Supporting Fruit Production

# OHIO FRUIT NEWS

Research and Recommendations from Experts at The Ohio State University

May 2023

## Plant Tissue Assessment Update from East Palestine, Ohio

**By Haley Shoemaker, OSU Extension Educator, Columbiana and Mahoning Counties; Jeff Hattey, Professor, School of Environmental and Natural Resources**

To address concerns from the agricultural community following the train derailment in East Palestine, Ohio, The Ohio State University (OSU) and the Ohio Department of Agriculture (ODA) established procedures and analytical protocols to evaluate plant tissue samples for 26 semivolatile organic compounds (SVOCs) that may be present in or on the plant tissue of growing crops. These compounds were selected because they were listed on the cargo manifest, or they could be released during the resulting burns and serve as markers for potential contamination. Sampling efforts focused on winter crops and pasture species such as winter wheat, barley, alfalfa, grass hay, and rye (Figure 1). The data derived from this sampling effort provides producers with a more thorough understanding of potential impacts resulting from the derailment.

Through cooperation with local agricultural producers and landowners, sampling sites were selected to represent both an inner-radius, spanning up to three miles from the derailment, as well as a background-radius, which included agricultural properties within three to five miles from the derailment but not exposed to potential contaminates. Inclusion of background sample locations is consistent with the approach to soil sampling conducted under the Preliminary Residential/Commercial/Agricultural Soil Sampling Work Plan.

Figure 1. Ohio State University College of Food, Agricultural and Environmental Sciences in partnership with the Ohio Department of Agriculture collected plant samples from nearby farms in East Palestine.

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Samples were then collected by ODA Plant Health Inspectors trained in EPA-approved methods for plant tissue sampling to evaluate pesticide residue in agricultural products. These standard EPA protocols were used in the collection of plant tissue in conjunction with observation from OSU staff. Immediately following collection, samples were placed in cold storage until extraction for SVOCs using a widely accepted method for extracting pesticide residues for plants, as approved by the Association of Official Analytical Collaboration International.

To determine potential impact from the event, each SVOC from the inner-radius was compared to the background-radius if values were reportable. No SVOCs were detected above reportable limits in the inner-radius and only one compound (Benzo[b]fluoranthene) was above reportable limits in the background-radius in two samples. Since there were no reportable SVOCs within the inner-radius, the implication is that **plant materials are not contaminated with SVOCs.** Scientific research has found the primary mode of SVOC ingestion from plant materials by animals or humans is a result of the SVOCs or SVOC contaminated soil being deposited on the exterior of the plant tissue. These findings indicate that plant tissue is an unlikely source of SVOC exposure in the impacted zone from the Norfolk Southern train derailment.

Specifically considering fruit crops, potential for contamination should be minimized since the derailment and release occurred during winter dormancy, meaning leaves were not exposed and soil transfer to leaf tissue would be minimal for trees and shrubs. Data derived from soil sampling conducted in the region under EPA supervision have not identified SVOC contaminated soils, therefore actively growing fruit crops should have minimal exposure to SVOCs.

# Grower's Corner

**What can be done about 2-4 D damage on grapevines?**

The herbicide 2-4 D is a growth regulator that mimics naturally occurring plant hormones that regulate plant growth and development. 2-4 D is rapidly taken up by the leaves and moved to growing shoots and the roots. The result is twisted shoots, tendrils and leaf petioles as well as deformed leaves. Depending on the amount of herbicide that contacted the plant, terminal growth may stop for several weeks. In severe cases, vines may not recover for two or more years, and the fruit may never mature. Leaf removal is not recommended as it will not affect the status of the vine. It is important to continue a disease management program as stressed plants are more susceptible to disease. More information is available in the factsheet *Herbicide injury and the problem of spray drift*.

2-4 D injury on grape leaf. *Image courtesy of Doug Doohan, Ohio State University.*

# HAL 9000 Meets Insect Monitoring: Introducing Trapview Camera Traps

**By James (Jim) Jasinski, Professor, Extension Fruit Pathologist and IPM Program Coordinator, Ohio State University Extension**

Well, not quite HAL from 2001: A Space Odyssey. The Ohio State University IPM Program and Department of Entomology have maintained an insect pest monitoring network for over three decades. Typically, pests are monitored using either sticky traps, scent-based traps or pheromone traps.

As trapping technology has evolved, OSU is now experimenting with Trapview camera traps (Figure 1) that purport to identify pests captured internally on sticky film using Artificial Intelligence (AI) software. Each AI identified pest is then reviewed and verified by a trained employee for accuracy. While the camera based traps are relatively expensive compared to traditional monitoring traps ($650 apiece), they require very little maintenance except pheromone lure replacement. The cost savings will come from time saved physically inspecting the trap every few days or weekly throughout the season. The number of pests identified by the AI is tallied per day and shown on a website and app, along with a picture of the pests on the sticky panel inside the trap (Figure 2).

Through a grant from Ohio Vegetable and Small Fruit Research and Development Program, five Trapview traps will be evaluated at three locations (Wooster (3), Celeryville (1), South Charleston (1)) on three different pests (Corn earworm (2), Grape berry moth (1), Codling moth (2)) compared to the standard trap for each pest. Updates on how well these AI based traps compare to standard traps will be reported at various times throughout the season.


Figure 1. Delta style Trapview trap (a) in apple orchard with solar charger (b), antennae (c) and humidity sensor (d).

Figure 2. Image capture inside Trapview trap. Insects caught are non-targets, otherwise they would be highlighted by green box indicating positive ID.

# Moisture Effects on Tree Fruits during Spring Season 2023

**By Diane Miller, Associate Professor, Tree Fruit Extension Specialist, Department of Horticulture and Crop Science**

We entered the 2023 growing season with good soil moisture levels and have needed all of that as the spring season has been dry. Tree fruit need roughly an inch of water a week during the growing season to ensure good function. In Wooster, we received 1.4 inches of rain in May compared to a historical average of 4 inches. While the actual average temperature (58 F) was right on the historical average, the lack of rainfall made it seem hotter. The OARDC weather station (now called the CFAES weather station, standing for **C**ollege of **F**ood, **A**gricultural and **E**nvironmental **S**ciences) has a wealth of weather data since 1982 for those wishing to delve into comparative weather (https://weather.cfaes.osu.edu/dailyinfo_B.asp ).

While small fruit crops are very dependent on regular moisture, and growers have acknowledged that reliable and quality production requires adding water when needed through an irrigation system, tree fruit growers have been slower to add irrigation systems. However, a component of young tree fruit plantings should be the ability to add water when needed (Figure 1). Below are some reasons why.

**Root Growth.** As we rely on dwarfing rootstocks for smaller tree size, easier management, and higher fruit quality, the root system of dwarfing rootstocks is considerably smaller and less extensive than on older or bigger rootstocks. Fortunately, root growth occurs mostly in early spring and late fall, times when soil moisture has not been limiting. But we are asking whatever root system is present to support the top during times of rapid shoot growth. A healthy root system is the key to what goes on above ground. Any root growth stress means that less root volume contacts less soil/soil moisture.

Apple trees are capable of surviving in droughty conditions as apple is native to dry areas of Kazakhstan, but as orchardists we are asking the trees to do more than survive! In our orchards, slightly drier (meaning well aerated, well-drained soil) is better than wet.

**Top Growth.** In spring, not only are the trees blooming, but shoots are also growing and fruit buds for the following season are generally initiated within 50 days after bloom. All of this top activity takes adequate moisture. When there is moisture stress, tree cycles start to suffer. And the impact can be seen in impact on cropping via fewer flower buds the next season. Water stress in May can also reduce cell division in developing fruit, resulting in smaller fruit size potential. Early thinning to eliminate inter-fruit competition is important in spring drought. Early thinning is especially important for peaches to allow adequate fruit size potential.

Figure 1. Drip irrigation in an apple orchard. See factsheet on types of irrigation systems for high density orchards. *Image courtesy of* the *Ministry of Agriculture Food & Rural Affairs, Ontario, Canada.*

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# Misshapen Strawberry Fruit – What are the Causes?

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

Misshapen (or deformed) strawberry fruit are commonly seen in strawberry fields in Ohio. Most of the causes of mishappen fruit are due to abiotic disorders or insect pests and not plant pathogens.

Abiotic disorders are also called non-infectious disorders because they are not caused by a pathogen or insect pest. Unfavorable soil properties, fertility imbalances, temperature and moisture extremes, and chemical toxicity, are examples of abiotic disorders. Some of the more common abiotic disorders that cause mishappen fruit in strawberry are **boron deficiency**, **poor pollination**, **frost injury**, and **fasciation**.

**Boron Deficiency.** Boron is the most common deficient micronutrient in strawberry. Boron is prone to leaching and the levels of boron in the soil varies widely. Boron deficient plants produce small, deformed berries (Figure 1A) and the leaves are often asymmetric and have tip necrosis (Figure 1B). Below the ground the roots are often stubby. To verify a boron deficiency a leaf nutrient analysis is required.

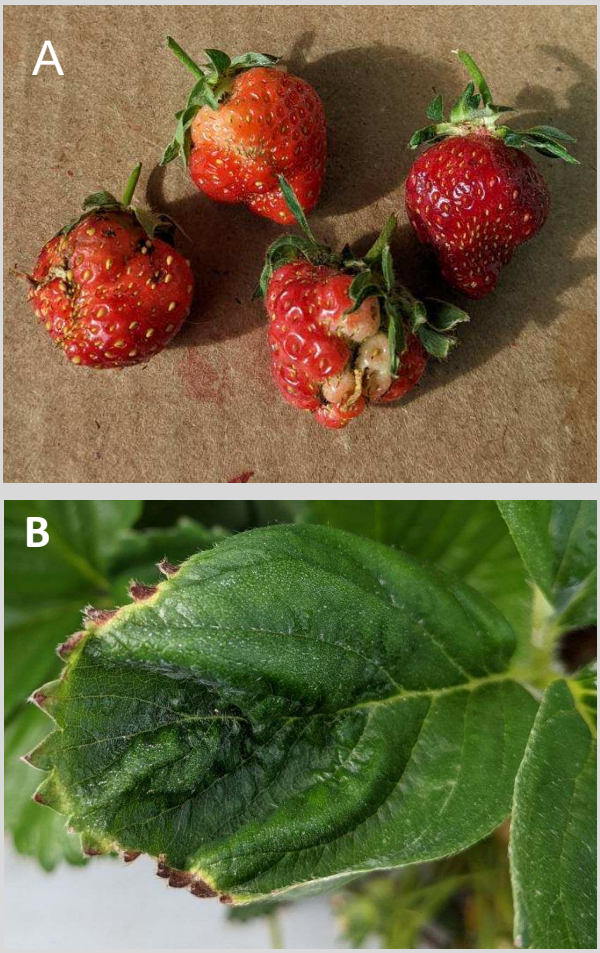


Figure 1. Symptoms of boron deficiency in strawberry fruit (A) and leaves (B). *Images courtesy of Clif Little, OSU Extension, Guernsey County.*

**Poor Pollination.** Poorly pollinated berries are small, dimpled, uneven, and seedy (Figure 2A). Cool, wet weather during the early bloom period (May) will reduce pollination. Although strawberries self-pollinate, pollinators will increase pollination and ultimately fruit size.

**Frost Injury.** Frost damage is the most common abiotic disorder affecting strawberry flowers and fruit. Injury often appears on the king fruit first. Affected areas of the fruit are seedy and the fruit are small and deformed (Figure 2 B). Frost injury can easily be mistaken for tarnish bug injury or poor pollination. Corresponding the symptoms to a frost during bloom is one way to verify frost injury. Frost damage can be minimized by overhead irrigation when temperatures are critical or using row covers. Portable wind machines can also be used but are not economical for most growers in Ohio.

**Fasciation.** Fasciation is caused by day lengths in the fall that are too short, and cool and dry fall temperatures; conditions that affect flower bud development. Berries are malformed, cockcomb-shaped with multiple tips, and lack seeds (Figure 2C).

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**Misshapen strawberry fruit continued from page 5**

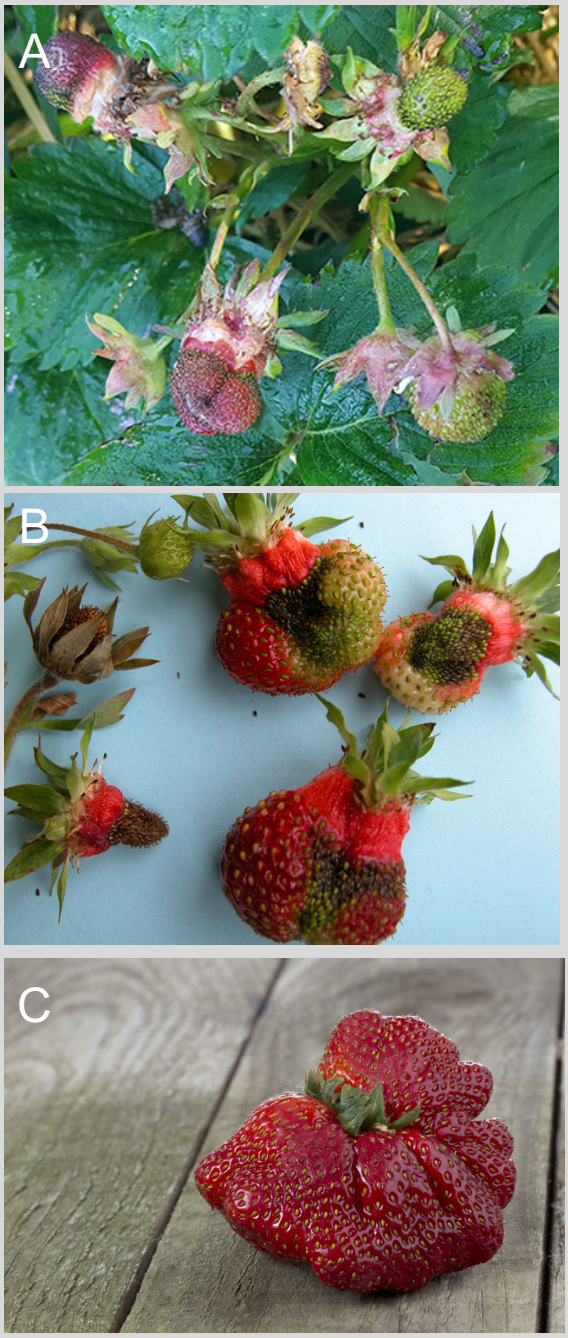


Figure 2. Symptoms of poor pollination (A), frost injury (B), fasciation (C, *Images courtesy of Mark Longstroth, MSU Extension* (A), *Ministry of Agriculture Food & Rural Affairs, Ontario, Canada* (B).

While many insect pests can affect the quality of strawberry fruit the **tarnished plant bug** is notorious for causing misshapen fruit.

**Tarnished Plant Bug.** Tarnished plant bugs feed as nymphs (Figure 3A) and adults on the flowers and developing fruit. They kill the area of the fruit that they are feeding on, but the rest of the fruit continues to grow resulting in malformed fruit (Figure 3B). Scouting for tarnished plant bugs is recommended during flowering. If one adult or nymph per 20 plants are observed, then control measures should be implemented. Consult the Midwest Fruit Pest Management Guide for management recommendations.

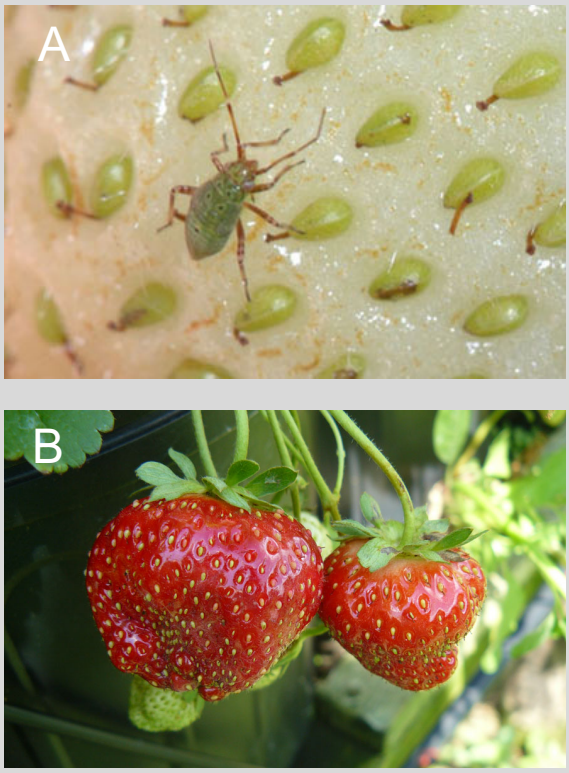


Figure 3.Tarnished plant bug nymph (A) and mishappen fruit from nymph or adult feeding (B). *Images courtesy of Jeff Hahn* (A) and *Ministry of Agriculture Food & Rural Affairs, Ontario, Canada* (B)

# June 20 2023

OPGMA Summer Tour

Columbus, OH at the Controlled Environment Agriculture Research Complex

# Tree Assistance Program (TAP) - Natural Disaster Relief for Fruit Growers

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

Natural disasters including drought, fire, floods, freeze, lightning, tornados, derechos, plant disease, and insect infestations can decimate an orchard or vineyard very quickly or slowly over time. The United State Department of Agriculture (USDA) Disaster Assistance, Tree Assistance Program (TAP) provides financial assistance to eligible commercial fruit tree, nut, and grape growers (collectively referred to as orchardists) to replant or rehabilitate eligible trees, and vines lost by natural disasters (Figure 1). Nursery trees produced for commercial sale are also included in the program. The program is funded by the Farm Bill and administered by the Farm Service Agency (FSA).

The TAP program provides assistance to eligible orchardists that have incurred tree or vine mortality losses in a stand of more than 15% (after normal mortality). Except for losses due to plant diseases, mortality is assessed on a calendar year basis. For plant diseases, mortality may be assessed over multiple years, depending on the disease and the time-scale for disease progression within the tree or vine. During assessment of mortality due to plant disease, losses that could have been prevented through reasonable and available disease management measures are excluded from the final percent loss count. For this reason, maintaining detailed records of tree or vine management is recommended.

In addition to meeting the more than 15% mortality for a stand after adjusting for normal mortality eligible orchardists must own the trees or vines (but not the land) when the natural disaster occurred and must replace the trees or vines within 12 months from the date the TAP application was approved.

Figure 1. Top: Apple trees destroyed by a derecho in 2020 in Iowa. Bottom: Flood vineyard in Ontario in 2019.

Applications must be submitted within 90 days of the disaster event or the date when the loss is apparent to the producer. For more information on TAP visit disaster.fsa.usda.gov or contact your County FSA office. To find your county office go on-line to the Ohio FSA Office or call 614-255-2441.

**Moisture effects on tree fruits continued from page 6**

**What I see in Wooster tree fruit thus far in 2023.** It appears the abundant soil moisture entering the growing season has pulled the tree fruit crops through thus far. Shoot extension growth has been adequate, with little fire blight. We have good fruit set on all apple varieties, which we adequately thinned down to a desirable crop load.

Early this spring, we extended the herbicide strip on the young apple trees on B9 rootstock to 6 feet total width to eliminate grass competition for moisture. That allowed the trees to extend their root systems during time of adequate soil moisture.

**We are installing trickle irrigation on all tree fruit crops.** The month of May was enough to convince me that rolling the dice on regular rainfall is unwise. When moisture crunch hit, tree fruit were the lowest priority among the specialty crops. We are setting up the capacity to turn on tree fruit trickle irrigation when needed to come up with an inch of water per week during the growing season.

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**Apple mosaic virus (ApMV)** is a virus that is transmitted exclusively by mechanical means. Leaves develop a distinctive, random pattern of pale to bright yellow (chlorotic) spots. The spots can turn brown when conditions are dry and hot. In severe cases the leaves prematurely drop their leaves. Infected trees are slow growing and produce low fruit yields. The disease can be avoided by planting certified virus-free trees. All commercial cultivars are susceptible to the virus but varieties such as Golden Delicious, Granny Smith and Jonathan are very susceptible. Diseased trees may need to be removed if yield is significantly reduced. Diseased trees should not be used as a source of scion material.

## CFAES Upcoming Events-2023

OEFFA Organic Apple Orchard Tour – June 15 link here
OPGMA Summer Tour – June 20 link here
Northern Nut Growers Association Conference – July 23-26 link here
Ohio State Fair – July 26 – August 6 link here
New Pesticide Application Training – August 16 link here
Ohio Pawpaw Festival – September 15-17 link here
Farm Science Review – September 19 - 21 link here

*Contact your county Extension office to register for events by phone.
For a list of CFAES events and schedule changes go to the CFAES Events Page

## Grower Resources:

- OSU Fruit Pathology website (u.osu.edu/fruitpathology)
- OSU Fruit and Vegetable Safety website (https://producesafety.osu.edu)
- OSU Fruit and Vegetable Pest Management website (entomology.osu.edu)
- OSU Fruit and Vegetable Diagnostic Laboratory (u.osu.edu/vegetablediseasefacts/)
- OSU Bramble: Production Management and Marketing Guide (Bulletin 782) (extensionpubs.osu.edu)

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