures. However, many of these aspects are still being researched. If you are interested in growing these native fruit trees for your backyard or farm you will need at least two trees and preferably young ones with healthy tap roots. After 5-6 years of growth, the pawpaw tree should produce ample fruit for your enjoyment.

Pawpaw orchard at CFAES-Waterman in Columbus, OH. Image courtesy of M. Lewis Ivey, The Ohio State University

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2025 OPGMA Summer Tour

June 24, 2025

Co-Hosted by The OSU CFAES Wooster Campus and Greenfield Farms Cooperative

More Information

www.opgma.org/summer-tour/

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ohiopgma@gmail.com

Best Practices for Effective Spraying in the Orchard and Vineyard

By Erdal Ozkan, Professor, Extension State Specialist, Pesticide Application Technology

Regardless of the crop being treated or the equipment used, applying pesticides requires much more skill and knowledge than all other operations required to grow crops. This is especially the case when spraying fruit trees for insect, disease, and mite control because of their wide variations in canopy characteristics (type, depth, height, and row distance). Additionally, there is a need to spray with sufficient momentum to reach the tree canopy's near side, far side, top, and bottom. For this reason, vineyard and orchard spraying requires more knowledge and management skills than what is necessary to spray field crops.

When applying pesticides, specific tasks are required for maximum biological efficacy:

- Mix pesticides uniformly (especially dry products) in the sprayer tank. This can be accomplished only if the agitation system has sufficient capacity for the tank's size and operates properly.
- Choose a pump with sufficient capacity to deliver the required gallonage (gal/acre) to the nozzles.
- Ensure that there is a minimum loss of pesticides as they are sprayed from the nozzles to the target.
- Attain a maximum retention of droplets on the target (minimum rebound).
- Provide thorough and uniform coverage of the target with droplets that carry active ingredients.

The following information summarizes the most critical issues influencing the effective and efficient application of pesticides in orchards and vineyards.

Choose the Right Equipment The most critical factors for selecting a vineyard or an orchard sprayer are that it delivers the required application rate, sprays droplets of the proper size on the target uniformly and minimizes spray loss on the ground and in the air. Different types of sprayers are used for treating pests (weeds, insects, and diseases) in orchards and vineyards because of variations in canopy structure and characteristics (height, depth, density), the width of the distance between rows of canopy, and the size of the area treated (from smaller than an acre to hundreds of acres). Depending on your own situation, the best sprayer for you may be a manually operated backpack sprayer, a sprayer with a vertical boom (no air assistance), an air-assisted sprayer, or an air-shear sprayer (Figure 1).

Figure 1. Examples of sprayers used in the vineyard or orchard. A) Backpack sprayer. B) Sprayer with vertical boom. C) Air-assisted sprayer. D) Tree-point-hitch air-shear sprayer. Photo C by Erdal Ozkan, The Ohio State University.

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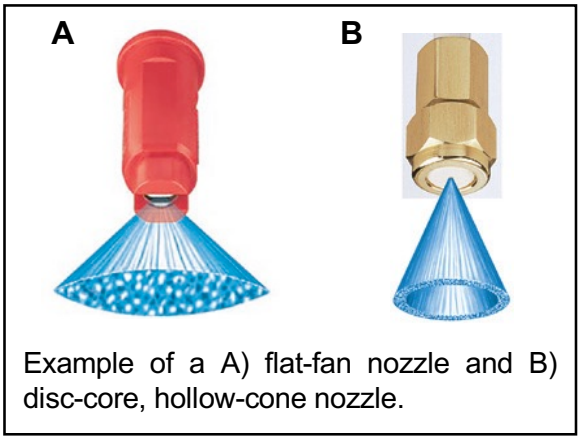
Extensive information on orchard and vineyard sprayers is available in the Ohio State University Extension publication (FABE-533) "Sprayers for Effective Pesticide Application in Orchards and Vineyards" (ohioline.osu.edu/factsheet/fabe-533).

Select the Right Type and Appropriate Size of Nozzle Although nozzles are some of the least expensive components of a sprayer, they hold a high value in their ability to influence sprayer performance. Nozzles meter the amount of liquid sprayed, emit the desired spray pattern, and affect the droplet size. The droplet size is a critical factor in the spray penetrating the target, providing a uniformity of coverage on the target, and minimizing the risk of spray drift. The best nozzle for a given application maximizes the pesticide's efficacy, minimizes spray drift, and complies with label requirements such as the application rate (gallons per acre) and spray droplet size. The procedure for nozzle selection (type and appropriate size) and additional information is available in the Ohio State University Extension publication (FABE-534), "Selecting the Right Type and Size of Nozzles for Effective Spraying in Orchards and Vineyards" (ohioline.osu.edu/factsheet/fabe-534)

Keep Spray Drift in Mind When Spraying Spray drift is defined as wind moving a pesticide from the application site to an off-target site. For many reasons, including production costs, safety, and the environment, maximizing pesticide deposits on the target is essential when spraying pesticides. Spray drift is a significant challenge for pesticide applicators trying to achieve this goal. Drift can occur during spraying and even after spraying due to the volatilization of pesticides. Although complete elimination of spray drift is impossible, it can be significantly reduced by being aware of its major causative factors and taking precautions to minimize their influence on off-target movement of droplets. More information on minimizing spray drift is available in the Ohio State University Extension publication (FABE-535) "Strategies to Minimize Spray Drift for Effective Spraying in Orchards and Vineyards" (ohioline.osu.edu/factsheet/fabe-535).



Example of a A) flat-fan nozzle and B) disc-core, hollow-cone nozzle.

Maximize Pesticide Deposit and Coverage on the Target Adequate amounts of pesticide sprayed on the target is only one aspect of efficient pesticide application. An equally important aspect is how efficiently and uniformly the target is covered. The term used to describe this is "spray coverage." The goal in spraying fungicides and insecticides should be landing as many droplets on the target as possible (maximum coverage). This is one reason why nozzles producing fine to medium droplets are generally preferred, especially when using air-assisted sprayers. The most practical and easy way to determine the location and uniformity of pesticide application is to use water-sensitive papers (Figure 2) attached to leaves in different canopy locations (depth, height).

Figure 2. Water-sensitive papers are used to determine the location and uniformity of pesticide applications.

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Best spray practices from page 5

Spray droplets intercepted by the yellow water-sensitive cards leave a blue stain, representing the spray deposit and coverage. No deposit on the cards indicates that the pesticide is not reaching that area of the canopy. More information on the adequate spray coverage recommended and on improving spray coverage and deposition is available in the Ohio State University Extension publication (FABE-536) "Maximize Pesticide Deposit and Coverage on the Target for Effective Spraying in Orchards and Vineyards. (ohioline.osu.edu/factsheet/fabe-536).

Final Thoughts

Technology is advancing to help fruit growers apply pesticides more effectively and efficiently. However, we still need to pay attention to the conventional, common-sense, and practical aspects of spraying when applying pesticides in orchards and vineyards. Regardless of the crop being treated or the equipment used, applying pesticides requires a much higher level of skill and knowledge than all other operations required to grow crops. Because of the nature of the target crop canopy, this is especially the case when spraying fruit trees and grapevines to control insect pests and diseases. The target to be treated for insect pests and diseases in vineyards and orchards is entirely different than field crops that are a short distance below a sprayer boom and relatively uniform in size. With fruit trees and grapevines, the target is above ground and exhibits great variation in height and depth, which makes uniform treatment and coverage rather difficult.

In this article, I mentioned briefly only the most essential elements of what it takes to get the most out of the pesticides sprayed to protect fruit trees from insects and diseases. A more comprehensive discussion of the best practices for effective spraying in orchards and vineyards can be found in the Ohio State University Extension publication FABE-539, available online at ohioline.osu.edu/factsheet/fabe-539.

Grower Survey: Assessing Ohio Fruit Grower Weed Management Needs

The Ohio State University Specialty Crop Weed Science program is conducting a short survey to identify weed management concerns and research priorities of Ohio fruit growers. The information gathered from this survey will help us better understand the fruit growers' weed management challenges and fill the gaps in current research and immediate needs. The survey includes questions detailing the most troublesome weeds, common weed control practices, and thoughts on future weed control practices. All the personal identifying information will be kept confidential and names, contact details, and IP addresses will not be collected. You can access the survey directly through this link (osu.az1.qualtrics.com/jfe/form/SV_6KD483OiCDqVL5s) or by using the QR code provided. We appreciate your time and feedback. If you have any questions regarding the survey or weed management practices in general, please do not hesitate to reach out to the OSU Specialty Crop Weed Science Specialist, **Dr. Ram Yadav at 330 263 8063 or by email at yadav.206@osu.edu**.

Survey QR Code

DATE:
August 12, 2025

TIME:
9:00 a.m.-5:00 p.m.

LOCATION:
Quarry Hill Winery & Orchard
8403 Mason Rd #2
Berlin Heights, OH 44814

REGISTRATION COST:
Early Registration: $45 per person until July 1

Late Registration: $60 per person July 2 until August 1

New Sprayer Technologies and Best Practices: Vineyards and Orchards

This workshop will feature presentations on best spraying practices using conventional sprayers and new sprayer technology, including spray drones and Intelligent sprayer units. The afternoon will provide field demonstrations showing adjustments to improve effectiveness of conventional sprayers as well as sprayer operation and calibration demonstration. This workshop is being developed by OSU, MSU, and PSU Extension Specialists and the USDA-ARS Application Technology Research Unit. Registration is required. Please see the agenda for program details. Lunch and workshop materials are included with registration.

Pesticide Recertification credits will be offered with this program

REGISTER AT GO.OSU.EDU/SPRAY2025

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Managing Moth Pests in Ohio Apples: A Seasonal Approach to Control

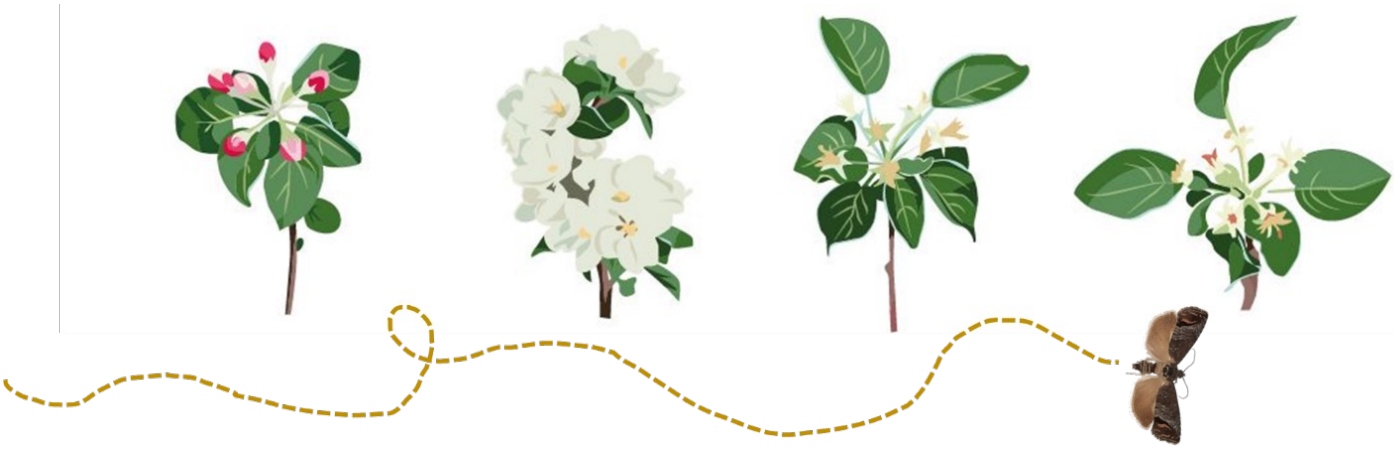
Dr. Ashley Leach, Assistant Professor of Specialty Crop Entomology, Dept. of Entomology; Entomology Department

Biofixes for codling moth are currently being set across the state. Among the most damaging insect pests in Ohio apple production are codling moth (CM) (*Cydia pomonella*) and oriental fruit moth (OFM) (*Grapholita molesta*), both of which can infest fruit and result in yield loss. A successful management strategy requires early-season monitoring, well-timed interventions, and integration of multiple control tactics. In Ohio, codling moth is often the primary "worm in the apple." It lays eggs on fruit and leaves in late spring. Upon hatching, larvae tunnel into fruit, rendering it unmarketable. Oriental fruit moth becomes active earlier, often in April, and sometimes as early as March, and can attack both apple and peach. In apples, OFM larvae damage tender shoots (causing shoot flagging) and bore into developing fruit, often mimicking codling moth injury.

Monitoring and Knowing When to Take Action

Monitoring pest pressure is one of our best defenses against injury. Use pheromone traps in early spring to track adult moth emergence. In Ohio, traps should be deployed by the **pink stage of apple development**, and **biofix** (the date of the first sustained trap catch) typically occurs from **mid-April to mid-May**, depending on your location and seasonal temperatures. Once biofix is established, **degree-day models** become essential tools to predict larval activity and time insecticide applications appropriately.

When choosing lures, I recommend keeping it simple: use the **standard lure for OFM** and the **L2 lure for codling moth**. If you're using mating disruption, switch to the **10X lure** or **CM-DA combo lure**, which attracts both male and female codling moths, providing a more complete picture of population pressure.



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Moth Management Tactics

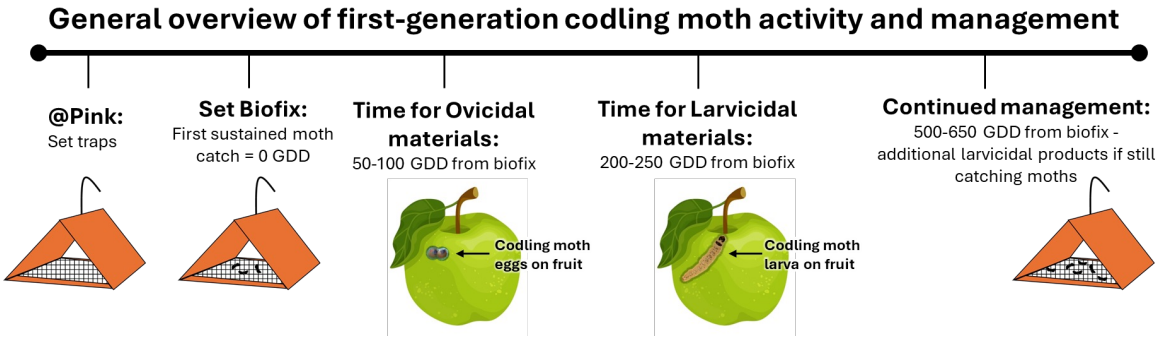
- **Mating Disruption**

  Moth populations are often effectively managed using mating disruption. For blocks larger than 5 acres with a history of codling moth or OFM pressure, **mating disruption dispensers** (such as pheromone twist ties, puzzle pieces, or aerosol puffers) can significantly reduce population buildup and reduce reliance on insecticides. This tactic works best in orchards with moderate to high codling moth pressure and **a lower proportion of wooded edge habitat**, which can serve as a refuge for immigrant moths. Mating disruption products are commercially available from **Trece, Inc.** and **Pacific Biocontrol**.

- **Chemical Control**

  A variety of insecticides are available to target different stages of moth development. The most critical spray timing targets newly hatched larvae—**around 250 degree-days after codling moth biofix**. To slow the development of resistance, be sure to **rotate Insecticide Resistance Committee (IRAC) groups** between generations. Codling moth has already shown resistance to more than 10 insecticide classes globally!

  If conserving beneficial insects is a priority, consider using more selective chemistries such as **insect growth regulators** or **diamide insecticides**, which generally have lower non-target impacts. Most fruit injury results from **first and early second-generation codling moth** activity, so focus sprays during these windows. Late-season applications may still be necessary if trap catches or injury persist. Use online degree-day tracking tools (such as models provided by NEWA) to fine-tune application timing and avoid unnecessary treatments.



- **Cultural Practices**

  Cultural tactics can be difficult to implement at scale but may reduce pressure in smaller operations or diversified blocks. Prompt **fruit thinning** is beneficial, as codling moths prefer clustered fruit. Avoid placing **woodpiles or apple storage bins** near orchard edges, as they can serve as overwintering sites or refuges for adult moths.

- **Biological Control**

  Biological control alone is not sufficient to manage moth populations, but it can play a supportive role. Some **parasitoid wasps**, including species in the genera *Trichogramma* and *Mastrus*, are known to attack moth eggs or larvae. However, their efficacy is still understudied in the Midwest. Conservation of natural enemies is best achieved by **limiting the use of broad-spectrum insecticides**, which can disrupt beneficial insect communities.

Changes to Federal Funding for the Northeast Regional Center (NRCC) – Implications on NEWA.

Melanie L. Lewis Ivey, Associate Professor, Extension Fruit Pathologist, Department of Plant Pathology

NEWA (Network for Environment and Weather Applications) is a web-based platform developed by the New York State Integrated Pest Management Program at Cornell University. It provides real-time weather data and predictive models to support integrated pest management (IPM) and crop decision-making. By using data from a network of weather stations, NEWA offers tools for forecasting pest and disease risks, tracking growing degree days, and guiding agricultural practices for crops like apples, grapes, and vegetables. Though it originated in New York, NEWA now serves multiple states, particularly in the Northeast, Midwest, and Mid-Atlantic regions of the U.S.

The Northeast Regional Climate Center (NRCC) is a federally funded program that provides critical database services, integration of historical weather station data with NOAA-generated hourly weather forecasts, key technical support, and website hosting for the NEWA platform. In April, the NRCC was notified that their funding would be withdrawn as of June 17, 2025. Although the funds were authorized for FY2025 the allocation of operating funds are still pending. The status of funds for FY2026 and beyond is unknown.

Ohio has been a member of NEWA since 2016 and we currently have 45 weather stations connected to NEWA. The fruit pathology program supports the yearly NEWA subscription fee, providing free access to all Ohio stakeholders. Fruit growers use NEWA to assist with making apple scab and fire blight spray decisions, calculating grower degree days, grape cold hardiness, etc. The importance of the NRCC in supporting NEWA can not be understated. NEWA has become a valuable resource to Ohio fruit growers significantly improving their ability to make real-time management decisions.

The following article was prepared by the NEWA Project Leader to help explain the the importance of the NEWA-NCCR partnership – What Keeps NEWA Running? The Cornell Integrated Pest Management Partnership with Northeast Regional Climate Center (go.cornell-ipm.org/newa-nrcc-partners). I have also included the article on page 11 in this issue of OFN for those of you with no or limited access to the internet.

I have served as the NEWA State Coordinator for Ohio since 2016. If you have questions about NEWA and the support provided by NRCC or my program, please contact me.

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What Keeps NEWA Running? The Cornell Integrated Pest Management Partnership with Northeast Regional Climate Center

Last updated 4/25/2025 by Dan Olmstead, NEWA Project Lead and Senior Extension Associate at Cornell Integrated Pest Management, which is part of the Cornell College of Agriculture and Life Sciences. Article is available at go.cornell-ipm.org/newa-nrcc-partners

If you've ever used the **NEWA website** to check when pests might arrive, track crop development, or see local weather data, you've experienced a small part of a larger system. Behind the scenes, powerful tools and trusted weather data work together to help farmers, gardeners, educators and researchers make better decisions. One of the most important partners in making this happen is the **Northeast Regional Climate Center (NRCC)**.

NEWA is part of **Cornell Integrated Pest Management (Cornell IPM)**, a program within Cornell University's College of Agriculture and Life Sciences that supports safe, science-based strategies for managing pests and crop health. Cornell IPM partners with the NRCC to power the NEWA platform and ensure the tools you rely on stay accurate, reliable and available every day.

How the NRCC Supports You through NEWA

Gathering and Organizing Weather Data

NEWA pulls in hourly weather data from more than 1,000 stations across the Eastern United States. The NRCC collects that information, checks it for accuracy and organizes it into a format that can be used by NEWA tools. This includes measurements like temperature, rainfall, humidity, wind and solar radiation.

Linking Real Conditions with Weather Forecasts

The NRCC helps NEWA match real-time weather observations with forecast data from NOAA—the National Oceanic and Atmospheric Administration. This unique connection means users receive both current conditions and smart predictions for what's likely to happen in the days ahead.

Hosting and Maintaining Tools

NEWA's decision support tools don't run on their own. The NRCC hosts these tools on secure servers and keeps them running smoothly 24/7. This includes tools for managing pests, tracking crop stages and monitoring disease risks — resources used by growers every single day.

Quality Control for Better Accuracy

Weather data isn't always perfect. Sensors might fail or report strange values—like saying it's 120 degrees in the middle of the night. The NRCC performs quality checks to catch and fix these issues before the data is used in any NEWA tool.

Building for the Future

As NEWA expands, the NRCC supports the development of new tools and helps improve existing ones. Their technical team works closely with Cornell IPM to build a platform that grows with the needs of the agricultural and environmental communities.

Why This Partnership Matters

Cornell IPM created NEWA to help people make smart, safe decisions using weather-based information. But it's the partnership with the NRCC that makes this vision a reality. Without the NRCC's data systems, technical support and connection to NOAA forecasts, NEWA simply couldn't function the way it does today.
This behind-the-scenes work keeps NEWA strong, reliable and free for the people who depend on it — whether they're managing a commercial farm or growing vegetables in a community garden.

Orange rust is the most important of several rust diseases that attack brambles. All varieties of black and purple raspberries, and most varieties of erect blackberries and trailing blackberries are very susceptible. Orange rust does not infect red raspberries. Orange rust symptoms first appear in the spring. Newly formed shoots are weak and spindly, and the canes are stunted. As the disease develops, the edges and lower surface of infected leaves are covered with blister-like pustules that are waxy at first but soon turn powdery and bright orange. Orange rust infections occur in the spring and fall. ***Spring infections*** are favored by cool (43 to 72 degrees F) and persistently wet conditions. ***Fall infections*** begin to occur about 21 to 40 days after spring infections. The best way to control orange rust is to plant resistant varieties. Severely infected plants should be removed making sure to remove as much as the root system as possible since the disease is systemic. For more information on orange rust of brambles go to ohioline.osu.edu/factsheet/plpath-fru-30

Grower Resources:

- OSU Fruit Pathology website (u.osu.edu/fruitpathology)
- OSU Plant and Pest Diagnostic Clinic website (ppdc.osu.edu or 330-263-3650)
- OSU Extension Fruit, Vegetable & Specialty Crop News (https://u.osu.edu/vegnetnews/)
- OSU Fruit and Vegetable Safety website (https://producesafety.osu.edu)
- OSU Fruit and Vegetable Pest Management website (entomology.osu.edu)
- OSU Bramble: Production Management and Marketing Guide (Bulletin 782) (extensionpubs.osu.edu)

CFAES & Other Upcoming Events – 2025

Greenhouse Tomato Academy – June 23 link here
OPGMA Summer Tour – June 24 link here
Ohio CEA Conference – July 16 link here
Northern Nut Growers Conference – August 3-6 link here
New Sprayer Technologies & Best Spraying Practices Workshop – August 12 link here
Ohio Pawpaw Festival – September 12-14 link here
Farm Science Review – September 16-18 link here
New Applicator Training Webinar – October 8 link here

*Contact your county Extension office to register for CFAES events by phone.

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