

Supporting Fruit Production

OHIO FRUIT NEWS

Research and Recommendations from Experts at The Ohio State University

March 2024

Fruit Tree Planting Tips

By Diane Doud Miller, Associate Professor, Tree Fruit Extension Specialist, Department of Horticulture and Crop Sciences

Getting a new planting of fruit trees off to a good start pays off with better tree survival, establishment, and growth. Nurseries provide instructions on handling trees after they arrive to your site. The nurseries have put a lot of effort into getting quality trees to you and you have paid for the trees; it's to everyone's benefit to handle new trees well. I will reiterate some key points here, focusing on apple trees.

Check tree status when they arrive. Smaller orders will come in cardboard boxes with tree roots covered with media and plastic wrapped. Upon arrival, open cardboard boxes, inventory what you have received, get trees standing upright, check moisture level of roots, and get packages into a cooler.

Bigger orders will come by truck usually heeled into a bulk box, i.e., bundles of trees upright with tree tops visible (maybe plastic wrapped) and roots covered with media to hold moisture. The box can be moved by forklift into the cooler and held until you are ready to plant.

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Newly planted apples at CFAES-Wooster in 2019.

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Use cooler dedicated to trees. Make sure there is no fruit in the cooler, as the ethylene from ripe fruit is harmful to bud break on trees. If the cooler has previously contained fruit but has been cleaned out and aired out it will be fine for the trees.

Okay to keep cooler lights off. The incoming trees don't need light and can be held in the darkness of a cooler. The tree buds will adjust just fine to day light and length when planted outside.

Watch your prepared site for the right time to plant. This step assumes you have prepared the new orchard site for a year, working on soil pH, nutrient status, organic matter, and perennial weed control. The right time to plant is as early as possible calendar-wise but when the soil is dry enough. It is a mistake to plant trees into soil that is too wet. Planting by auger or by tree planter (or even by shovel) into saturated soil affects drainage patterns and can restrict roots from growing freely in all directions. Anchorage of trees will be impacted, as will amount of root growth, and overall tree health. If planting occurs later in the spring, make sure the soil is dry.

The reason it's desired to plant trees early in the spring is to allow for new root growth.

Tree root growth occurs predominately in the spring and in the fall, with shoot growth occurring during the later spring/summer season. If the new trees are planted before the shoot buds break, then the roots have the chance to settle in, establish, and grow before having to support shoot growth. That's ideal.

In practice, though, in Ohio, it's difficult to get the soil dry enough to plant as early as is ideal. So, fear not! Waiting is better than planting into too wet of soil. Planting trees into too wet soil is never a good idea for long term tree health and performance.

Make sure overall field soil is loose if using a tree planter.

Basically, the bigger the root system, the more a tree planter can smash the root system into two dimensions. If you're fortunate enough to have nice big root systems on your trees from the nursery, make sure your field soil is loose when planting, so the root system doesn't get stuck growing two-dimensionally down the tree planter trench.

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Grower's Corner

How can I protect my blueberries from a late spring freeze?

Water applied to the plants using sprinklers can protect blueberry flowers from freeze injury; however, if applied at the wrong time water can increase injury. Sprinklers should not be used when temperatures are predicted to go below 24 F. The temperature range where sprinklers can protect the flowers is 24-27 F. Water should be applied at a rate of 0.10 to 0.15 inches of water per hour. Once the sprinklers are turned on, they must stay on until the temperatures are above freezing. Once the ice begins to melt and drop away from the plant and temperatures are rising the sprinklers can be turned off.

For more information on protecting blueberries using sprinklers [click here](#)

Late pink bud stage



M. Longstroth, MSUE Extension Educator

Fruit tree planting tips continued from page 2

Adequate moisture and weed control are key to ensuring a strong start for newly planted trees. A good rain within a few days after planting will settle the soil around the tree roots and provide moisture for the tree to grow. If rain is not predicted soon after planting, water should be applied to the newly planted trees. Good weed control gives the tree an area without weed competition in which to establish roots. Tree fruit roots are not very competitive with weed roots, and restricted tree rooting area results in less water and nutrient uptake and less tree growth.



CFAES-Wooster apple orchard in 2021.

Wait, it's back? Updates on Chlorpyrifos use in 2024

By Ashley Leach, Assistant Professor, Extension Entomologist, Department of Entomology

In November 2023, the 8th circuit court of appeals overturned the Environmental Protection Agency's (EPA) decision to restrict use of chlorpyrifos (organophosphate insecticide) on all food or animal feed crops after February 28, 2022. The suit involved numerous agricultural commodity groups including tree fruit producers. Ultimately, the 8th circuit court of appeals, ruled that EPA's ban was "arbitrary and capricious" after hearing arguments that the sudden loss of chlorpyrifos economically challenged production systems that rely heavily on the compound. After near silence about the ruling for two months, the EPA released an update in early February clarifying usage for the 2024 growing season. **All pre-existing food tolerances of chlorpyrifos (prior to the ban placed in 2022) are reinstated for the 2024 growing.**

► What does this mean for you?

If you possess a chlorpyrifos product, you can apply it according to label restrictions and previous tolerances. Check the label to confirm that tree fruit is an approved application- there are several formulations available, and many do not have tree fruit on the label. If you don't have a chlorpyrifos product, certain companies like Drexel and Gharda can produce the active ingredient and may supply local agricultural companies.

Products containing chlorpyrifos with tree fruit indicated on the label include Chlorpyrifos 4E AG.

► Application advice

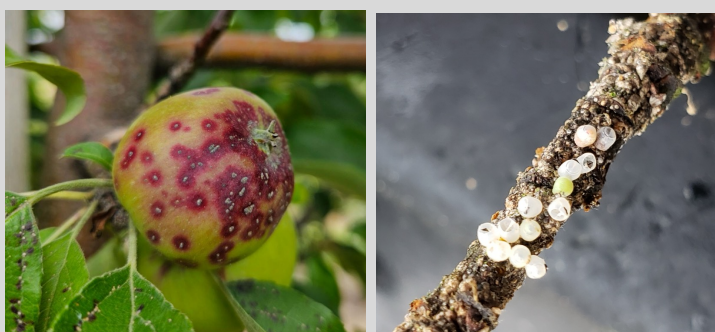
Key apple pests targeted by this active ingredient include San Jose Scale and Dogwood borer. Moreover, chlorpyrifos applications in stone fruit can control populations of Greater and Lesser Peachtree borer, in addition to San Jose Scale. In apple production, chlorpyrifos products can be applied pre-bloom dormant or delayed dormant. Additionally, applications in apple trees must be limited to the lower 4 feet of the trunk. Chlorpyrifos has faced challenges for years, primarily due to human health concerns. However, as a broad-spectrum insecticide, it also poses significant risks to natural enemy and pollinator communities. Thus, it is advisable to use chlorpyrifos products sparingly.

► What's the future of Chlorpyrifos?

The EPA is expected to complete the process of revoking tolerances for all crops except 11 crops within the next year. Tolerances of chlorpyrifos are anticipated to remain in place for peach, apple, and tart cherry. However, restrictions against chlorpyrifos may be enforced by certain retailers and limit use further.

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Additional restrictions on chlorpyrifos may be implemented in the future with the EPA's adherence to the Endangered Species Act. **Alternative management approaches are available for tree fruit pests traditionally managed with Chlorpyrifos.** For instance, clearwing moth borers (e.g., dogwood borer, lesser Peachtree borer, and greater Peachtree borer) can be effectively managed with mating disruption. San Jose Scale infestations can be controlled with a variety of insecticide actives, including those found in insecticide products like Esteem, Movento, Centaur, Senstar, and Sivanto. Trunk insecticide applications in stone fruit (e.g., Asana) or pome fruit (e.g., Assail) can also aid in managing borer pests.



San Jose Scale (SJS) infestation on apple. Chlorpyrifos applications are effective at preventing SJS, although alternative management options are available. Photo credit: A. Leach (left) and M. L. Lewis Ivey (right), The Ohio State University.

Spring is the Time to Tune-up Your Sprayer!

By Erdal Ozkan, Professor, Extension Pesticide Application Technology Specialist,
Department of Food, Agricultural and Biological Engineering

An important task you should complete before starting your spraying for the season is to make sure the sprayer is delivering the gallons per acre (gal/acre) application rate you expect to get from it at the travel speed you operate the sprayer. Many refer to this as “calibration” of the sprayer. A sprayer can only be effective, efficient, and safe if it’s properly checked and calibrated before it’s taken to the field, and if it’s periodically checked and calibrated during the spraying season. The primary goal with calibration is to determine the actual rate of application, and then to make the necessary adjustments if there is a difference between the actual application rate and the “intended” application rate.

Usually, the “intended” application rate is what is mentioned on the chemical label and sprayer operators must follow what is recommended on the label. This required rate is most often given in gal/acre for both field crops and for fruit crops (orchards, vineyards, etc.) spray applications. For field crop spraying, the “acre” refers to the “field acre,” which is the same as the “treated acre”,

because the target being sprayed is usually uniformly distributed across an acre of ground. On the contrary, the target in fruit crops is three dimensional (length, height, and depth) with great variations in size. The targets being sprayed are rows separated by 8–12 feet. So, only a portion of the field acre is treated in the case of orchards or vineyards. Even in the same orchard or vineyard, the canopy volume may show significant variation during the growing season with significant gaps between trees or vines. In most European Union countries rates are expressed in terms of “Tree Row Volume” (TRV) or some other ways to consider the fruit canopy characteristics, although not very accurate, growers applying pesticides in fruit crops in the United States will continue to calibrate their sprayers in gal/acre because that is what is shown and required on the product labels. Therefore, as long as the rates on labels are given in gal/acre, we will continue using a sprayer calibration procedure that relies on determining the actual application rate in gal/acre.

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Things to do prior to calibration

Before calibration, run the sprayer, inspect it for leaks, and make sure all vital parts function properly and that the sprayer has a good set of nozzles. Some nozzles or screens may become clogged causing under-application. Clean all clogged nozzles and screens before calibrating the sprayer and after each application (especially when powder sulfur or copper are applied in vineyards). Observe the spray pattern before calibration, and often during spraying to make sure there is no clogging. Nozzle wear from extended use causes over-application and/or non-uniform application. Check the flow rate of each nozzle for at least 30 seconds and then replace the old nozzles with new nozzles and compare the new nozzle flow rate with the flow rate of the old nozzles, using the same pressure setting recommended by the manufacturer's catalog or website. Replacing a nozzle is recommended if an old nozzle has a measured flow rate that is 10% greater than that of the new nozzle.

Checking the flow rate of nozzles

This is a relatively safe process when working with field sprayers that have nozzles affixed to a horizontal boom. These nozzles discharge spray toward the ground. It is easy and safe to hold a cup under the nozzle and measure the flow rate without getting wet. With orchard sprayers, the discharge is horizontal or slightly upward which makes collecting spray from the nozzles rather challenging. To avoid getting wet, the best approach is to securely attach hoses to each nozzle and collect the nozzle output. As shown in Figure 1, using milk liners to connect nozzles to the hoses is a practical and economical way to check flow rates of nozzles.

Calibrate to determine gal/acre application rate

Once all the nozzles on the sprayer are checked to make sure they are not clogged or worn out, the sprayer is ready for calibration. Two key measurements are needed to calibrate a sprayer – actual ground speed and nozzle flow rate.



Figure 1. A sprayer can only be effective, efficient, and safe if it's properly checked and calibrated before it's taken to the field. Photo credit: E. Ozkan, The Ohio State University.

Three things are needed to collect sprayer calibration measurements:

- 1) a timer or smart phone showing time in seconds,
- 2) a measuring tape, and
- 3) a measuring cup graduated in ounces.

A detailed explanation of the procedure used to determine the actual application rate of an orchard/vineyard sprayer is given in the Ohio State University Extension Publication FABE-533, which is available online at <https://ohioline.osu.edu/factsheet/fabe-537>.

Once the application rate is determined, the percent error in application rate between the actual and the intended rates should be determined using the following formula:

$$\text{Percent error (\%)} = \left[\frac{\text{Actual application rate} - \text{Intended application rate}}{\text{Intended application rate}} \right] \times 100$$

If the application error is greater than 5% of the intended rate, adjustments must be made to bring the error margin below 5%.

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These adjustments may include changing the spray pressure, changing the travel speed, or changing both. If further changes in pressure and travel speed cannot be made, then the best option is to replace the nozzles with a larger or smaller size of the same nozzle type. Other adjustments include changing the direction and/or rate of air flow while calibrating the sprayer.

Follow safety rules when calibrating sprayers

For safety reasons, calibration should be done using water in the sprayer tank. A mixture containing pesticides may have a slightly higher density or viscosity than water, which may slightly reduce the flow rates of nozzles. However, usually

the difference in flow rates between water alone and a mixture containing pesticides is not significant unless a high volume of high-dense or viscous adjuvant are included in the spray mixture. Conversions for spray solutions with different densities are provided by the nozzle manufacturers in their catalogs or websites.

Even when calibrating the sprayer using water, always wear the personal protective equipment (PPE) used for spraying pesticides, such as gloves and goggles

Aphids in Disguise: Unmasking the Threat of Woolly Apple Aphids

By Ashley Leach, Assistant Professor, Extension Entomologist, Department of Entomology

Woolly apple aphid management considerations for the 2024 season

Woolly apple aphid (WAA) has been an occasional pest of apples for decades. However, in recent years, occurrences of this pest have increased both in number and severity. WAA infestations feed above and below ground and can create galls and deformations on roots and limbs. Studies indicate that WAA, primarily root-feeding forms, can reduce fruit set and increase fruit drop if not properly controlled.

Identification

Woolly apple aphid infestations can be identified early to mid-season by the presence of **white cottony wax** clinging to tree limbs (Figure 1). Beneath these waxy secretions, you will find **pinkish-grey aphids** (often in large numbers). However, in some cases, colonies can be parasitized by wasps, and even if the aphids are dead, wax secretions from them may remain, making it appear as though the colony is still active. A helpful tip for scouting for WWA is to

lightly blow on the infested spots to determine the number of aphids present. Identifying root infestations can be more challenging, but **gall formation** on roots is a common indicator. If you can uproot part of the tree, you may also see nymphs. Root-feeding individuals do not have long filamentous secretions but short rod-like filaments. Root-dwelling forms also appear redder in comparison to the aerial-forming aphids found on branches and twigs.



Figure 1: A winged Woolly apple aphid (WAA) adult shown above and a colony on an apple limb (right). Note that both images showcase the filamentous wax produced by individual to ward off natural enemies.

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Life Cycle (Figure 2)

- 1. Overwintering Eggs or nymphs:** During the winter, Woolly apple aphids overwinter as either nymphs or eggs. Nymphs overwinter in the bark of apple trees (usually near pruning scars) or below ground in the root system. They can also overwinter as eggs on nearby elm trees. They can also overwinter as eggs on nearby elm trees.
- 2. Spring Hatching:** As temperatures rise in the spring, the overwintering eggs hatch, releasing young nymphs known as crawlers. Nymphs on apple trees also become active. These crawlers move to new growth, settling primarily on the roots and occasionally on stems near the soil surface.
- 3. Colony Formation:** Once settled, the crawlers begin feeding on the sap of the apple tree. They secrete a waxy substance, forming woolly, cotton-like colonies that provide protection from predators and environmental conditions.
- 4. Summer Development:** Throughout the summer months, aphids continue to feed and reproduce on the apple tree. Winged forms may develop within the colonies and allow aphids to spread to other hosts.
- 5. Fall Egg-laying:** In the fall, winged females may migrate back to Elm tree to produce eggs. These eggs can serve as an overwintering stage, as well as nymphs that remain on the apple tree. Nymphs will take refuge in the root systems or in bark crevices.

Management

Early and aggressive management of WAA will likely result in best management outcomes. There are several efficacious products that may provide control of aerial populations. These products* include Transform (IRAC group 4), Diazinon (IRAC group 1), Admire Pro (IRAC group 4), and Assail (IRAC group 4).

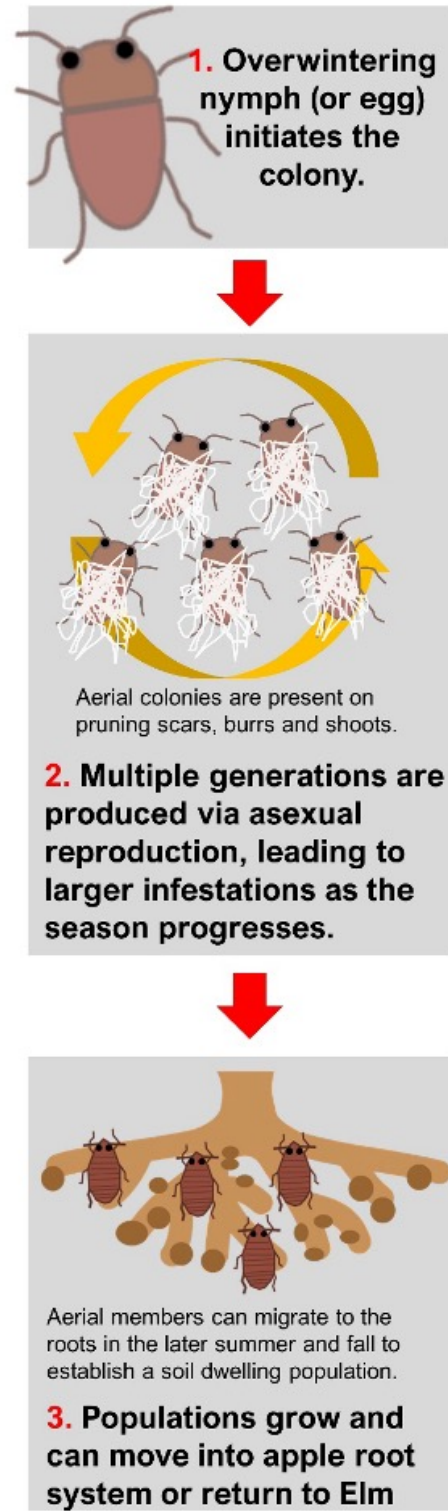


Figure 2: Simplified lifecycle of Woolly apple aphids.

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Root-feeding populations are difficult to control, and only Movento (spirotetramat, IRAC group 23) has some potential activity of these stages. Movento has systemic activity which can move into the root system. Management of aerial colonies is recommended when **10% of the pruning scars/shoots** are infested with live colonies. Natural enemies, namely parasitoid wasps, can help control these pests. Try to prioritize reduced-risk products that are 'softer'

on beneficial insects. Host plant resistance is available. Malling rootstocks like MM. 106 and MM. 111 in addition to G.41 and G. 202 are generally resistant to Woolly apple aphids. However, keep in mind that resistance is not passed to the scion material and aerial populations may still be present.

*Note that other products may be used to control WAA populations.

Best Practices for Planting Strawberry Propagation Material to Prevent Diseases in the Field

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

Spring is the best time to plant strawberries in Ohio, although with proper care planting can occur in the fall. Strawberry transplants can be purchased as plugs or bare roots (Figure 1). Bare root plants are field harvested and arrive in the dormant stage with no soil as bundles. Plugs, in contrast, are produced from runners taken from 'mother' plants and planted into a potting mix. Both bare roots and plugs can be the source of strawberry pathogens, including viruses, phytoplasmas, bacteria, nematodes, and fungi or oomycetes (i.e., *Phytophthora*). To prevent the introduction of pathogens into the production field (or greenhouse) the following best practices are recommended:

bundle and check for root discoloration. Cut the crown tissue longitudinal and look for discoloration. To confirm if plants are diseased



Figure 1. Strawberry transplants can be purchased as plugs (left) or bare roots (right).

Certified transplants – Use certified transplants to prevent the introduction of viruses, bacteria and foliar nematodes into the field. Certified plants are not guaranteed to be free of all pathogens, however, they are as free as possible from the pathogens for which they are tested.

samples can be sent to the Plant Pest Diagnostic Clinic located on the CFAES-Wooster campus. There is no cost to commercial fruit growers in Ohio. Contact the clinic for sample collection, packaging and shipping instructions.

Scout transplants – Look for symptoms of disease on the roots, petioles, stems, and leaves before transplanting (Figure 2). For plugs, separate trays with disease symptoms from trays without symptoms. If disease progresses in the plugs with symptoms do not plant. For bare root plants, randomly select a few plants from each

Plant Pest Diagnostic Clinic Contact Information

- Website: ppdc.osu.edu
- Phone: 330-263-3721

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Chemical control – For fungal and oomycete disease a preventative fungicide application can be made prior to planting or at-planting. Bare root plants should be washed to remove any soil and then dipped in the fungicide solution for the recommended contact time (Figure 2). Treated plants must be planted immediately to prevent injury (phytotoxicity). Plugs can be drenched with the fungicides before planting or at planting.

About SC (azoxystrobin) and Switch 62.5WG (cyprodinil + fludioxonil) are recommended to control anthracnose crown rot. For *Phytophthora* crown and root rot Aliette WDG (aluminum tris) and phosphorous acid (i.e., Phostrol or Prophyte) are recommended. Consult the Midwest Fruit Pest Management Guide for rates and contact times. All fungicides must be applied according to the label.

Clean water – When overhead sprinklers are used to establish plants in the field clean water should be used. City and well water are recommended. Surface water (i.e., pond or irrigation ditch water) is a source of plant pathogens including *Phytophthora* and *Pythium* and should be avoided if possible. If surface water is used it should be filtered and treated before being applied to the plants.



Figure 1. Lesion on strawberry petiole. Do not plant transplants with visible lesions on roots, petioles, stems or leaves.



Figure 2. Fungicide application of bare root strawberry plants for prevention of root and crown diseases. Image from S. Dara. 2020. *E-Journal Ent. Biolo.*



cfaesosu.catalog.instructure.com/courses/good-agricultural-practices-for-produce-safety

Good Agricultural Practices (GAPs) for Food Safety of Fresh Produce

Self-paced

\$50 Enroll



This self-paced on-line course provides produce growers with the knowledge and tools needed to implement best management practices to reduce microbial food safety hazards in vegetable and fruit operations. Participants will receive a certificate of participation after completing this course.



Image from New England Fruit Tree Management Guide

Powdery mildew on apple is caused by the fungal pathogen *Podosphaera leucotricha*. On susceptible varieties symptoms become visible at tight cluster. Growth of infected buds (right image) is delayed compared to healthy buds (left image) and the emerging tissue is misshapen (twisted or crinkled). The fungus overwinters in buds but winter temperatures below -10 F will kill the fungus. Fungicide sprays on susceptible varieties should begin at tight cluster. Consult the 2023-2024 Midwest Fruit Pest Management Guide (page 54) for fungicide recommendations.

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 Upcoming Events-2024

Planning for the Future of Your Farm Workshop – April 4 [link here](#) or call Greg Myer 515- 695-1311

Small farm Conference – April 6 [link here](#)

CFAES-Wooster Solar Eclipse Day – April 8 [link here](#)

New Applicator Training Webinar – April 10 [link here](#)

New Applicator Training In-person – May 15 [link here](#)

OPGMA Summer Tour – July 23 [link here](#)

Ohio Hop Grower Guild Hopyard Open house – July 20 [link here](#)

Ohio Pawpaw Festival – September 13-15 [link here](#)

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

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