UConn Extension and Department of Plant Science and Landscape Architecture

CROP TALK

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In This Issue:

Clover and oats between the plastic mulched vegetable beds at Ciccarellis Harrison Hill Farm in Northford, CT. Cover crops between the beds provide weed control, reduce soil erosion, can add nitrogen and organic matter to the soil, and provide habitat for pollinators (photo by Shuresh Ghimire).

UCONN
COLLEGE OF AGRICULTURE, HEALTH AND NATURAL RESOURCES
EXTENSION & PLANT SCIENCE AND LANDSCAPE ARCHITECTURE

Beware of *Hopperburn*!

Dr. Ana Legrand, Extension Assistant Professor
Department of Plant Science and Landscape Architecture, UConn

'Hopperburn' refers to the complex of symptoms associated with potato leafhopper (PLH) feeding injury. This leafhopper, native to North America, has a broad host plant range including 220 plant species in 26 families. Though, most of its host plants are in the legume family. Crops primarily attacked by the potato leafhopper include potato, beans, soybeans and alfalfa. Other host plants include eggplant, cucumber, Jerusalem artichokes, squash, sweet potato and rhubarb. Reports also note PLH on hops and hemp. PLH arrives every summer in June from southern locations where they overwinter in pine forests. They complete two or more generations in Connecticut before non-reproductive adults are transported back by prevailing winds to the south in the fall. Environmental conditions can have a significant impact on this insect, beginning with their inability to survive our winter temperatures. On the other hand, warmer conditions increase the severity of infestation during summer and drought can worsen its feeding damage.

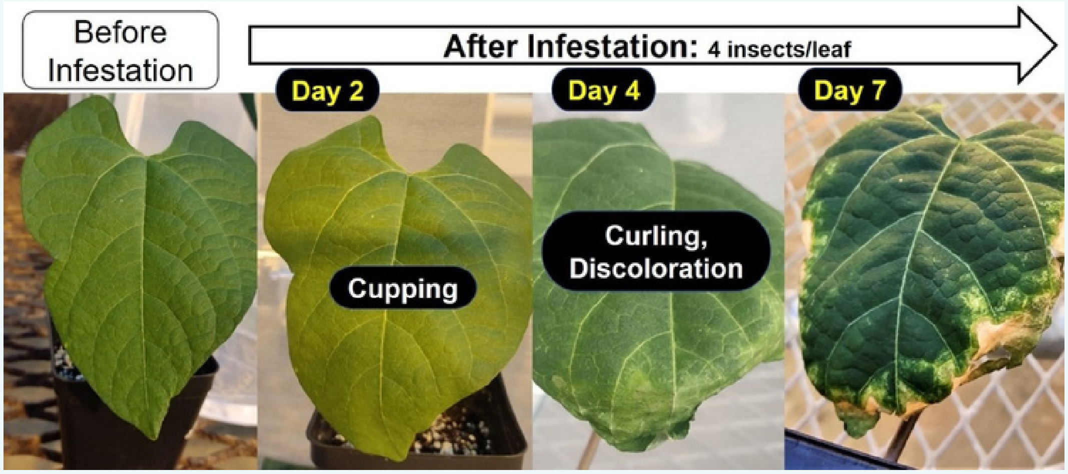
Figure 1. Potato leafhopper adult on bean leaf

Figure 2. Potato leafhopper nymph

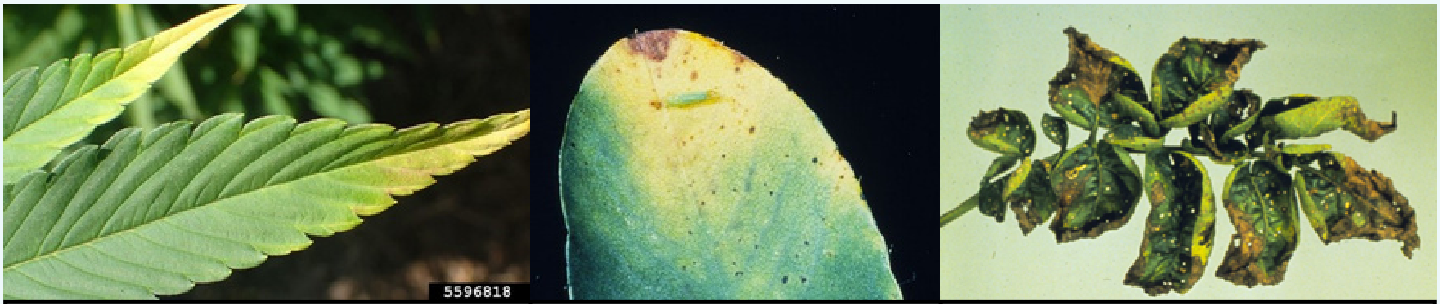
Adult leafhoppers insert their eggs into plant stems and nymphs will emerge 7-14 days with warmer temperatures inducing an earlier emergence. Nymphs cannot fly but they do walk rather rapidly over the plant surface. Nymphs have a peculiar way of moving sideways which helps in spotting who they are. Nymphs develop through five instars eventually molting into adults that can migrate long distances aided by wind currents. Adults are small (1/8 of an inch or about 3 mm), bright green and with six white spots behind the eyes on top of the head. Adults and nymphs feed on plants using 'pierce-sucking' mouthparts, probing and damaging tissues while they inject saliva into the tissues as they feed resulting in their hallmark 'hopperburn' damage.

This type of plant damage presents general symptoms like tip-wilting in young plants, yellowing or chlorosis that expands through the leaf and plant stunting. Other specific symptoms include triangular yellowing at the leaf tips of alfalfa and some clovers. In potato, soybean and beans the leaves exhibit yellowing at the margins, leaf curling and eventual leaf tissue death and leaf drop. The damage progression from initial symptoms to death of leaves may take only 4-5 days, depending on the leafhopper infestation level, degree of feeding and plant moisture stress. In potatoes, nymphs can cause more feeding damage than adults. To some, hopperburn appears like leaf senescing or drought damage so it is important to inspect the plants for leafhopper presence.

Figure 3. Potato leafhopper feeding damage on green beans. Damage starts with cupping and/or curling followed by discoloration in curled region and tissue death. This damage is known as 'hopperburn'. Leaf in photos was exposed to 4 potato leafhopper adults in a controlled setting. Photos: Bivek Bhusal, UConn



Monitoring is essential to detect the leafhoppers before extensive damage occurs and to evaluate if a damaging pest population is present. Check the underside of leaves for nymphs and adults can be flushed out of foliage by shaking the plants. Insect sweep nets can be used to collect insects for counting. Action thresholds are available to make decisions about treatment needs. See the New England Vegetable Management Guide for crop-specific action thresholds and registered control products. Other management tactics include row covers for beans and eggplants and using varieties that are less susceptible to the leafhopper. For instance, potato varieties noted to be moderately resistant to leafhoppers include Katahdin, Elba and All Red while Russet Burbank is least susceptible to hopperburn.



Slight foliar symptoms of hopperburn on hemp. Photo: W. Cranshaw, Colorado State University	**Potato leafhopper and hopperburn on alfalfa.** New York State Cooperative Extension, Cornell University	**Hopperburn on potato.** New York State Cooperative Extension, Cornell University

Figure 4. Foliar symptoms on hemp, alfalfa, and potato

References

Backus, E. A., M. S. Serrano and C. M. Ranger. 2005. Mechanisms of hopperburn: an overview of insect taxonomy, behavior, and physiology. Ann. Rev. Entomol. 50: 125–51.

Calderwood, L., S. Lewins and H. Darby. 2015. Survey of Northeastern Hop Arthropod Pests and Their Natural Enemies, Journal of Integrated Pest Management 6 (1) https://doi.org/10.1093/jipm/pmv017

Chasen, E.M., C. Dietrich, E.A. Backus and E. M. Cullen. 2014. Potato leafhopper (Hemiptera: Cicadellidae) ecology and integrated pest management focused on alfalfa. J Integr Pest Manag. 5:1-8.

Lamp, W.O., G.R. Nielsen and S. D. Danielson. 1994. Patterns among host plants of potato leafhopper, Empoasca fabae (Homoptera: Cicadellidae). J Kans Entomol Soc.67: 354–368.

Seaman, A. 2016. Production Guide for Organic Potato. Publisher: New York State Integrated Pest Management Program, Cornell University, New York State Agricultural Experiment Station, Geneva, NY. http://hdl.handle.net/1813/42897

Newly registered pesticides for vegetable production in Connecticut

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Integrated pest management (IPM) is a way to manage pests by combining biological, cultural, mechanical, and chemical practices. Although IPM places a strong emphasis on pest prevention and minimizing chemical usage, it is important to acknowledge that complete avoidance of chemicals may not always be feasible. Pesticides should be selected in a way that minimizes the possible harm to human, non-target organisms, and environment. As we are in the start of peak vegetable growing season, we may start observing insect and disease symptoms on vegetable crops. This article will provide a summary of newly registered insecticides and fungicides in the year 2023 by June 2 that can be applied on vegetable crops grown in Connecticut. The objective of this article is to help growers in selecting appropriate pesticides for vegetable pest management.

Over time, the repeated application of pesticides with the same mode of action (i.e., affecting pests in the same way) can lead to the development of pesticide resistance. When pesticides with the same mode of action are consistently used, even higher doses or more frequent applications will eventually fail to effectively control the pest population. Consequently, the pest population becomes dominated by individuals that are no longer susceptible to pesticides belonging to that specific chemical class or mode of action.

To manage the development of pesticide resistance, it is essential to adopt certain practices. Prioritize minimizing pesticide usage and utilizing nonchemical approaches whenever possible and effective. Reduce the use of persistent pesticides to avoid prolonged exposure across multiple pest generations. Implement a rotation strategy by alternating the use of pesticides with different modes of action. Pesticide mode-of-action codes (also referred as groups) are listed on the label of many trade-name products.

Table 1: List of newly registered pesticides this year for use in CT on vegetable crops

<table>
<tr><th>S. No</th><th>Product Name</th><th>Group</th><th>Registrant</th><th>Active Ingredient</th><th>Crops Listed</th><th>Target pests</th></tr>
<tr><td colspan="7">Restricted Use Pesticides</td></tr>
<tr><td>1.</td><td>Cortes Maxx</td><td>Group 3A</td><td>Atticus LLC</td><td>Zeta-cypermethrin 9.15%</td><td rowspan="6">Brassica crops, bulb vegetables, cucurbit vegetable, and fruiting vegetable crops</td><td rowspan="6">Aphids, armyworms, cabbageworm, cabbage looper, Colorado potato beetle, corn earworm, cucumber beetles, cutworms, diamondback moth, flea beetles, imported leafhoppers, onion maggot adults, onion thrips, stink bugs, and whiteflies</td></tr>
<tr><td>2.</td><td>Bifenthrin 2EC</td><td>Group 3A</td><td>Tenkoz Inc</td><td>Bifenthrin 25.10%</td></tr>
<tr><td>3.</td><td>Bifenture 10DF</td><td>Group 3A</td><td>UPL NA LLC</td><td>Bifenthrin 10%</td></tr>
<tr><td>4.</td><td>Signature Bifentrin</td><td>Group 3A</td><td>Loveland Products</td><td>Bifenthrin 25%</td></tr>
<tr><td>5.</td><td>Lambda 1EC</td><td>Group 3A</td><td>Tenkoz Inc.</td><td>Lambda-cyhalothrin 12.7%</td></tr>
<tr><td>6.</td><td>Lancer FC</td><td>Group 3A</td><td>Albaugh LLC</td><td>Bifenthrin 17.15%</td></tr>
</table>

S. No	Product Name	Group	Registrant	Active Ingredient	Crops Listed	Target pests
7.	Mineiro 2F Flex	Group 4A	Atticus LLC	Imidacloprid 21.4%	Vegetable plants in greenhouses, nurseries, and interior plant space	Aphids, Japanese beetles, leaf hoppers, leaf beetles, mealy bugs, sawfly larvae, thrips, and whiteflies
8.	Equity Vayo A seed treatment product contains Insecticide with fungicides	Group 4A Group 4 Group 1 Group 12 Group 7	Loveland Products	Thiamethoxam 22.4% Mefenoxam 3.35% Thiabendazole 2.24% Fludioxonil 1.12% Sedaxane 1.12%	Soybean vegetables	Aphids, bean leaf beetle, grape colaspis, leaf miners, leaf hoppers, Mexican bean beetle, seed corn magot, three-cornered alfalfa hopper, thrips, white grubs, and wireworm. Damping-off and seed borne rots caused by *Pythium, Phytophthora, Fusarium, Rhizoctonia* species, and early season phytophthora root rot, also suppresses seed-borne *Sclerotinia* and *Phomopsis*
9.	Decree 50 WDG	Group 17	Sepro Corp.	Fenhexamid 50%	Cucurbit vegetables, fruiting vegetables, leafy greens	Gray mold disease caused by *Botrytis cinerea*
General-Use Pesticides						
10.	Enervate 50 WSB	Group 20D	Atticus LLC	Bifenazate: hydrazine carb-oxylic acid 50%	Cucurbit and fruiting vegetables	Spiders and mites
11.	PH-D	Group 19	UPL NA LLC	Polyoxin D zinc salt	Bulb vegetables, cole crops, cucurbit vegetables, fruiting vegetables, leafy vegetables, and legume vegetables	Soilborne/seedling disease control when applied in-furrow. Powdery mildew, alternaria leaf spot, corynespora leaf spot, gray mold, early blight, scab, target leafspot, gummy stem blight, rhizoctonia damping-off and web blight
12.	Vacciplant	Group P4	UPL NA LLC	Laminarin is an extractant from the plant *Laminaria digitata*		Bacterial leaf streak, botrytis leaf blight, botrytis neck rot, downy mildew, onion purple blotch, powdery mildew, *Rhizoctonia* spp., *Fusarium* spp., *Pythium* spp., *Verticillium* spp., alternaria leaf spot, anthracnose, and cercospora leaf spot
13.	Cuprofix Flex	Group M1	UPL NA LLC	Basic Copper Sulfate 71.1%		

S. No	Product Name	Group	Registrant	Active Ingredient	Crops Listed	Target pests
14.	Howler EVO*	Group BM02	Agbiome	*Pseudomonas chlororaphis* strain AFS009	Bulb vegetables, cole crops, cucurbit vegetables, fruiting vegetables, leafy vegetables, and legume vegetables	Seed and soil-borne fungal diseases related to wilt, root rot, and damping off
15.	Achiever	Group 9B	Aceto Life Sciences	Pymetrozine 50%		Aphids and whiteflies
16.	Lalstop G46 WG*	Group BM02	Danstar Ferment AG / Lallemand	*Gliocladium catenulatum* strain J1446		All kinds of soil borne, seed borne, and foliar diseases caused by fungal pathogens
17.	Lalguard M52 OD*	Group UNF		*Metarhizium brunneum* Strain F52	Cucurbits: Whiteflies, mites Onion: Thrips Peppers and Tomatoes: Thrips, whiteflies, aphids, and psylids Celery, lettuce, and spinach: Thrips, whiteflies, aphids, and psylids	
18.	Obtego*	Group BM02	Sepro Corp.	*Trichoderma asperellum* (ICC 012) and T. gamsii (ICC 080)	All types of vegetables except brassica crops	Protects from soil-borne diseases caused by fungal pathogens and enhances the plant growth
19.	Ferti-lome Horticultural Oil*		Voluntary Purchasing Groups	Canola oil 96%	Field-grown vegetables	Sucking pests and powdery mildew
20.	Ferti-lome Spinosad Soap Ready to Spray*		Voluntary Purchasing Groups	Potassium Salts of Fatty Acids 18.8%		Foliage-feeding Insects and powdery mildew

Note: Pesticides can be classified as either general or restricted use. General-use pesticides can be purchased and used by the general public whereas restricted use pesticides can only be used by or under the direct supervision of a certified applicator.

*Product is listed by the Organic Materials Review Institute (OMRI) as approved for use in organic production.

Reading the label before purchasing the pesticides is always recommended. **The Label is the Law!**

Understanding spring frosts: critical temperatures, freeze injury, and frost protection in Connecticut fruit orchards.

Evan Lentz – Assistant Extension Educator,
Fruit Production and IPM, UConn

Introduction:

This has been a very eventful spring, with many surprises and unprecedented weather events. We will likely all remember the “Spring of 2023” in the years to come given the devastating late spring frost event that we all witnessed. In this article, I present information geared towards helping us all understand the factors that influenced the May 18 frost event as well as some tools that can help us prepare for the future, keeping in mind that extreme weather events like this will likely continue to occur.

Critical Temperatures:

The best place to start this discussion is at critical temperatures. According to the USDA, critical temperature is defined as the highest temperature at which freeze/frost damage to plant tissues can be detected. These temperatures allow us to understand the relative cold tolerance of certain plant species (DeHayes and Williams, 1989). Below is a collection of critical temperature charts for various fruit crops, collected from various sources. Understanding this threshold for each of the crops you grow will go a long way in your risk management plan.

Table 1. Critical temperatures for various pome fruit (M. Longstroth, MSU)

CRITICAL SPRING TEMPERATURES FOR TREE FRUIT BUD DEVELOPMENT STAGES

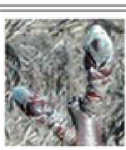
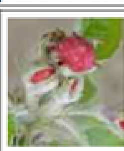
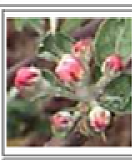
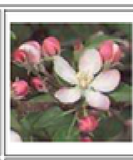
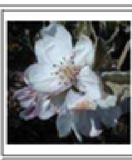
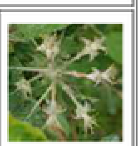
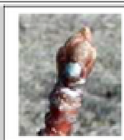
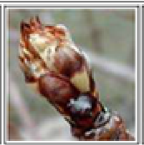
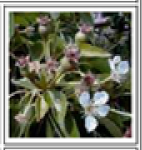
Pome Fruit (Apples and Pears)									
Apples									
Apples	Silver tip	Green Tip	Half inch green	Tight Cluster	First Pink	Full Pink	First Bloom	Full Bloom	Post Bloom
Old temp 10% kill 90% kill	16 15 2	16 18 10	22 23 15	27 27 21	27 28 24	28 28 25	28 28 25	29 28 25	29 28 25
Pears									
Pears	Bud scales separating	Blossom buds exposed	No name	Tight cluster	First White	Full White	First Bloom	Full Bloom	Post Bloom
Old temp 10% kill 90% kill	18 15 0	23 20 6	No data	24 24 15	28 25 19	29 26 22	29 27 23	29 28 24	30 28 24

Table 2. Critical temperatures for various stone fruit (M. Longstroth, MSU)

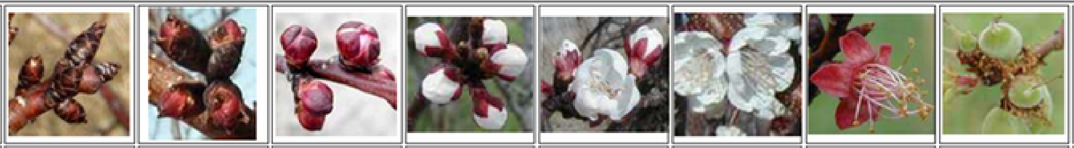
Stone Fruit (Apricots, Peaches and Plums)									
Apricots									
Apricots	Swollen Bud	Tips separate	Calyx red	First White	First Bloom	Full Bloom	In the shuck	Green Fruit	
Old temp 10% kill 90% kill	-- 15 --	23 20 0	-- 22 9	25 24 14	-- 25 19	28 27 22	-- 27 24	31 28 25	
Peaches									
Peaches	Swollen Bud	Calyx Green	Calyx Red	First Pink	First Bloom	Full Bloom	Post Bloom		
Old temp 10% kill 90% kill	23 18 1	-- 21 5	-- 23 9	25 25 15	-- 26 21	27 27 24	30 28 25		
European Plums									
European Plums	First Swelling	Side White	Tip Green	Tight Cluster	First White	First Bloom	Full Bloom	Post Bloom	
Old temp 10% kill 90% kill	-- 14 0	-- 17 3	-- 20 7	-- 24 16	23 26 22	27 27 23	27 28 23	30 28 23	

Table 3. Critical temperatures for cherries (M. Longstroth, MSU)

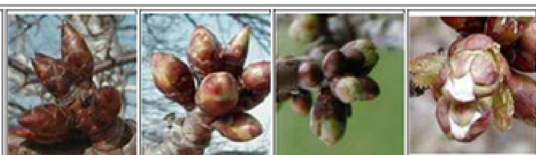
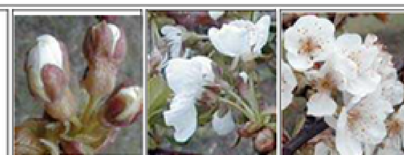
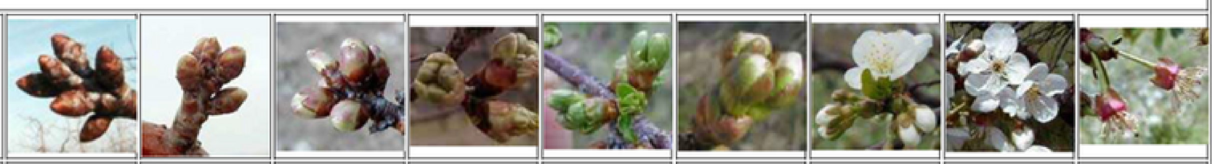
CRITICAL SPRING TEMPERATURES FOR TREE FRUIT BUD DEVELOPMENT STAGES									
Cherries									
Sweet Cherries					No picture				
Sweet Cherries	Swollen Bud	Side Green	Green Tip	Tight Cluster	Open Cluster	First White	First Bloom	Full Bloom	Post Bloom
Old temp 10% kill 90% kill	23 17 5	23 22 9	25 25 14	28 26 17	28 27 21	29 27 24	29 28 25	29 28 25	30 28 25
Tart Cherries									
Tart Cherries	Swollen Bud	Side Green	Green Tip	Tight Cluster	Open Cluster	First White	First Bloom	Full Bloom	
10% kill 90% kill	15 0	24 10	26 22	26 24	28 24	28 24	28 24	28 24	

Table 4. Critical temperatures for various small fruit (K. Demchak, Penn State)

Critical Temperatures for Small Fruit*

Blueberries

Stage	Bud Swell	Tight Cluster	Pinecone Stage	Blossoms Full but Closed	Open Blossom	Petal Fall
Critical Temperature	15-20°F	18-23°F	22-25°F	25-26°F	27°F	28°F

Strawberries

Stage	Flower Buds Emerged	Blossoms Emerged but Tight	Popcorn Stage Blossoms	Open Flowers	Green Fruit
Critical Temperature	10°F	22°F	26°F	30°F	28°F

Blackberries

Stage	All Stages
Critical Temperature	27.5°F

Raspberries

Stage	Newly Emerged Foliage	Open Flowers
Critical Temperature	16°F	30-32°F

*From Frost and Freeze Damage on Berry Crops, Kathy Demchak, Penn State

Table 5. Critical temperatures for grapes (M. Longstroth, MSU)

Critical temperatures for grapes*

Growth Stage	Description	No Damage	10% Kill	50% Kill	90% Kill
Dormant	Bud not swollen.	N/A	Varies with conditions.		
First Swell	Early swell, bud brown, no color.	N/A	13	7	-3
Full Swell	Late Swell, swollen bud looks pink.	N/A	21	26	10
Bud Burst	Leaves at tip of bud separate.	30	25	28	16
First Leaf	One leaf out at 90° to the stem.	30	27	28.5	21
Second Leaf	Two leaves out, 90° to the stem.	30	28	29	22
Third Leaf	Three leaves out, 90° to the stem.	N/A	28	N/A	26
Fourth Leaf	Four leaves out at 90° to the stem.	N/A	28	N/A	27

*Mark Longstroth, Extension Educator, MSU Extension

Tables 1-4 show the critical temperatures for various tree fruit crops at various stages of development. Temperatures are organized by the temperature at which one can expect to see a 10% loss and the temperature at which one can expect to see a 90% loss. You'll likely notice that the range in between these two values is often only a few degrees. Table 4 shows the critical temperature for various small fruit crops at various developmental stages. Some crops such as brambles, blackberries and raspberries, have fewer differences in critical temperatures between the plant's stages of development. Finally, Table 5 provides the same critical temperature information for grapes, with 10% and 90% kill estimates.

Something else to notice is that as the developmental stage progresses, the critical temperature increases. This means that as plants come out of dormancy and develop, they become more sensitive to cold temperatures. Often, we may assume the opposite – thinking that the developing flowers are the most sensitive and that once we are past bloom, we are in the clear. However, that green developing fruit is highly susceptible to frost damage. Ensuring that you are aware of the critical temperatures for your fruit crops will allow you to make more informed decisions in your frost protection plan. Additionally, these values are presented as estimates and it's important to understand that other factors, such as genetics and other environmental factors, could affect a plant's susceptibility to frost injury.

Common Frost Questions:

To best predict when a late-season frost or freeze event may occur, you'll need to understand the dew point and how a frost occurs. Below are a couple of general questions about the dew point, frost formation, and freeze damage:

Q: What is the dewpoint and how does this affect frost formation?

A: The dewpoint is the absolute measure of the amount of water held in the air. The dewpoint is recorded as a temperature. When the air reaches that temperature, liquid dew is formed. When the dew point is below freezing, it becomes the frost point. When the air temperature reaches the frost point, a frost is formed.

Q: Are there different types of frost?

A: Yes, there are two general types of frost. The first type of frost is called depositional frost, or white/hoar frost. This occurs when the dewpoint is below freezing (a frost point) and the air reaches or goes below that temperature. The water vapor goes directly from the gaseous state to a solid state, to form crystals on the surface of vegetation. The other type of frost is called a "frozen dew' and occurs when the dewpoint is above freezing (not a frost point). The air temperature then reaches that dew point to cause a liquid dew to form on the surface of the vegetation and continues to fall below freezing. The liquid dew that was formed then freezes.

Q: Does frost need to occur to cause damage to vegetation?

A: No, frost formation is not necessary to cause damage to vegetation. If the frost point (dewpoint) is well below freezing (say 20°F) and the nighttime air temperature reaches 23°F, no frost will be formed. However, if we refer to our critical temperature charts, we can see that 23°F is cold enough to cause damage to many fruit crops, despite their developmental stage. In fact, lower dewpoints (drier air) combined with below-freezing temperatures work together to cause cold injury by both freezing and drying out plant tissues. This can occur to even fully dormant plant tissues and buds, with high winds acting to accelerate the process.

Factors Affecting Plant Tissue Hardiness:

One of the most common topics for discussion with growers this year has been cold hardy varieties. Given the loss of peaches from the February cold snap and the late season freeze on May 18, many were wondering if more can't be done to develop new cold-hardy fruit varieties or if existing varieties can be evaluated for cold-hardiness. This would make farm planning and varietal selection a bit easier considering these events are likely to continue to occur.

Selecting the proper varieties, whether it be for control of vigor, disease resistance or winter hardiness, is the first, and perhaps most important, step that can be taken to ensure optimal fruit production. However, studies have shown that environmental factors play a much larger role in cold hardiness/frost resistance when compared to the variety (or genetics) alone. As much as two thirds of frost resistance in apple blossoms can be attributed to factors other than the plants variety (L. Szalay, et al. 2019). This other two-thirds includes things such as phenological stage, nutritive status, tissue moisture content, and late-winter/early-spring weather (Figure 1).

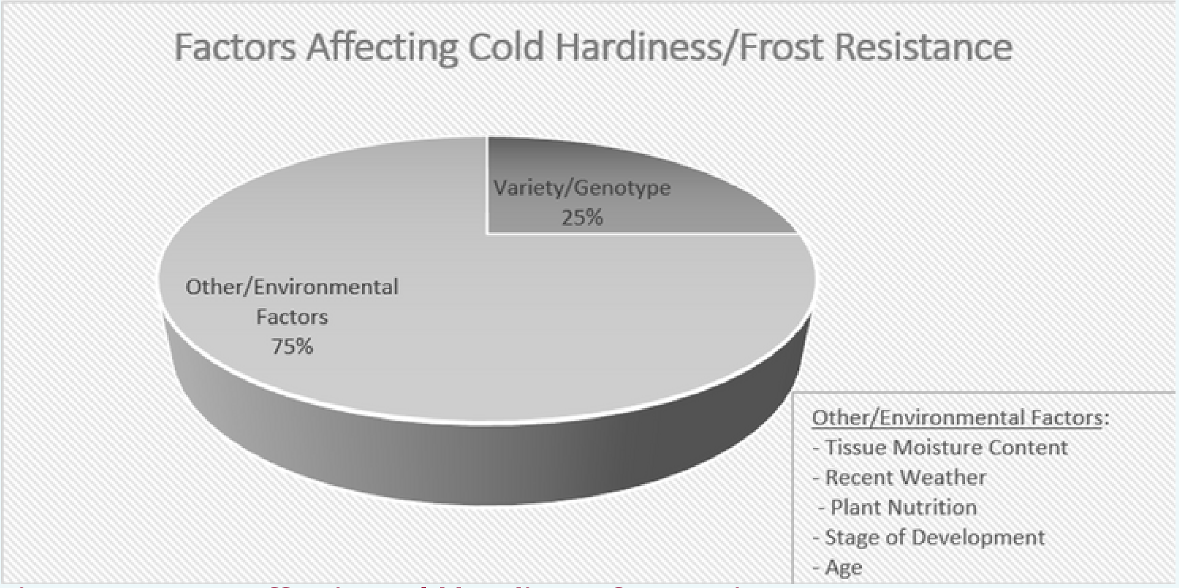


Figure 1. Factors affecting cold hardiness/frost resistance (E. Lentz, UConn)

Many of these "other" factors are still uncontrollable, such as the weather leading up to the frost event or the stage of development – which is tied directly to the preceding weather. Yet, there are some things we could do to increase our plants' resilience. First, we can make sure that the plants have adequate water and nutrition going into their dormancy. Practicing proper cultural management all season long ensures that plant tissues, and in particular flower buds, are not stressed or underdeveloped. Although this is not specifically preventing frost/freeze damage, it provides the plant with its best chance of enduring these late spring cold-weather events.

Discussion of May 18:

The May 18 freeze event caught most of us off guard. Predicted low temperatures did not suggest the devastation that was observed in the following days. Below is a bulleted list of possible attributing factors that contributed to the widespread severity of this event:

- Many factors affect the hardiness of various plant tissues (buds, blossoms, shoots, etc.). Even if a critical temperature is not reached, damage could still occur. Likewise, reaching a critical temperature might not always result in damage. Factors that affect hardiness include variety, plant age, nutritive status, water status, and other plant stresses.
- This year, the apple bloom came about 2 weeks earlier than usual, based on my discussions with growers. This might have been due to the extended warm weather that we had in February. Either way, plants (apples particularly) were much further along than they would normally be. This likely predisposed them to cold injury. As we mentioned above, as plants progress through the developmental stages, the critical temperature rises, meaning that they are more sensitive to freeze damage the further they progress.

- The weather conditions directly preceding and during the morning of May 18 likely also influenced the susceptibility of our plants. The warm temperatures leading up to May 18 could have affected hardiness. Additionally, the dewpoint during the freeze event was very low. The drier air likely increased the degree of cold injury sustained.

Preventative Measures:

If nothing else, May 18 demonstrated the need for frost protection across commodities. Below are some frost protection ideas:

- Varietal Selection – pre-plant, passive protection
  - Some varieties such as 'Gala' for apples are rated as cold tolerant.
- Site Selection – pre-plant, passive protection
  - If possible, avoid sites that are overly exposed to winter winds. Winds work together with lower temperatures to dry out even fully dormant plant tissues.
  - Avoid frost pockets or areas where cold air might gather and remain for extended periods of time.
- Good Cultural Management – passive protection
  - Anything to reduce plant stress, water, nutrition, pest management.
- Wind Machines – active protection
  - Works to bring the warmer rising air down towards the plants, preventing cold air from settling.
  - Can be expensive.
- Heaters – active protection
  - Warms the air around the plants.
- Helicopters – active protection
  - Like wind machines, but more expensive.
- Overhead Irrigation – active protection
  - Heat is released as the water freezes on the plants, keeping them at 32°F.
  - Relies on a constant supply of water transforming into the solid state.
  - Can be difficult to maintain coverage in windy conditions.
  - The temperature at which to begin irrigation varies and is tied to the dewpoint. The lower the dewpoint, the earlier you want to start your sprinklers. If the dewpoint is in the teens, start irrigation at 38-39°F; if it is in the 20's, start the irrigation at 34-37°F.
  - Ensure the pressure is enough to fill any gaps in the sprinkler pattern.
  - Do not stop the water until temperatures reach above freezing and the ice has begun to melt.
- Chemical Protection – active protection
  - There are some chemicals which produce a hydrophobic particle film on the plants' surface. However, these chemicals do not protect during bloom.

Assessing Freeze Damage:

We all might be familiar with assessing frost damage at this point, but here is a link to a great article on how to do just that from Mark Longstroth of Michigan State University Extension https://www.canr.msu.edu/news/assessing_frost_and_freeze_damage_to_flowers_and_buds_of_fruit_trees

I'd like to keep the conversation going on the topic of frost protection in Connecticut fruit operations. Feel free to reach out with any questions, concerns, or suggestions. Email: evan.lentz@uconn.edu

References:

DeHayes, D.H.; Williams, M.W., Jr. 1989. Critical temperature: A quantitative method of assessing cold tolerance. Gen. Tech. Rep. NE-134. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station. 6 p.

Szalay, L.; Gyorgy, Z.; Toth, M. 2019. Frost hardiness of apple (Malus x domestica) flowers in different phenological stages. Scientia Horticulturae 253(309-315).

Announcements:

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COLLEGE OF AGRICULTURE, HEALTH AND NATURAL RESOURCES
EXTENSION & PLANT SCIENCE AND LANDSCAPE ARCHITECTURE

IPM

Vegetable IPM Field Workshop

August 8, 2023 Rain date August 9

10am – 2:30pm

UConn Plant Science Research and Education Facility

59 Agronomy Road, Storrs CT

Join UConn Extension Faculty at the Plant Science Research Farm to learn about important vegetable pests and management options.

Presentation topics include:

- ✓ UConn Plant Diagnostic Lab updates
- ✓ Powdery mildew and downy mildew management
- ✓ Alternaria survey results and fungicide sensitivity evaluation
- ✓ Biodegradable plastic mulch: impacts on crops and soil
- ✓ Allium insect pests
- ✓ Evaluation of a push and pull system for diamondback moth management
- ✓ Remote sensing of potato leafhopper damage and drone demonstration

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- There is no cost to attend this workshop but **registration by July 31 is required.** Seating is limited - reserve your spot today!
- Complimentary lunch and refreshments will be offered
- Register online (preferred) at this link: https://forms.gle/2pAd28Jg6tRkewzS6 or call 860-486-0572 to register by phone.
- 2.5 pesticide recertification credits in PA and 1A categories-
- Questions can be e-mailed to ana.legrand@uconn.edu or leave a message at 860-486-0572.
- If you require an accommodation to participate in this event, please contact organizer at above e-mail or phone number by July 31, 2023.

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U.S. DEPARTMENT OF AGRICULTURE

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