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www.umass.edu/fruitadvisor/berrynotes/index.html

Massachusetts Berry Notes Underwriters:

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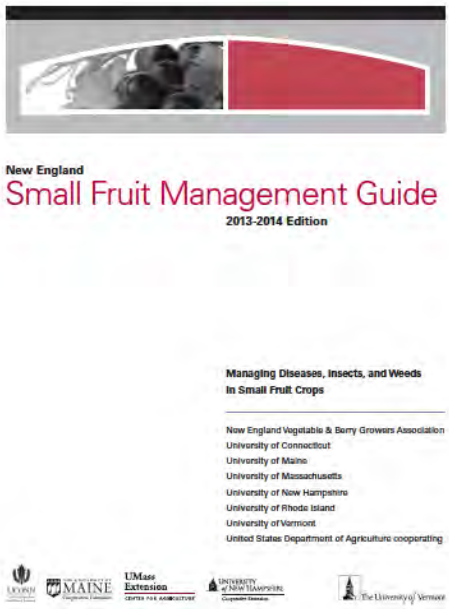
IN THIS ISSUE:

SHORTS:

2013-14 New England Small Fruit Pest Management Guide – The 2013 edition of the ***NE Small Fruit Guide*** is available. In Massachusetts, copies can be ordered by going to the UMass Extension Bookstore at http://www.umassextensionbookstore.com/store.php?crn=238. For other states, contact your local Extension office for information how to get print versions in your state.



ENVIRONMENTAL DATA

The following growing-degree-day (GDD) and precipitation data was collected for an approximately one week period, April 4 through April 10. Soil temperature and phenological indicators were observed on or about April 10. Total accumulated GDDs represent the heating units above a 50° F baseline temperature collected via our instruments for the 2013 calendar year. This information is intended for use as a guide for monitoring the developmental stages of pests in your location and planning management strategies accordingly.

Region/Location	2012 Growing Degree Days		Soil Temp (˚F at 4" depth)	Precipitation (1-week gain)
	1-week gain	Total accumulation for 2013 (2012)		
Cape Cod	11	19 (88)	52˚	0.50"
Southeast	13	23 (95)	56˚	0.32"
East	14	16 (110)	60˚	0.06"
Metro West	7	8 (72)	54˚	0.80"
Central	5	8 (65)	41˚	0.14"
Pioneer Valley	-	12 (88)	53˚	0.28"
Berkshires	5	8 (62)	52˚	0.18"
Average	13	12 (83)	49˚	0.03"

(***Source***: *UMass Landscape Message #4, April 12, 2013*)

STRAWBERRY

Spring Strawberry Chores

Sonia Schloemann, UMass Extension

Established plantings:

1.**Straw mulch removal** – Remove straw mulch from strawberry rows in late-March to early April. Keep straw between the rows to help suppress weeds and reduce splashing from rain or irrigation. For fields where delaying bloom to avoid frost is desired, delaying mulch removal can be a useful technique. Check plants frequently and be sure to remove mulch before any plant growth begins. Delayed mulch removal can delay bloom by up to a week.

2. **Floating row covers** – Set out floating row covers as soon as straw mulch is removed on fields where early bloom is desired. Remember to remove row covers as soon as plants beneath them are blooming to insure good pollination of the flowers. Failure to remove row covers can result in poor pollination and misshapen unmarketable fruit. Covers can be pulled back over for frost protection if needed, although irrigation will protect to a lower temperature. See more below.

3.**Spring weed control** – Calibrate weed sprayer before season starts. Apply pre-emergent herbicides to dormant strawberries. See the 2013-14 New England Small Fruit Pest Management Guide (www.umass.edu/fruitadvisor) for detailed recommendations.

4. **Frost Protection** – be sure that overhead irrigation for frost protection is in place and running properly before it is needed. Pump failures and blown irrigation lines are no fun at 2:00 in the morning. The next issue of Berry Notes will carry detailed information about frost protection.

5.**Insect and disease management** – Calibrate sprayer before season starts. See article in this issue for more information. Order scouting supplies (traps, pheromones, etc.) and anticipated spray materials and store properly.

New plantings:

1. **Site preparation** – Prepare field properly well in advance of planting. This means doing site work (e.g., drainage, running irrigation mains, picking stones, etc.), and making soil adjustments (e.g., soil pH, organic matter, etc.).

2. **Preplant weed management** – Some pre-plant herbicides must be applied 30 days prior to planting. Keep this in mind. Some herbicides can be applied shortly before or after planting See the 2013-14 New England Small Fruit Pest Management Guide (www.umass.edu/fruitadvisor) for detailed recommendations.

Planting–

a. Check condition of plants on arrival and contact nursery if you have concerns.

b. b. Keep dormant plants moist (but not wet) and cold (32 ̊F) until planting.

c. c. Lay out planting scheme before taking plants out of cold storage or have field ready before delivery if no cold storage is available.

d. d. Make sure transplanter is in good running order before planting day.

e. e. Soak roots in water for up to an hour before planting. Do not allow plants to sit in water much longer before planting but make sure they are moist until planted.

f. f. Set plants so the middle of the crown is at the soil surface (not to deep or too shallow). This may take some fine-tuning of the planter.

g. g. Irrigate immediately after planting to settle soil around the plants.

h. h. Recheck planting depth after irrigation and make adjustments as needed.

Strawberry Leaf Diseases– Identification and Management

Cathy Heidenreich, Cornell University

IDENTIFICATION OF LEAF DISEASES

Leaf Spot *(Fungus Mycosphaerella fragariae)*
On leaves: Look for small round purple to reddish spots on upper leaf surfaces. *Centers of these spots become light tan to grey to white with age, with narrow reddish purple to brown borders; centers of the spots may dropout giving the leaves a "shot-hole" appearance.*

On fruit: "Black seed disease" occurs occasionally in heavily infected plantings. One to two black spots form on the surface of ripe berries under groups of up to 8 to 10 seeds. No fruit rot occurs below the spots but fruit are generally considered unmarketable due to appearance.

Other plant parts infected: leaf stems (petioles), runners, fruit stalks (pedicels), flowers, berry caps (calyxes). Symptoms are almost identical to those described on leaves.

Conditions favoring infection: Spores (conidia) are produced in spring on overwintering and dead leaves. They are rain-splashed onto newly growing leaves, stems, flowers and fruit. Infections occur during periods of leaf wet- ness lasting 12 to 96 hours and temperatures between 59 and 68 ˚F.

Leaf Scorch *(Fungus Diplocarpon earliana)*
On leaves: Spots may have 2 shapes; small pinpoint spots in large or small numbers and/or 1⁄4 to 1⁄2" diameter blotchy spots. Scorch spots are typically reddish brown and often fuse together. As the disease progresses the leaves brown, wither and curl, becoming "scorched" in appearance. *Note the centers of these spots do not become white, brown, or gray, as with leaf spot or leaf blight.*

On berry caps: "dead cap", "dead burr". Irregular brown spots form on the berry caps, often from the margins or tips of the caps inward. No fruit rot occurs but fruit are generally considered unmarketable due to appearance.

Other plant parts infected: leaf stems (petioles), fruit stalks (pedicels), flowers, berry caps (calyxes). Flower and fruit trusses may be girdled and die. Severe leaf

scorch infections reduce vegetative growth and fruit yield the season *after* infection. Scorch also reduces both numbers and vigor of crowns; highly infected plants may die when stressed by heat, cold or drought.

Conditions favoring infection: Spores (conidia) are produced in spring on overwintering and dead leaves. They are splashed onto newly growing plant tissue by rain, heavy dew or overhead irrigation. Infections occur during periods of leaf wetness lasting 9 hours or more and temperatures between 59 and 86 ˚F. Leaf scorch infections may occur year round but hot dry conditions (>95 ˚F) and temperatures below freezing reduce the rate of disease.

Leaf Blight *(Fungus Phomopsis obscurans)*
On leaves*: Large, nearly circular spots with wide reddish purple margins and brown centers. Lesions (spots) from the leaf margin may also be V-shaped toward the mid-vein.*

On fruit: Phomopsis soft rot has not yet been re- ported in New York but does occur in Ohio and southern states to Florida. The disease affects ripening or fully matured fruits. Early symptoms are round, pink, water-soaked spots. Later these en- large and turn brown with a "crusty" appearance. The crusty appearance is due to formation of clusters of tiny spore producing structures called pycnidia. These can be seen with a 10x hand lens or magnifying glass. Later stages of Phomopsis soft rot resemble those of anthracnose except anthracnose spots on fruit do not have a crusty appearance but rather develop salmon-colored ooze under moist conditions.

Other plant parts affected: leaf stems (petioles), runners, fruit trusses (pedicels) may be girdled, collapse and die. Severely diseased plants may not yield well. Plants weakened from Phomopsis may be more susceptible to winter injury.

Conditions favoring infection: Spores (conidia) are produced on overwintering and dead leaves. They are rain-splashed onto newly growing plant tissue in spring. The fungus is capable of causing infection over a wide range of temperatures (50 to 95 ˚F). Research indicates disease development is influenced more by wetting period length (6 to 15 hours) than temperature. Infections typically occur early in the season but remain latent until warmer weather with symptoms appearing during harvest or after renovation in late July.

Powdery Mildew *(fungus Podosphaera macularis)*
On leaves: White powdery patches typically develop on the lower surfaces of leaves first and may go unobserved until leaf margins begin to curl upward. These patches may enlarge and cover the entire leaf undersurface. Purple

to reddish blotches may also occur on the lower leaf surface as a result of infection. Upper surfaces may have powdery patches as well. Numerous small dark round overwintering structures (cleistothecia) may appear on leaves in fall.

On fruit: Powdery mildew may infect flowers, causing them to produce hard dry, misshapen fruit; older fruit may also be colonized giving them a seedy look. Both types of infection reduce fruit quality and marketable yields.

Other plant parts infected: leaf stems (petioles), flower trusses (pedicels. Severe leaf infections damages leaves, reducing their ability to photosynthesize; leaves may eventually die and drop off depending on the severity of infection. This in combination with infections of flowers and fruit may have a serious effect on yield.

Conditions favoring infection: Unlike the leaf spot fungi, which are favored by the presence of free water on plant surfaces, the powdery mildew fungus is inhibited by wet, rainy conditions. Disease develops best under conditions of moderate to high humidity and warm temperatures (60 to 80$_{o}$F). This fungus also differs from the leaf spot fungi in that it is an obligate parasite requiring living host tissue to survive; thus it overwinters only in infected living tissue (crowns and leaves). Infected transplants may be a major source of disease initiation in a new planting

Angular Leaf Spot *(bacterium Xanthomonas fragariae)*
On leaves: *Angular leaf spot appears first as tiny water-soaked spots (lesions) on the lower leaf surface. These enlarge to form angular lesions, restricted by small leaf veins.* The young spots are usually best viewed on the underside of the leaf and appear translucent when looked at with a light source behind them and dark green when viewed normally. This difference is an important distinguishing characteristic in identifying the disease. Spots eventually become visible on the upper leaf surface and appear as irregular, reddish brown spots. These may grow together to cover large leaf areas, causing infected leaves to appear scorched or blighted closely resembling leaf spot and leaf scorch. Dead tissue becomes dry and brittle, breaking off; giving leaves a frayed or ragged look. Heavily infected leaves may die if the bacterial infection moves into major veins.

On fruit: When infections of angular leaf spot become systemic, the berry cap (calyx) may also be infected. The modified leaves of the berry cap (sepals) darken and dry. This reduces the marketability of the fruit.

Other plant parts affected: Systemic infections may occur, with all types of plant tissue including the crown being infected. In severe cases, a decline similar to that caused

by *Phytophthora cactorum* or anthracnose crown rot may develop. Water soaking at the base of newly emerging leaves may be the only visible symptoms to be expressed before the plant suddenly dies.

Conditions favoring infection: Moderate day time temperatures (68 ˚F) accompanied by low to near freezing night-time temperatures (36-39˚F) and precipitation events such as heavy rain or dews or overhead irrigation used for frost protection.

MANAGEMENT OF LEAF DISEASES

Leaf Spot, Leaf Scorch, Leaf Blight

General management information: Frequent rains, overhead irrigation, and heavy dews favor disease development and spread. Promote good air circulation for rapid drying of leaves and fruit by using recommended in-row and between-row plant spacings and keeping plantings well-weeded. Minimize the use of overhead irrigation; consider installing a drip irrigation system and using floating row cover for frost protection instead.

Whenever possible choose varieties that are resistant or tolerant to leaf diseases. Remove and destroy dead leaves at renovation. Apply nitrogen fertilizers only after renovation or in the fall to reduce chance of infection; applications of nitrogen in the spring produce an overabundance of young leaf tissue susceptible to leaf-disease fungi.

New plantings or plantings with history of disease: Apply a protectant spray in early spring as new leaves begin to unfold and again before conditions that favorable for disease occur (check product labels for recommended intervals between sprays). Begin sprays again after renovation to protect new foliage from infection. Thorough coverage is necessary for good control; it is especially important to cover undersides of leaves as well as surfaces.

Leaf Spot

Conventional Products: Cabrio EG, Captan 50WP, Captan 4L, Captec 4L, Pristine, Rally 40WSP, or copper (several formulations).

Organic Products: Basic Copper 53, Nu-Cop 50DF and 50WP, or Badge X_2.

Leaf Scorch

Conventional Products: Topsin-M 70WSP, or copper (several formulations).

Organic Products: Badge X_2; check with certifier for allowable copper formulations.

Leaf Blight

Conventional Products: Agristar Sonoma 40WSP or Rally 40WSP, Topsin-M 70WP, or copper (several formulations).

Organic Products: Nu-Cop 50DF and 50WP, or Oxidate.

Powdery Mildew

General management information: Whenever possible choose varieties that are resistant or tolerant to powdery mildew. Infected transplants may be a major source of disease initiation; plant only clean plant material from certified nurseries. Ask your nursery about their powdery mildew management program for transplants. Note the standard practice of removing leaves from transplants during harvest and packing will also help reduce disease in new plantings although some powdery mildew may be present on crowns.

New plantings or plantings with history of disease: It is important to begin management at the very first sign of disease in the field and continue applications as long as disease development continues (see product labels for recommended spray intervals). Effective control of powdery mildew in the fall will reduce disease development in the spring; reduction of powdery mildew development on leaves will also aid in reducing fruit infections.

Conventional Products: Abound, Cabrio EG, Organic JMS Stylet Oil, Pristine, Quintec, Rally 40WSP or Agristar Sonoma 40WSP, Rampart, Topsin 4.5L, Microthiol Disperss or Kumulus DF.

Organic Products: Actinovate-AG, Kaligreen or Milstop, Kumulus DF, Oxidate, or Organic JMS Stylet Oil.

Angular Leaf Spot

General management information: Frequent rains, overhead irrigation, and heavy dews favor disease development and spread. Promote good air circulation for rapid drying of leaves and fruit by using recommended in-row and between-row plant spacings and keeping plantings well-weeded. Minimize the use of overhead irrigation; consider installing a drip irrigation system and using floating row cover for frost protection instead.

Begin applications when symptoms occur. Continue on a weekly basis until conditions no longer favor disease development; discontinue applications if signs of crop injury appear. Thorough coverage is necessary for good control; it is especially important to cover undersides of leaves as well as surfaces.

Conventional Products: Kocide DF or Badge X_2.

Organic Products: Badge X_2 or Oxidate.

(***Source**: New York Berry News, Vol. 12, No. 3, March 2013*)

RASPBERRIES/BLACKBERRIES

Spring Bramble Chores

Sonia Schloemann, UMass Extension

Established Plantings:

1. **Pruning and trellising** - Finish pruning before budbreak by removing spent floricanes and thinning remaining canes to 6-8" apart. Keep row with to no more than 18" at the base. These practices allow for good air circulation and light penetration within the canopy and benefit fruit quality.

2. **Spring weed control** – Calibrate herbicide sprayer before season starts. Apply pre-emergent herbicides according recommendations in the 2013-14 New England Small Fruit Pest Management Guide (www.umass.edu/fruitadvisor). Hand-weed trouble spots with perennial weeds if needed.

3. **Insect and disease management** – Calibrate sprayer before season starts. See article in this issue for more information. Order scouting supplies (traps, pheromones, etc.) and anticipated spray materials and store properly. A dormant lime-sulfur application can help control cane and spur blights but must be applied before green tissue appears.

New Plantings

1. **Site preparation** – Prepare field properly well in advance of planting. This means doing site work (e.g., drainage, running irrigation mains, picking stones, etc.), and making soil adjustments (e.g., soil pH, organic matter, etc.).

2. **Preplant weed management** – Some pre-plant herbicides must be applied 30 days prior to planting. Keep this in mind. Some herbicides can be applied shortly before or after planting See the 2013-14 New England Small Fruit Pest Management Guide for detailed information.

Planting –

a. Check condition of plants on arrival and contact nursery if you have concerns.

b. Keep dormant plants moist (but not wet) and cold (32 ℉) until planting. Plant as soon as is feasible after delivery.

c. Lay out planting scheme before taking plants out of cold storage or have field ready before delivery if no cold storage is available.

d. If using a transplanter, be sure it is in good running order before planting day.

e. Soak roots in water for up to an hour before planting. Do not allow plants to sit in water much longer before planting but make sure they are moist until planted.

f. Set dormant plants at the same depth as they were in the nursery. This may take some fine-tuning of the planter. Trim 'handles' to 6" at planting.

g. Irrigate immediately after planting to settle soil around the plants.

h. Apply a layer of organic mulch to help suppress weeds until plants are well established. Mulching is only recommended in raspberries during the establishment year. In subsequent years, mulch can lead to rot at the base of canes from excess moisture.

i. Seed row middles to slow growing sod such as hard fescue to reduce soil erosion.

BLUEBERRY

Blueberry Disease Fast Fact Sheet; Mummyberry

Dena Fiacchino, Cathy Heidenreich, and Wolfram Koeller, Cornell University

What: Mummy berry is caused by the fungus, *Monilinia vaccinii-corymbosi*, and is one of the most important blueberry diseases in New York State. If left untreated, mummy berry can reduce yields by 30-40%. Early control and detection is necessary to reduce the impact of this disease.

Figure 1.

When: The fungus overwinters in infected berries, or "mummies" on the soil under bushes. Mushroom-like structures (apothecia) grow out of the mummies (Figure 1). In early spring, ascospores are released from the apothecia to infect the newly emerging leaf tissue. These spores are disseminated by wind and rain. This step is the primary or shoot blight phase of the disease. Shoot blight symptoms typically develop 2 weeks after infection. Infected shoots and leaves wilt, turn brown, and die (Figure 2). Masses of secondary spores (conidia) are produced on infected shoot surfaces (Figure 3), which

then infect flower blossoms, starting the second phase of the disease.

Where: Mummy berry occurs in most regions where blueberries are commercially grown. This fungus only infects cultivated blueberries and a few wild blueberry species. Generally, the disease is introduced from neighboring infected plantings or from wild blueberries in nearby woods.

How: Under moist conditions in early spring, apothecia begin to form from mummified fruit remaining on the soil surface. The apothecia slowly develop as moisture levels and temperatures rise. At low temperatures such as 35° F, spores mature slowly taking 10+ hours to release, however at an increased temperature of 61° F, apothecia take about 4hrs to fully mature.

Conidia form on infected shoots, then are carried to flower blossoms by wind and pollinating bees (who are tricked by color changes and sugar secretion into thinking that the infected leaves might be flowers). Once the fungus has been introduced to the flower, it will germinate with the pollen and slowly infect the developing fruit. Evidence of blossom infection does not appear until the fruit begins to ripen. As normal berries ripen, the infected berries begin to shrivel and turn a pinkish color. (Figure 4) These "mummy berries" become filled with fungus, and have a hard grayish white center.

They fall to the ground, shrivel up becoming pumpkin- shaped, and turn dark brown or black. These serve as an inoculum source the following spring when apothecia form and disease cycle begins again.

Figure 2.

Control Strategies: Mummy berry can be a difficult disease to control. An integrated pest management program including both cultural and chemical control strategies is needed for best results. The best time to achieve control of this disease is during the primary infection phase.

Figure 3.

• Rake or disk soil beneath the blueberry bushes or cover the fallen mummy berries with a 3-4 inch mulch layer before apothecia appear in the spring.

• Apply 200lbs/A of 50% urea to burn out apothecia.

• Fungicides may be used to control this disease during both disease phases. For control of the primary infection phase applications should begin at green tip and continue on 7-10 day intervals when conditions favor infection.

For secondary infection control, make applications beginning at bloom on the same type of schedule. Different fungicides are required to control primary vs. secondary infections.

For more information see *Cornell Pest Management Guidelines for Berry Crops* [or *2008 New England Small Fruit Pest Management Guide*]. Apply all pesticides according to label rates and instructions.

Figure 4.

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1. Caruso, F.L., and Ramsdell, D.C. (eds.) 1995. *Compendium of Blueberry and Cranberry Diseases*. APS Press, St. Paul Minn.
2. DeMarree, J.B., and Wilcox, M.S. 1947. *Fungi Pathogenic to Blueberries in the Eastern United States*. Phytopathology 37: 487-506.
3. Pritts, M.P. and Hancock, J.F. (eds.) 1992. *Highbush Blueberry Production Guide*. Northeast Regional Engineering Service, Ithaca, NY.
4. Schilder, Annemiek. 2005. *Michigan Blueberry Facts: Mummy Berry*. http://www.blueberryfacts.org/mummyberryguide. html.

(***Source**: New York Berry News, Vol. 5, No. 2, March 31, 2006*)

Spring Blueberry Chores

Sonia Schloemann, UMass Extension

Established Plantings:

1. **Spring weed control** – Calibrate herbicide sprayer before season starts. Apply pre-emergent herbicides according recommendations in the 2013-14 New England Small Fruit Pest Management Guide (www.umass.edu/fruitadvisor). Hand-weed trouble spots with perennial weeds if needed.

2. **Frost/Freeze Damage** – Be prepared for heavy frost/freeze events during bloom with frost protection. More detail on this in the next issue of Berry Notes. Note that frost damage to blossom tissue can result in more infection by mummyberry so fungicide applications soon after a frost event is recommended.

3. **Insect and disease management** – Calibrate sprayer before season starts. See article in this issue for more information. Order scouting supplies (traps, pheromones, etc.) and anticipated spray materials and store properly. A dormant lime-sulfur application can help control cane and spur blights but must be applied before green tissue appears.

New Plantings

1. **Site preparation** – Prepare field properly well in advance of planting. This means doing site work (e.g., drainage, running irrigation mains, picking stones, etc.), and making soil adjustments (e.g., soil pH, organic matter, etc.).

2. **Preplant weed management** – Some pre-plant herbicides must be applied 30 days prior to planting. Keep this in mind. Some herbicides can be applied shortly before or after planting See the 2013-14 New England Small Fruit Pest Management Guide for detailed information.

Planting –

a. Check condition of plants on arrival and contact nursery if you have concerns.

b. Keep dormant plants moist (but not wet) and cold (32°F) until planting. Plant as soon as is feasible after delivery.

c. Lay out planting scheme before taking plants out of cold storage or have field ready before delivery if no cold storage is available.

e. Soak roots in water for up to an hour before planting. Do not allow plants to sit in water much longer before planting but make sure they are moist until planted.

f. Set dormant plants at the same depth as they were in the nursery. This may take some fine-tuning of the planter. Trim 'handles' to 6" at planting.

g. Irrigate immediately after planting to settle soil around the plants.

h. Apply a layer of organic mulch to help suppress weeds until plants are well established.

i. Seed row middles to slow growing sod such as hard fescue to reduce soil erosion.

GRAPE

Early-Season Disease Management

Anne DeMarsay, formely of Univ. of Maryland

Growers should apply a series of protectant fungicide sprays to new shoots to protect them from several diseases, beginning shortly after bud break. Maryland growers may refer to Extension Fact Sheet 848, *Guidelines for Developing an Effective Fungicide Spray Program for Wine Grapes in Maryland* for specific management recommendations.

1/2- to 1-inch Shoots

- **Phomopsis cane and leaf spot** is usually the earliest disease threat. Spores can germinate as soon as temperatures are above freezing, so include protection in your first shoot spray. Cool, rainy weather favors spore production and shoot and leaf infection.
- **Powdery mildew (PM)**. In Maryland, the ascospores that cause primary infections on shoots and rachises may be present as soon as bud break, so include a PM fungicide in your first shoot spray. Temperatures above 59° F, high humidity, and overcast skies favor infection. Protecting new growth from primary infections on shoots and rachises is the key to preventing later fruit infections.
- **Black rot (BR)**. You may want to include BR protection in the first spray in warmer parts of the state, particularly in wet weather and in vineyards that had high levels of disease last year. Leaf infections may occur at temperatures as low as 50° F if leaves remain wet for 24 hours or longer. The warmer the

temperature, the shorter the leaf wetness period needed for infection.

3- to 5-inch Shoots

- Continue protection for **Phomopsis** and **PM**. Begin protection for **BR** if you didn't do so at the first shoot spray. Preventing leaf lesions reduces BR inoculum for fruit infections.
- Make your second shoot spray 7–10 days after the first spray. Use a 7-day interval if you are applying sulfur for PM, if 2 or more inches of rain have fallen since the first spray, or if shoots are growing rapidly. Fungicides must be re-applied as new growth occurs, as they do not move systemically to protect it.
- If rain is predicted between 7 and 10 days after the first spray, make the second spray *before* the rain. To be effective, protectant fungicides must be on the shoots and leaves before spores arrive.

6- to 10-inch Shoots

- Continue protection for **Phomopsis**, **PM**, and **BR**. Make your third spray 7–10 days after the second spray. See the note on intervals under the previous spray.

Pre-Bloom

- If you are using a fungicide that is at high or medium risk of resistance development, remember to rotate to a fungicide with a different mode of action after each spray. Limit total applications of these fungicides to no more than 2 per season. See Table 2 of Fact Sheet 848 for more information on fungicide classes and resistance risks.
- Protection against **downy mildew (DM)** may be warranted in warm, wet years once 5 or 6 leaves have emerged on the shoot, though generally no earlier than mid-May. If you are using mancozeb or captan for Phomopsis and BR, they will protect shoots against DM as well.

12- to 17-inch Shoots

- **If you have been spraying at 10-day intervals** and your vines are approaching bloom, make sure you include **DM** protection in this spray. Add a fungicide for **Botrytis blight** for Botrytis-prone varieties or if the weather is consistently wet.
- **If you have been spraying at 7-day intervals**, make one more shoot spray for **Phomopsis**, **PM**, and **BR**. Make sure to include **DM** protection in this spray.
- If you have been using paraffinic oil (JMS Stylet-Oil or Pure-Spray) for PM, switch to another fungicide after the last shoot spray. Later in the season, oil can slow growth and retard fruit ripening.
- Remember to increase spray volume as the canopy fills out to ensure thorough coverage.

(***Source**: Maryland Timely Viticulture, Prebloom Factsheet Series*)

GENERAL INFORMATION

Study Offers New Insights on Invasive Fly Threatening U.S. Fruit Crops

Matt Shipman, News Services, and Dr. Hannah Burrack, North Carolina State University

Humans aren't the only species with a sweet tooth. Research from North Carolina State University shows that the invasive spotted-wing vinegar fly (*Drosophila suzukii*) also prefers sweet, soft fruit – giving us new insight into a species that has spread across the United States over the past four years and threatens to cause hundreds of millions of dollars in damage to U.S. fruit crops.

Male & female SWD on a berry. (Photo credit: Hannah Burrack)

"Because we know that *D. suzukii* prefers softer, sweeter fruit, we can focus our research efforts into which wild fruits may serve as reservoirs for this species and help identify new crops that might be at risk," says Dr. Hannah Burrack, an assistant professor of entomology at NC State and lead author of a paper on the research. "These findings may also be a starting point for plant breeders interested in developing new fruit varieties that are more resistant to *D. suzukii*."

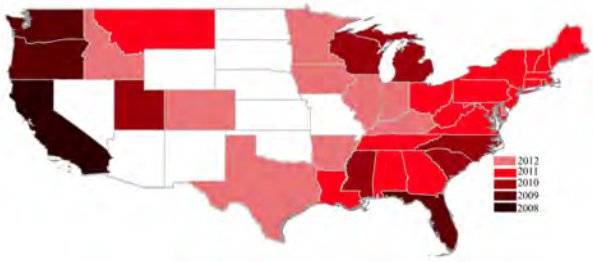
Originally from east Asia, *D. suzukii* were first detected in California in 2008. They have since spread to states from Wisconsin to North Carolina to Florida. The female flies use serrated blades on the tip of their abdomens to cut through the skin of ripe fruit and lay their eggs. The eggs hatch into larvae that feed on the flesh of the fruit until they reach maturity – ruining the fruit in the process.

Sellers go to great pains to remove infested fruit before it reaches the marketplace, so consumers won't notice a difference in fruit quality. But infestations can cause

significant economic problems for fruit growers. For example, researchers estimate that *D. suzukii* has the potential to destroy 40 percent of blackberry and raspberry crops in the eastern U.S., which would affect berry prices and availability.

D. suzukii already causes tens of millions of dollars in crop damage annually to cherries, raspberries, blackberries, blueberries and strawberries. But researchers estimate that losses could climb into the hundreds of millions of dollars per year if the pest can't be controlled.

While ongoing studies explore pesticide-based approaches to control *D. suzukii*, the new research from NC State should help scientists and farmers with other control options. The red states show how far D. suzukii has spread since 2008. (*Image credit: Hannah Burrack*)



For example, the study found that *D. suzukii* are more likely to infest certain varieties of raspberries and blackberries. This means growers may be able to limit crop damage by planting more of the varieties that *D. suzukii* tend to avoid. Similarly, this information allows farmers to focus pesticide treatment on varieties that are most susceptible to infesta- tion.

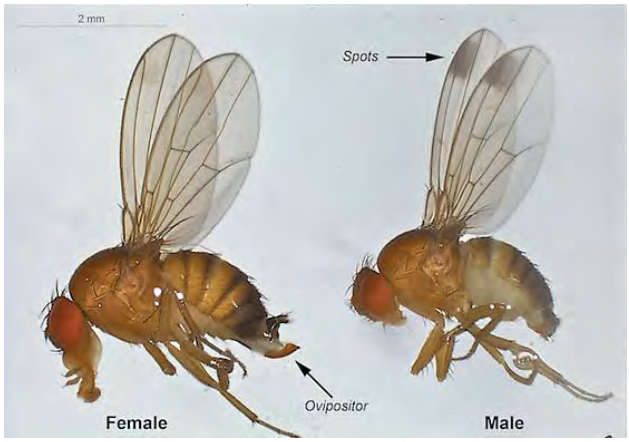
The three-year study evaluated *D. suzukii* impacts in commercial blackberry and raspberry crops in North Carolina, and also encompassed laboratory experiments to help researchers determine which characteristics made fruits more likely to be infested. The work was supported by the Southern Region Small Fruit Consortium, North Carolina Tobacco Trust Fund Commission, North Carolina Department of Food and Agriculture, U.S. Department of Agriculture and North Car- olina Blueberry Council.

The paper, "Variation in selection and utilization of host crops in the field and laboratory by *Drosophila suzukii* Matsu- mara (Diptera: Drosophilidae), an invasive frugivore," was published online March 14 in Pest Management Science. Co- authors are Dr. Gina Fernandez, a professor of horticultural science at NC State; Taylor Spivey, an undergraduate at Bre- vard College; and Dylan Kraus, an undergraduate at NC State. (***Source**: New York Berry News, Vol. 12, No. 3, March 2013*)

How do I manage Spotted Wing Drosophila (SWD) on My Farm

Laura McDermott, Cornell Cooperative Extension Capital District

Ripening and ripe fruit are susceptible to SWD attack, but they appear to be only mildly attracted to unripe fruit. If adult SWD are present on your farm, manage them aggressively.



Aggressive management entails:

1. **Excellent sanitation**: Fruit should be harvested frequently and completely. Unmarketable fruit should be removed from the field and either frozen, "baked" in clear plastic bags placed in the sun, or disposed of off-site. This will either kill larvae or remove them from your farm.

2. **Canopy and water management**: Prune to maintain an open canopy. This may make plantings less attractive to SWD and will facilitate pesticide applications. Leaking drip lines should be repaired, and overhead irrigation should be minimized.

3. **Insecticide treatments**: Insecticide treatments should begin when scouting reports in the region alert growers to the first fly finding. Treatments should be applied at least every seven days and repeated in the event of rain. Choose the most effective insecticides with pre harvest intervals that work for your picking schedule. Rotate insecticides according to their modes of action. Check the 2013 Cornell Guidelines for the latest list of approved pesticides. (See tables below) Growers should be careful to avoid exceeding maximum applications per season which may be difficult for organic growers.

4. **Monitor success of insecticide treatments with baited traps**: Use red cups with holes no larger than 5mm in size. Bait can be apple cider vinegar or a yeast/sugar mix – what- ever is easier for growers to accurately

monitor. Traps should be hung in mid-canopy or on the north side of the row. Monitor these traps weekly.

5. **Regular fruit sampling**: At least 100 fruit per block per harvest should be observed for infestation. between sprays to determine spray efficacy. Place fruit sample in Ziploc bags. Crush berries lightly and add the saltwater solution (1-2 tsp salt to 1 cup water). Leave for an hour and assess for larvae.

6. **Cool berries immediately**: Chilling berries immediately after harvest to 32o -33oF will slow or stop the development of larvae and eggs in the fruit. U-Pick customers should be encouraged to follow this strategy to improve fruit quality at home.

Insecticides for 2013 Blueberries:

1. **Spinetoram** [Delegate WG) (EPA # 62719-541) with 2(ee) recommendation. Recommended rate is 3-6 oz/A. Restrictions: Preharvest interval = 3 days; Do not apply more than a total of 19.5 oz/A per year; Do not make more than 2 consecutive applications of Group 5 insecticides (spinetoram, spinosad). If additional applications are necessary, rotate to a different class of material. Do not make more than 6 applications per calendar year; minimum treatment interval is 6 days. **IRAC group: 5**

2. **Spinosad** [Entrust, Entrust SC] (EPA # 62719-282, 62719-621) with 2(ee) recommendations. OMRI listed. Recommended rate 1.25-2 oz/A for Entrust and 4-6 fl oz/A for En- trust SC. Restrictions: Preharvest interval = 3 days; Do not apply more than a total of 9 oz/A of Entrust or 29 fl oz/A Entrust SC per year; Do not make more than 2 consecutive applications of Group 5 insecticides (spinetoram, spinosad). If additional applications are necessary, rotate to a different class. Do not make more than 6 applications per calendar year or more than 3 applications per crop; Minimum treatment interval is 6 days. **IRAC group: 5**

3. **Azadirachtin** [AzaSol, Molt-X] (EPA # 81899-4, 68539-11). Recommended rate is 6 oz/ A in 50 gallons of water/A for AzaSol and 10 fl oz/A for Molt-X. Restrictions: Preharvest interval 0 days. **IRAC group: UN** (unknown)

4. **Bifenthrin** [specifically Triple Crown] (EPA NO 279-3440). This product is a mixture of three active ingredients including bifenthrin, zeta- cypermethrin and imidacloprid. Bifenthrin is a synthetic pyrethroid and is the same active as is found in Brigade. Recommended rate is 6.4-10.6 fl oz/A. Restrictions: Triple Crown is a Restricted Use Pesticide; Preharvest interval is 5 days; Minimum application interval is 7 days; Maximum amount of Triple Crown allowed per crop season is 31.0 fl oz/A. See maximum usage table on label when applying more than one of these active ingredients. Minimum spray volume is 20 gal/A of water by ground or 5 gal/A by air. **IRAC groups: 3A,** (bifenthrin and zeta-cypermethrin) **and 4A** (imidacloprid)

5. **Bifenthrin** [specifically Brigade WSB] (EPA #279-3108) with 2(ee) recommendation. Recommended rate is 5.3 to 16 oz/A. Restrictions: Brigade WSB is a restricted use pesticide. Preharvest interval is 1 day; Do not make applications less than 7 days apart. Do not apply more than 0.5 lb active ingredient per acre per season. **IRAC group: 3A**

6. **Fenpropathrin** [Danitol 2.4EC] (EPA #59639-35). Recommended rate 16 fl oz/A. Restrictions: Danitol is a restricted use Pesticide; Preharvest interval is 3 days; No not exceed 32 fl oz/A per season. **IRAC group: 3A**

7. **Phosmet** [Imidan 70-W] (EPA # 10163-169). Recommended rate 1.33 lb/A. Preharvest interval = 3 days. Do not apply more than 7 1/8 lb/A per year. Do not make more than 5 applications per year. **IRAC group: 1B**

Caneberries:

1. **Spinetoram** [Delegate WG) (EPA # 62719-541) with 2(ee) recommendation. Recommended rate is 3-6 oz/A. Restrictions: Preharvest interval = 1 day; Do not apply more than a total of 19.5 oz/A per year; Do not make more than 2 consecutive applications of Group 5 insecticides (spinetoram, spinosad). If additional applications are necessary, rotate to a different class of material. Do not make more than 6 applications per calendar year; Minimum treatment interval is 4 days. **IRAC group: 5**

2. **Spinosad** [Entrust, Entrust SC] (EPA # 62719-282, 62719-621) with 2(ee) recommendations. OMRI listed. Recommended rate 1.25-2 oz/A for Entrust and 4-6 fl oz/A for En- trust SC. Restrictions: Preharvest interval = 1 day; Do not apply more than a total of 9 oz/A of Entrust or 29 fl oz/A Entrust SC per year; Do not make more than 2 consecutive applications of Group 5 insecticides (spinetoram, spinosad). If additional applications are necessary, rotate to a different class. Do not make more than 6 applications per calendar year; Minimum treatment interval is 5 days. **IRAC group: 5**

3. **Azadirachtin** [AzaSol, Molt-X] (EPA # 81899-4, 68539-11). Recommended rate is 6 oz/ A in 50 gallons of water/A for AzaSol and 10 fl oz/A for Molt-X. Restrictions: Preharvest interval 0 days. **IRAC group: UN** (unknown)

4. **Bifenthrin** [specifically Triple Crown] (EPA # 279-3440). This product is a mixture of three active ingredients including bifenthrin, zeta- cypermethrin and imidacloprid. Bifenthrin is a synthetic pyrethroid and is the same active as is found in Brigade. Recommended rate is 6.4 – 10.3 fl oz/A. Restrictions: Triple Crown is a Restricted Use Pesticide; Preharvest interval is 3 days; Minimum application interval is 7 days; Maximum

amount of Triple Crown allowed per season is 10.3 fl oz/A. See maximum usage table on label when applying more than one of these active ingredients. Minimum spray volume is 50 gal/A by ground or 10 gal/A by air. **IRAC group: 3A**

5. **Bifenthrin** [specifically Brigade WSB, Brigade 2EC] (EPA #279-3108, EPA #279-3313) with 2(ee) recommendations. Recommended rate is 8.0 to 16 oz/A for Brigade WSB and 3.2-6.4 fl oz per/A for Brigade 2EC. Restrictions: Brigade WSB and Brigade 2EC are restricted use pesticides. Preharvest interval is 3 days; only one application may be made postbloom. Do not apply more than 0.2 lb active per acre per season. **IRAC groups: 3A**, (bifenthrin and zeta-cypermethrin) and **4A** (imidacloprid)

6. **Fenpropathrin** [Danitol 2.4EC] (EPA #59639-35). Recommended rate 16 fl oz/A. Restrictions: Danitol is a restricted use Pesticide; Preharvest interval is 3 days; No not exceed 32 fl oz/A per season. **IRAC group: 3A**

7. **Malathion** [Malathion 8 Aquamul] (EPA #34704-474) for raspberries, blackberries, boysenberries, dewberries, and loganberries with 2(ee) recommendation. Recommended rate 2 pts/A. Restrictions: Preharvest interval = 1day. **IRAC group: 1B**

Strawberries:

1. **Spinetoram** [Radiant SC) (EPA # 62719-545) with 2(ee) recommendation. Recommended rate is 6-10 fl oz/A. Restrictions: Preharvest interval = 1 day; Do not apply more than a total of 39 fl oz/A per year; Do not make more than 2 consecutive applications of Group 5 insecticides (spinetoram, spinosad). If additional applications are necessary, rotate to a different class of material. Do not make more than 5 applications per calendar year; Minimum treatment interval is 4 days. **IRAC group: 5**

2. **Azadirachtin** [AzaSol, Molt-X] (EPA # 81899-4, 68539-11). Recommended rate is 6 oz/A in 50 gallons of water/A for AzaSol and 10 fl oz/A for Molt-X. Restrictions: Preharvest interval 0 days. **IRAC group: UN** (unknown)

3. **Fenpropathrin** [Danitol 2.4EC] (EPA #59639-35). Recommended rate 16 – 21.33 fl oz/A. Restrictions: Danitol is a restricted use Pesticide; Preharvest interval is 2 days; No not make more than 2 applications totaling 42.67 fl oz/A to the same planting in 12 consecutive months. **IRAC group: 3A**

4. **Bifenthrin** [specifically Brigade WSB] (EPA #279-3108) with 2(ee) recommendation. Recommended rate is 8.0 to 16 oz/ A. Restrictions: Brigade WSB is a restricted use pesticide. Preharvest interval is 0 days. Do not apply more than 0.5 lb active per acre per season. For ground application, apply full cover spray in minimum of 50 gallons of finished spray per acre. **IRAC group: 3A**

5. **Spinosad** [Entrust, Entrust SC] (EPA # 62719-282, 62719-621) with 2(ee recommendations. OMRI listed. Recommended rate 1.25-2 oz/ for Entrust and 4-6 fl oz/A for Entrust SC. Restrictions: Preharvest interval = 1 day; Do not apply more than a total of 9 oz/A of Entrust or 29 fl oz/A Entrust SC per year; Do not make more than 2 consecutive applications of Group 5 insecticides (spinetoram, spinosad). If additional applications are necessary, rotate to a different class. Do not make more than 5 applications per calendar year; Minimum treatment interval is 5 days. **IRAC group: 5**

6. **Malathion** [Malathion 8 Aquamul] (EPA #34704-474) only with 2(ee) recommendation. Recommended rate is 2 pts/A. Restrictions: Preharvest interval is 3 days. **IRAC group: 1B**

(***Source****: New York Berry News, Vol. 12, No. 3, March 2013*)

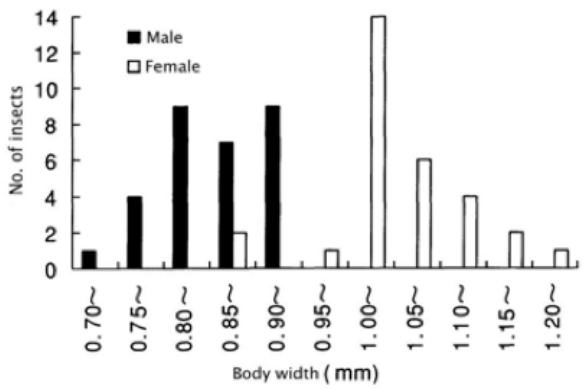
Netting Control of Spotted Wing Drosophila (Drosophila suzukii)

Chiba Prefectural Agriculture Research Center & Chiba Industrial Technology Research Institute

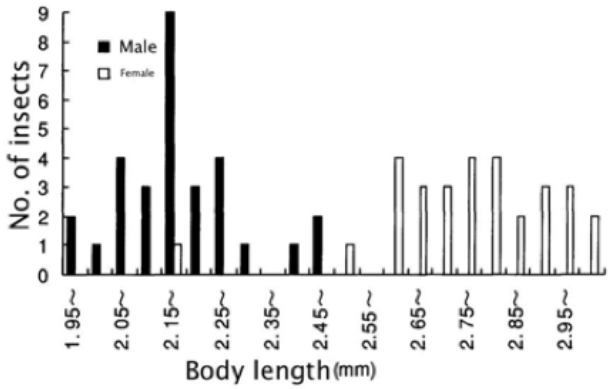
***(Editor's note**: The authors of the two articles summarized below were graciously granted permission for a printing of a summary translation of them in NY Berry News. We wish to express our gratitude to them and also to Dr. Masanori Seto (ms545@cornell.edu), Postdoctoral Associate, Cornell University Department of Entomology, for his preparation of the summary translation).*

The researchers' approaches consisted of three steps. Examine the body sizes of adult *Drosophila suzukii* A laboratory trial to determine the maximum mesh size that do not allow *D. suzukii* adult passing through the net, A field trial on effectiveness of netting against *D. suzukii* infestation and crop quality

1. **Body width and body size**



Body width was measured at the widest part of throrax.



Body length was measured from the head to the end of abdomen.

2. **Mesh size that is small enough to prevent *D. suzukii* adults from passing through** 12 cylindrical plastic containers (10 cm diameter) with bottoms were prepared. 20 ml of a mixture of Japanese sake and honey (5:1 volume) was placed as a bate in each container. Three containers were covered with 0.98 mm mesh, three containers were covered with 1.0 mm mesh, three of them were covered with 1.5 mm mesh and the last three were left uncovered as control. All containers were placed in a rearing box of *D. suzukii* for 24 hours and the number of insects trapped in the containers was counted. The trial had 6 repetitions.

Different mesh sizes. The containers were placed for 24 hours.

Table 1. Relationship between mesh sizes and the number of adults passing through the nets

Mesh Size (mm)	Weave	No. of adults passing	Standard Error
0.98	Plain	0 B	
1.0	Raschel Knitting	0.2 b	0.17
1.5	Raschel Knitting	43.0 a	23.5
Control	-	143.5	49.0

a,b Steel-Dwass method, 5% signifiance level

3. Field trial

Two 150 m2 blueberry fields were covered with either insect net (0.98 mm mesh size) or bird net (30 mm mesh size) at the height of 2.5 m. The blueberry trees were 8 year old BlueCrop and planted at 1.4 x 1.4 m interval. During the harvest period, ripe fruit was collected. The fruit was soaked in water for an hour and counted the number of larvae coming out. Also, the crop quality, yield and the growth of new tree under each treatment were evaluated. The trials were done over three years.

Photos courtesy of Shinzo Kawase of the Chiba Prefectural Agriculture Research Center

Table 2. Duration of covering period with nets and duration of harvest period.

Treatment	Year	Covering period	Harvest period	Covering duration before harvest*
		(Month/Day)	(Month/Day)	(Days)
0.98 mm	2003	5/22~8/17	6/23~7/20	32
Insect net	2004	5/16~8/1	6/25~7/5	40
	2005	5/10~8/5	6/24~7/27	45
30 mm	2003	5/28~8/18	6/16~7/11	19
Bird net	2004	5/16~8/1	6/18~6/29	33
	2005	5/16~8/5	6/20~7/21	35

* Covering duration before harvest was the number of days between the beginning of covering period and the beginning of harvest period.

Table 3. The number of *D. suzukii* larvae detected from field grown blueberries covered with two different mesh size.

Treatment	Sampling date		# of fruit tested	# of larvae	#of larvae/100 fruit
0.98	2003	7/6	100	0	0
Insect net	2004	6/16	127	0	0
		6/22	238	0	0
		7/14	84	0	0
		Total	449	0	0
	2005	6/27	211	0	0
		7/4	176	0	0
		Total	387	0	0
	3 yr Total		936	0	0
30 mm	2003	7/6	100	191	191
Bird Net	2004	6/16	150	0	0
		6/22	340	3	0.9
		7/14	96	23	24.0
		Total	586	26	4.4
	2005	6/27	219	13	5.9
		7/4	171	120	70.2
		Total	389	133	34.2
	3 yr Total		1076	350	32.5

Summary

1. Damage by Cherry Drosophila could be completely prevented by covering a blueberry orchard with a 0.98 mm mesh net.
2. Covering with the net did not decrease the soluble solids or amount of free sugar but it might produce a large amount of titratable acid and blue skin of the blueberry becomes lighter.
3. Covering with the net did not influence blueberry fruit weight, yield, or growth of current shoots.

Original Articles:

[i] Kawase, S. and K. Uchino, 2005. Effect of Mesh Size on Drosophila Suzukii Adults Passing Through the Mesh. *Annual Report of the Kanto Tosan Plant Protection Society*, 52, 99-101. [ii] Kawase, S., K. Uchino, M. Yasuda and S. Motoori. 2008 Netting Control of Cherry Drosophila *Drosophila Suzukii* Injurious to Blueberry. *Bulletin of Chiba Prefectural Agriculture Research Center*, 7. 9-15.

(***Source**: New York Berry News, Vol. 12, No. 3, March 2013*)

Critical Spring Temperatures for Tree Fruit and Small Fruit Bud Stages

Compiled by Mark Longstroth, MSU Extension

Pome Fruit

Apples	Silver Tip	Green Tip	½ inch green	Tight Cluster	First Pink	Full Pink	First Bloom	Full Bloom	Post Bloom
Old	16	16	22	27	27	28	28	29	29
temp 10%	15	18	23	27	28	28	28	28	28
kill 90% kill	2	10	15	21	24	25	25	25	25

Pears	Bud Swell	Bud Burst	Tight cluster	First White	Full White	First Bloom	Full Bloom	Post Bloom
Old	18	23	24	28	29	29	29	30
temp 10%	15	20	24	25	26	27	28	28
kill 90% kill	0	6	15	19	22	23	24	24

Stone Fruit

Apricots	Bud Swell	Bud Burst	Red Tip	First White	First Bloom	Full Bloom	In the Shuck	Green Fruit
Old	--	23	--	25	--	28	--	31
temp 10%	15	20	22	24	25	27	27	28
kill 90% kill	--	0	9	14	19	22	24	25

Peaches	Bud Swell	Calyx Green	Calyx Red		First Pink	First Bloom	Full Bloom	Post Bloom
Old	23	--	--		25	--	27	30
temp 10%	18	21	23		25	26	27	28
kill 90% kill	1	5	9		15	21	24	25

European Plums	Bud Swell	Side White	Tip Green	Tight Cluster	First White	First Bloom	Full Bloom	Post Bloom
Old	--	--	--	--	23	27	27	30
temp 10%	14	17	20	24	26	27	28	28
kill 90% kill	0	3	7	16	22	23	23	23

Sweet Cherries	Bud Swell	Side Green	Green Tip	Tight Cluster	Open Cluster	First White	First Bloom	Full Bloom	Post Bloom
Old	23	23	25	28	28	29	29	29	30
temp 10%	17	22	25	26	27	27	28	28	28
kill 90% kill	5	9	14	17	21	24	25	25	25

Tart Cherries	Bud Swell	Side Green	Green Tip	Tight Cluster	Open Cluster	First White	First Bloom	Full Bloom	
10% kill	15	24	26	26	28	28	28	28	
90% kill	0	10	22	24	24	24	24	24	

Small Fruits

Concord Grapes	First Swell	Full Swell	Bud Burst	First Leaf	Second Leaf	Third Leaf	Fourth Leaf
10% kill	13	21	25	27	28	28	28
90% kill	-3	10	16	21	22	26	27

Strawberries	Buds Emerged	Buds Closed	Bloom	Small Fruit
Damage	10	22-27	28	28

Blueberries	Bud Burst	Pink Bud	Open Flower	Petal Fall	Green Fruit
Damage	< 20	< 25	27	28	28

Old standard temperature is the lowest temperature that can be endured for 30 minutes without damage. This chart also shows the temperature that will kill 10 % and 90 % of normal fruit buds. These numbers were taken from Washington (WSU), Michigan (MSU) and North Carolina (NCS) Extension Bulletins. Apple - WSU EB0913, Pears - WSU EB0978, Sweet Cherries - WSU EB1128, Peaches - WSU EB0914, Apricots - WSU EB1240, Tart Cherries - MSU Research. Rpt. 220, Portions of these bulletins are posted at Gregg Lang's Fruit Bud Hardiness Page at the MSU Horticulture Department (***Source**: MSU Fruit Program Frost/Freeze page http://web1.msue.msu.edu/vanburen/frost.htm*)

UPCOMING MEETINGS:

April 16 and 17, 2013 – *Fruit Twilight Meetings*. 5:30 – 7:30 Locations:
4/16 - Big Apple Farm, 207 Arnold Rd., Wrentham Massachusetts
4/17 – Outlook Farm, 136 Main Rd.,Westhampton Massachusetts 02116
1 pesticide re-certification credit; $25 registration fee ($20 for state association members), light dinner will be served For more information: Jon Clements, clements@umext.umass.edu, or go to http://extension.umass.edu/fruitadvisor/upcoming-events.

April 17, 2013 - *Harmonized Good Agricultural Practices (GAP) Training Program*, 10am – 4pm. Massachusetts Farm Bureau Federation Office, 249 Lakeside Drive (the office is located at the intersection of Rt 20 and 495) Marlboro, MA 01752. Pre-registration required. Cost: $50. Register by contacting Doreen York at Doreen at 413-545-2254 or email at dyork@umext.umass.edu.

April 19, 2013 - *Spotted Wing Drosophila Management*, 5-7pm. Claremont Savings Bank, 145 Broad St, Claremont NH 03743. For more information see: http://extension.unh.edu/events/files/4BBA0A9D-9EDE-02FE-B98E51B163150B33.pdf

April 19, 2013 – 2013 *Spring Boom Sprayer Calibration Meeting*, 12 – 2:30pm. Connecticut River Ag Service, 949 Old Claremont Road, Charlestown, NH, 03603. For more information see: http://extension.unh.edu/events/files/60620294-F4ED-20A0-FE771815D201055F.pdf.

April 22, 2013 - *Spotted Wing Drosophila Management and* , 6-9PM, Hillsborough County Cooperative Extension, 329 Mast Rd, Goffstown NH 03045. For more information see: http://extension.unh.edu/events/files/4BBA0A9D-9EDE-02FE-B98E51B163150B33.pdf

April 24 & 25, 2013 – *Building Healthy Soils: The Benefits to Your Farm*. Two locations; April 24th at UMass Crops Research & Education Farm, 89 River Rd. S. Deerfield MA 8-4pm; $20, Register by contacting Doreen York at dyork@umext.umass.edu. April 25th at South Rehoboth Fire Dept. 104 Pleasant St. Rehoboth MA. 8-4:30pm. $20. Register by contacting Sue Guiducci at sguiducci@earlthink.net.

May 1, 2013 – *Invasive Plant Certification: Part A2 – State Regulations Pertaining to Invasive Plant Management*. 9am – 3pm. Doubletree Hotel, 11 Beaver St. Milford MA 01757. $75, For information on how to register go to http://extension.umass.edu/landscape/events/state-regulations-pertaining-invasive-plant-management-a2 or contact Ellen Weeks at eweeks@umext.umass.edu.

WEBINARS OF INTEREST:

National Sustainable Agriculture Information Service (ATTRA) webinars and videos can be found at: https://attra.ncat.org/video/.

Northern Grapes Project recorded webinars can be found at: http://northerngrapesproject.org/?page_id=257

Northeast Sustainable Ag Research & Education (NE-SARE) Video Vault can be found at: http://www.nesare.org/Dig-Deeper/Pictures-Stories-and-Video/Video-vault

If you know of an event that would be suitable for this list, please forward to sgs@umext.umass.edu