Supporting Fruit Production

# OHIO FRUIT NEWS

Research and Recommendations from Experts at The Ohio State University

September 2023

## Eliminating the Bad Apple – Conditioning Honeycrisp Apples for Storage

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

Honeycrisp is one of the most beloved apple varieties currently on the market. Unfortunately, they are difficult to store for prolonged periods of time because they are very sensitive to chilling. Examples of chilling injury include ribbon scald (Figure 1) and soggy breakdown (Figure 2). Honeycrisp are also sensitive to injury by carbon dioxide ($CO_2$) in storage (Figure 3). Dr. Randy Beaudry at Michigan State University (MSU) Extension has conducted research to develop best practices for preserving the quality of Honeycrisp while in storage. This article provides a summary of his recommendations for air storage and controlled atmosphere (CA) storage of Honeycrisp apples.

Fruit should be harvested prior to 60% starch clearing or a starch iodine index of less than 6 (Figure 4) and when ground color change is from green to yellow. During preconditioning steps, the apples can be treated with the synthetic growth regulator 1-Methylcyclopropene (1-MCP) at a rate of 1 ppm for 24 hours.

**Air Storage**

1. Precondition for five to seven days at 50 °F (10 °C) to suppress chilling injury. $CO_2$ levels should not exceed 1% during preconditioning, especially for fruit harvested from young trees.

Figure 1. External and internal symptoms of ribbon scald on Honeycrisp caused by improper storing condition. Photo courtesy of R. Beaudry, MSU Extension.

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2. Transfer fruit to cold storage at 36 - 38 F (2-3 C) for three to four months. Fruit may need additional time in cold storage if the initial maturity / starch clearing was less than 60%.

Figure 2. Internal appearance of soggy breakdown on Honeycrisp caused by improper storing conditions. Photo courtesy of OMAFRA.

**Controlled Atmosphere Storage**

**Mild Preconditioning**

1. Precondition for five to seven days at 50 °F (10 °C) to suppress chilling injury. $CO_2$ levels should not exceed 1% during precondition, especially for fruit harvested from young trees.
2. Transfer fruit to cold storage at 36 - 38 °F (2-3 °C) for at least one month maintaining $CO_2$ levels between 0.5 to 1% and $O_2$ levels between 1.5 and 3%. Following this initial cold storage period, the conditions should be modified depending on whether standard CA or low $O_2$ CA is used.

- ***Standard CA***: Store fruit at 36 - 38 °F (2-3 °C) for an additional five to six months while increasing the $CO_2$ level to 3% and maintaining the $O_2$ level between 1.5 and 3%.
- ***Low $O_2$ CA***: Store fruit at 36 - 38 °F (2-3 °C) for an additional six to seven months while adjusting the $CO_2$ level to 1% and decreasing the $O_2$ level to 0.5 to 1%.

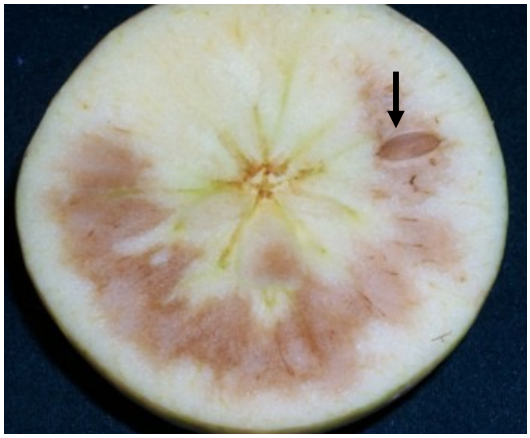

Figure 3. Internal appearance of $CO_2$ chilling injury on Honeycrisp. Cavities (black arrow) embedded in the brown tissue is a common symptom of $CO_2$ chilling injury. Photo courtesy of R. Beaudry, MSU Extension.

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# Grower's Corner

Search Licensed Nurseries

**What is a reputable nursery?**

Almost all disease management recommendations for berries say purchase clean plant material from a reputable nursery. But what is a reputable nursery? A reputable nursery is a state certified nursery that uses foundational level plant material to establish healthy sources of propagation materials for commercial production. Foundational level plant material is produced from tissue culture to eliminate viruses and other target pathogens. The material is tested annually to ensure the plants are clean and the integrity of the variety is maintained. For nurseries to be included in state certification programs they must use foundational level plant material. A reputable nursery will use best propagation and production practices to ensure the stock remains disease and insect pest free. The Ohio Department of Agriculture Plant Pest Control Section certifies Ohio's nursery stock producers by performing inspections. To find a licensed nursery in Ohio go to agri.ohio.gov/divisions/plant-health/nurseries-dealers.

**Conditioning of Honeycrisp apples for storage continued from page 1**

### Intense Preconditioning

*Note: Intense preconditioning will shorten storability and can enhance bitter pit development. To minimize bitter pit, manage crop load by thinning and provide adequate calcium immediately after fruit set.*

1. Precondition for three to five days at 70 °F (21 °C) to suppress chilling and CA injuries. $CO_2$ levels should not exceed 1% during precondition, especially for fruit harvested from young trees.
2. Transfer the fruit to cold storage. Conditions during cold storage will vary depending on whether standard CA or low $O_2$ CA is used.

- Standard CA: Store at 36 - 38 °F (2-3 °C) for six months with a $CO_2$ level of <1% and $O_2$ between 1.5 and 3%.
- Low $O_2$ CA: Store at fruit 36 – 38 F (2-3 C) for six to seven months with a $CO_2$ level of 1% and an $O_2$ level of 0.5 to 1%.

For more detailed information on cold storage of Honeycrisp apples I encourage you to read Dr. Beaudry's factsheet "Comprehensive Honeycrisp Harvest and Storage Recommendations".

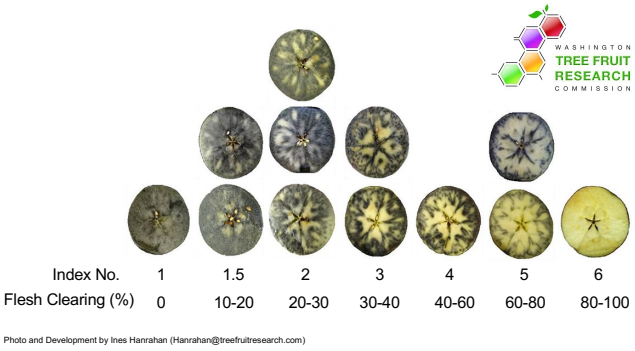



Figure 4. Starch iodine index and flesh clearing rating for Honeycrisp. Figure courtesy of the Washington Tree Fruit Research Commission.

# New Field Specialist for Specialty Crop Production Systems Joins OSU

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

Dr. Logan Minter the new field specialist for specialty crops production systems, at Ohio State University Extension in The Ohio State University College of Food, Agricultural, and Environmental Sciences (CFAES).

Logan grew up in rural Pike County, Ohio. He has a Ph.D. in entomology from the University of Kentucky, Lexington, KY. Before joining OSU on August 1, he previously worked as an associate professor of biology at Shawnee State University.

Logan will work closely with Extension professionals, growers, industry contacts, and other Extension clientele throughout Ohio to address specialty crop production issues such as pest control, disease management, production methods, organization systems,

and breeding and varietal trials of new cultivars. Logan has hit the ground running, attending the Pawpaw Festival and Farm Science Review. Watch for him at upcoming Extension events this fall!

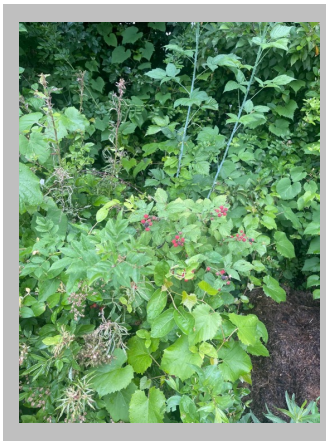
Logan is based at OSU South Centers in Piketon. You can reach him by email at minter.21@osu.edu or by phone 740-289-2071.

# Preparing Brambles for Winter – Sanitation Practices for Disease Prevention

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

Disease management of perennial fruit crops is a year-round endeavor. Many fungal pathogens survive the winter months in the soil or plant debris, infected canes or buds, or dead canes. As part of an integrated disease management program fall sanitation practices to reduce inoculum in the planting should be done. Best sanitation practices include removing floricanes after harvest, removing diseased and dead canes, removing dead or systemically infected plants, and raking or chopping fallen leaves. Pruning debris should be destroyed by burning or placing in the trash or discarding it away from the planting. Diseased plant material should not be composted. Pruning cuts should be sharp and clean to avoid unnecessary mechanical wounds.

The fall is also a good time to scout for and remove wild bramble populations that are near the production field. In addition to fall sanitation practices, some diseases require a dormant or delayed dormant fungicide application. For fungicide recommendations consult the Midwest Fruit Pest Management Guide (OSU Extension Bulletin 506).



Wild bramble populations near production fields should be removed to reduce the spread of orange rust disease.

The table below summarizes where the fungi for several common diseases of brambles in Ohio overwinter, the recommended fall sanitation practices for each disease, and whether a dormant or delayed dormant fungicide application is recommended.

| Disease (pathogen) | Host | Overwintering Location | Best Sanitation Practices | Dormant Fungicide Application |
|---|---|---|---|---|
| **Anthracnose** (*Elsinoe veneta*) | All brambles | • Infected canes | • Remove floricanes after harvest<br>• Remove diseased canes | Yes |
| **Cane blight** (*Leptosphaeria coniothyrium*) | Raspberry<br>Blackberry | • Infected canes<br>• Dead canes | • Remove floricanes after harvest<br>• Remove diseased and dead canes | Yes |
| **Cercospora leaf spot** (*Mycosphaerella confusa*) | Raspberry<br>Blackberry | • Fallen leaves | • Rake and remove leaves or chop leaves | No |
| **Orange rust** (*Gymnoconia nitens*) | Blackberry<br>Red raspberry | • Systemic infection in crowns and roots | • Remove and destroy infected plants and roots<br>• Remove wild brambles | No |
| **Phytophthora root and crown rot** (*Phytophthora* spp.) | Raspberry | • Soil | • Remove floricanes after harvest<br>• Remove diseased canes | Yes |
| **Raspberry leaf spot** (*Sphaerulina rubi*) | Raspberry | • Fallen leaves<br>• Infected canes | • Remove floricanes after harvest<br>• Remove diseased canes<br>• Rake and remove leaves or chop leaves | No |
| **Septoria leaf spot** (*Sphaerulina westendorpii*) | Blackberry<br>Black raspberry | • Fallen leaves<br>• Infected canes | • Remove floricanes after harvest<br>• Remove diseased canes<br>• Rake and remove leaves or chop leaves | No |
| **Spur blight** (*Didymella applanata*) | Raspberry | • Infected canes | • Remove floricanes after harvest<br>• Remove diseased canes | Yes |

**Black Knot** is a fungal disease that affects ornamental (shown here), native and edible plum and cherry trees. The fungus (*Apiosporina morbosa*) overwinters in galls on branches and spores are released in the spring during wet weather. Black gals represent a two-year infection. Galls can be removed from the branches by pruning at least 4 inches below the gall. Removing the galls will reduce the amount of inoculum available in the spring. Pruning should be done in late winter when temperatures are below freezing. In trees that are heavily infected replacing the tree may be more feasible than pruning. Tree fruit growers should avoid planting plum and cherry trees near the edges of woody areas where wild plums and cherries may be growing. For fungicide recommendations consult the 2023-2024 Midwest Fruit Pest Management Guide, page 99.

## 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)

## CFAES Upcoming Events-2023

Urban Landscape Pest Management Workshop Webinar – September 27 link here
Midwest Mechanical Weed Control Field Day – September 27 link here
New Pesticide Applicator Training – October 11 link here
2023 Great Lakes Fruit, vegetable and Farm Market Expo – December 5-7 link here
2024 Commercial Recertification Opportunities (January 11 and 18; February 14 and 22) – link here
Ohio Produce Network – January 15-16 link here
Ohio Ecological Food and Farm Association Conference – February 15-17 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

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