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IN THIS ISSUE:

CROP CONDITIONS:

The 2015-16 Small Fruit Pest Management Guide is now available. Contact your state's Extension Office to buy a copy or go to the UMass Extension Bookstore at https://www.umassextensionbookstore.com/products/108. The price is $16/copy plus shipping. The guide can also be viewed online at here.

Strawberries: Mulch removal was completed for most growers by mid April - later than usual due to the persistent snow and cold temperatures. Subsequent growth has been slow to stalled with the season running late at this point by 7-10 days, more or less depending on location. Plants under row covers are coming along slowly with bloom expected in a week or so. Winter injury has not been common in most fields most likely because of the good snow cover for most of the winter. It may be soon to know for sure, so keep an eye on plants as they begin more vigorous growth. In some locaitons the weight of snow made mulch removal more difficult this year. **Brambles:** Summer fruiting varieties are beginning to push growth on floricanes with leaves visible and beginning to expand. No flower tissue visible yet for most varieties but will come quickly as temperatures warm up. A significant amount of dieback is likely following this winter's cold temperatures. It may not be possible to fully assess the extent of winter damage until growth is farther along. Some shoots may begin growing and then wilt from sublethal damage. Primocane varieties are showing some new growth but only a few inches so far. Brambles in tunnels are further along and should be monitored for two-spotted spider mite. **Blueberries**: Bushes are at budswell generally around the region. Some areas my see a lot of winter injury fro winter temps but it's hard to tell how much at this time. Winter Moth egg hatch started around April 18th -19th this year and spray applications should be made now. A second application may be needed if significant rainfall occurred after the initial application was made. Now is the time to look for apothecia (fruiting cups) of the overwintered Mummyberry beneath the bushes. If high infections were seen last year, be prepared to protect against this disease this year. **Grapes**: Vines are still fairly dormant or just beginning budswell in most locations. Be prepared to scout for flea beetle soon.

ENVIRONMENTAL DATA

The following growing-degree-day (GDD) and precipitation data was collected for an approximately one week period, April 9 through April 15. Soil temperature and phenological indicators were observed on or about April 15. Total accumulated GDDs represent the heating units above a 50° F baseline temperature collected via our instruments for the 2015 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	GDD (1-Week Gain)	GDD (Total 2014 Accumulation)	Soil Temp (°F at 4" depth)	Precipitation (1-Week Gain in inches)
Cape Cod	14	18	48	0.47
Southeast	11	12	60	0.75
North Shore	16	19	45	0.48
East	16	20	55	0.59
Metro West	2	4	46	0.53
Central	13	14	42	0.70
Pioneer Valley	14	17	48	0.79
Berkshires	7	10	46	0.85
AVERAGE	14	18	48	0.47
n/a = information not available				

(***Source**: UMass Landscape Message #5, April 17, 2015*)

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 2015-16 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. 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 2015-16 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 ℉) 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.

Spring Weed Management in Strawberries

Bruce Bordelon, Purdue University

There have been several herbicide label changes for strawberries. There is a new formulation of Gramoxone, a revised supplemental label for Sinbar, and labels for Prowl H20, Aim, Blazer, Chateau and Goal. Growers should read the [*2015-16 New England Small Fruit Management Guide*] to familiarize themselves with these changes. Changes that may influence weed management decisions for early spring are listed below.

Gramoxone Inteon is the formulation available for strawberries. This formulation is designed to be safer to the user. However it is still restricted use and the signal word is still "Danger". Gramoxone Inteon contains an "alginate" which is made from seaweed and slows absorption into the bloodstream. There is also an alerting agent that smells like decaying grass, and emetic and purgative, and a green dye. The new formulation also comes with some rate changes. Rates for the new formulation are 2.5 to 4 pints/acre.

Chateau (flumioxazin) is registered for pre and post emergence weed control in dormant strawberries. In dormant strawberries, the rate is 3 oz/acre. Also apply a crop oil concentrate at 1% or a non-ionic surfactant at 1⁄4% by volume. Chateau will control emerged chickweed, field pansy, and oxalis if sufficient contact is made with the weeds. Chateau will not control all emerged weeds. Scout the field and check the labels. 2,4-D amine may still be required to control other emerged weeds.

Select Max (clethodim) is a grass specific herbicide registered in strawberry. It is applied at 6 to 8 ounces per acre. It is effective on small, actively growing grasses. It has improved activity over Poast on cool-season and perennial grasses. Add 1 qt/100 gal spray of crop oil concentrate. Repeat application at 14 days for perennial grasses. Ammonium sulfate can be added at 2.5 lb/acre to improve activity on perennial grasses. Do not apply within 4 days of harvest. Select will not kill old established grasses. Avoid spraying on hot humid days or some crop burning will result.

Ultra Blazer 2E (acifluorfen) is registered for use in annual and perennial strawberries. In matted row plantings, applications can be made after renovation and when plants are dormant during fall or early spring. The PHI for matted row strawberries is 120 days, so growers need to carefully consider spring application dates. (***Source**: Facts for Fancy Fruit, Vol. 15, Issue 1. April 6, 2015*)

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 2015-16 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. 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 2015-16 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.

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.

Raspberry Anthracnose

Bruce Bordelon, Purdue University

The most important spray of the season for control of anthracnose on brambles is the delayed dormant spray of lime sulfur, Sulforix or copper hydroxide. If you have a problem with anthracnose, this is one spray that you can't afford to miss. One of these materials should be applied when new leaves are exposed 1/4 to 3/4 inches; if you are late in your application and don't spray until a few leaves have unfolded, cut the rate to reduce the risk of leaf burn. See the [2015-16 New England Small Fruit Management Guide) and the product labels for complete information on rates and timing. (***Source**: Facts for Fancy Fruit, Vol. 15, Issue 1. April 6, 2015*)

BLUEBERRY

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 2015-16 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. 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 2015-16 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.

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.

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.

Figure 1.

Figure 2.

Figure 3.

Figure 4.

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.

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.

• 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.

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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.

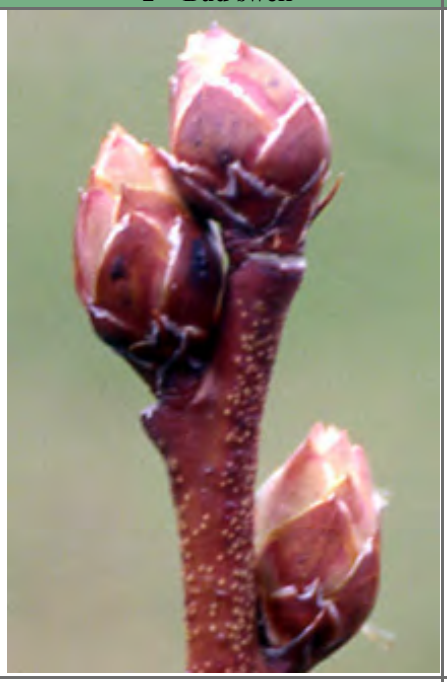
3. Pritts, M.P. and Hancock, J.F. (eds.) 1992. *Highbush Blueberry Production Guide*. Northeast Regional Engineering Service, Ithaca, NY.

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*)

Critical Cold Temperatures for Blueberries

Mark Longstroth, Michigan State University

1 – Dormant or tight bud	2 – Bud swell	3 – Tight cluster
		
Plant part: Flower bud. **Description:** No visible swelling of the fruit buds. Bud scales tightly closed. No visible signs of growth.	**Plant part:** Flower bud. **Description:** First sign of growth as plant growth begins in the spring. Visible swelling of the flower buds; outer bud scales begin to separate at the tip revealing paler interior bud scales. This bud stage can usually tolerate cold temperatures of 10 to 15°F (-12 to -9°C).	**Plant part:** Flower. **Description:** Individual flowers are distinguishable in the flower cluster. This bud stage can tolerate 20 to 23°F (-7 to -5°C).
4 – Early pink bud	**5 – Late pink bud**	**6 – Full bloom**

		
Plant part: Flower. **Description:** Expanding flowers are readily visible and have separated. The pink corolla tubes (petals) are short and closed. This bud stage can tolerate 23 to 25°F (-5 to -4°C).	**Plant part:** Flower. **Description:** Individual flowers fully developed. Expanded corollas are now white but still closed. This bud stage can tolerate 24 to 27°F (-4.4 to -2.8°C).	**Plant part:** Flower. **Description:** Most of the flowers on the bush have opened. The bloom stages can tolerate 28°F (-2.2°C).
7 - Petal fall		
		
Plant part: Flower. **Description:** The corolla tubes are falling off the flowers, revealing small green fruit. This is the most vulnerable stage to freeze injury. Damage can occur at 32°F (0°C).		

GRAPE

Vineyard Fertilization

Dave Scurlock and Imed Dami, Ohio Agricultural Research and Development Center

It is nearing time to start applying fertilizer if you have not done so already. In the past we would apply fertilizer in early spring before bud break because we had some time before spring work really got started. We had finished pruning, tightened the wires, tied up the vines, replanted missing vines and removed our hills on the vinifera. **Now what?** Let's throw on some fertilizer and get that done so we can go on to some other operation.

Is timing of fertilization really that important? The following excerpts are from an earlier report out of the Vineyard Vantage. A report by Eric Hansen indicated that multiple applications of nitrogen may be needed to maintain sufficient nitrogen in the root zone over the extended period of peak demand, particularly on sandy soils. Efficiency of nitrogen uptake may also be affected by fertilization placement and rate. Greatest absorption may be achieved when fertilizer is applied over the soil containing the most grapevine roots, which is normally the herbicide strip immediately under the trellis. This is most important in younger vineyards where the root system is not as extensive. As a general rule, the percentage of fertilizer nitrogen absorbed decreases as the rate of nitrogen increases. Although some growers apply high rates of nitrogen in a single application, greater efficiency of nitrogen uptake may occur from multiple applications banded beneath the vine when the vine demand is high. Studies have shown that application of nitrogen while grapes are dormant is inefficient because a high percentage of the applied

nitrogen is leached from the soil before uptake by the vine. Vines absorb nitrogen relatively slowly between budburst and bloom, most rapidly between bloom and veraison and then slow down between veraison and harvest. Thus the most efficient time to apply nitrogen would be shortly after bloom when the vines are growing rapidly.

Application Rate: Generally we apply approximately 50 pounds of actual nitrogen per acre each year to juice grapes with lower rates (30 pounds) applied to wine grapes. The actual nitrogen that you apply is calculated by taking the form of nitrogen that you are applying such as ammonium nitrate, which is 33% nitrogen and multiply the weight of a 50-pound bag of ammonium nitrate which will give you 16.5 pounds of **actual N** that you are applying per bag. Approximately three 50-pound bags will give you 50 pounds of actual N per acre if applied at 0.27 pounds of ammonium nitrate per vine at an 8 foot by 10 foot spacing (545 vines/acre). Example 2: Urea (45% N) x 50 lb bag of Urea = 22.5 lbs of actual N/bag. If you are going for 50 lbs of actual N per acre then: 50 lbs/acre divided by 22.5 lbs of actual N = 2.22 bags per acre using Urea at the 50 lb per acre rate.

Training systems that permit large vines such as Geneva Double Curtain(GDC) require higher application rates of 75-100 pounds of actual N per acre. Larger amounts are best applied as split; half rate applied by bloom and the second half by veraison. Younger vineyards require less nitrogen usually in the 15 to 20 pounds of actual nitrogen per acre. Nitrogen is readily available between the pH values of 6.0 and 8.0, but becomes less available at lower or higher pH levels.

We would like to see pH values around 6.0 to 6.5. The American varieties can tolerate lower pH values of 5.5 better than vinifera type grapes. Liming should be done after you have tested your soil and determined a need and the absolute best time to lime is well in advance of planting so that you can incorporate the lime into the soil 8 to 12 inches deep. The pH is much more difficult to correct after the planting because of the slow movement of the lime through the soil. Lime can also increase the availability of other elements such as phosphorus, calcium, magnesium, and molybdenum. The dolomitic lime can be used to raise the magnesium content in the soil and pH and a calcitic lime can be used to raise the calcium content as well as the pH in the soil. If the soil pH was not corrected before planting the pH may be raised over time with multiple applications of lime of 2 to 2.5 tons per acre twice a year.

Can Potassium additions help? Next to nitrogen we have to consider Potassium as one of the next most important elements to maintain good vine health and sugar development. Application rates should be based on vine vigor, soil tests, and petiole analysis. For soil applications 100-400 pounds per acre of 0-0-60 is recommended. The number of applications may be higher in clay and sandy soil if the pH is above 6.5. Apply potassium in 2-foot bands under the trellis to assure that the major portion of the material will be available for root uptake. Potassium can be applied anytime, but the maximum uptake will be between bud break and veraison and again immediately after fruit harvest.

Organic fertilizer? Any time you can add organic material to the fields it is going to help the health of the soil and tilth. An organic material may vary greatly in composition depending on its source. When such a material is applied as a fertilizer an unknown quantity of nitrogen, phosphorus, potassium or other elements are applied unless it has been analyzed. Cost to obtain and spread and amounts are usually higher unless a readily available source is part of the operation. Observations of growth and petiole analysis can tell you if you are getting enough nutrients to the vines. Organic materials such as mulches can have a detrimental effect of tying up nitrogen that is used by microorganisms to break down the mulch into a usable form for the vine. Additional nitrogen to feed both the vine and microbes will alleviate this problem.

What about fertilizing vines that were winter injured? The rule here is wait and see. We are definitely going to want to reduce the normal application rates of nitrogen to vines that are showing signs of winter injury. That is delayed bud break or uneven budbreak and shoot growth. If you are unsure about your crop, it might be advisable to split the nitrogen application this year and apply a half-rate at bloom (two thirds of nitrogen goes to vegetative growth, one third to fruit). If you have very few shoots, this may be a year to not apply nitrogen. Watch for nitrogen deficiency symptoms (thin weak growth, light green foliage). If symptoms develop, apply a foliar spray of urea around veraison. Foliar sprays can be a corrective for deficiency symptoms, but are not a permanent solution to vineyard fertility problems. (***Source**: Ohio Grape-Wine Newsletter, April 2011*)

Spring Frost and Grapevines

Tony Wolf, Virginia Tech

Wish I could say that there's a fool-proof method of protection, but not much has changed on this ancient problem. Ed Hellman has a good overview of frost avoidance measures on the eXtension website (http://www.extension.org/) [enter "grapes frost avoidance" in the search box, upper right]. Some of my own comments from a number of years ago still resonate:

• It's mostly about site selection and putting the early budding varieties higher on a slope (passive control), but there are some active measures that can be implemented, depending on your circumstances, such as use of wind machines (mast-mounted and helicopters), use of sprinkler frost control, and input of heat into the vineyard. Irrigation and heaters are rarely used in Virginia vineyards, but wind machines and contracting with helicopter services are used more commonly. Helicopter services (Warrenton and Richmond, for example, have helicopter services) are often based at metropolitan airports. Explore these services and their costs well in advance of a potential frosty morning if you choose to use this means of protection.

• Mow cover crops to increase soil heating during the day.

• Wind machines: Inspect, fuel and test solid-set wind machines well in advance of their need. Mobile, tractor-powered are fans and heaters are also available and offer some measure of protection. Overhead irrigation is another alternative, but requires large amounts of water and can cause more injury than protection if not correctly used.

• Avoid use of crop oils after bud break if you are in a frost-prone site (note, research has shown some bud-break delay with some varieties when dormant oils are applied to vines in the dormant period, well before bud break)

• Efficacy of prophylactic sprays ("night before" measures) to minimize frost injury are generally ineffective – they promise much but generally fail to deliver. That said, there is some research occurring at Penn State with "KDL" a potassium-containing fertilizer. Results from 2014 were inconclusive, as no frost occurred at the 25 study vineyards. The study is being repeated this year.

• With some variance due to wind speed, cloud cover, and the relative dryness of the air, the temperatures (degrees F) that will damage grape buds and shoots are:
- dormant bud < 20F

- dormant swollen 26F

- burst bud 28F

- one leaf unfolded 28 - 29F

- two leaves unfolded 29 - 32F

• What happens if your vines get frosted? Should you rush out and remove the frosted shoots? Not much point. I covered this (my opinion) in an earlier Viticulture Notes: (http://www.arec.vaes.vt.edu/alson-h-smith/grapes/viticulture/extension/news/vit-notes-2010/vn-june-2010.pdf) and will stick to that response.

(***Source**: Virginia Vitculture Notes: Vol. 30, April 2015*)

GENERAL INFORMATION

Upgrade and Calibrate to Optimize Your Backpack Sprayer

Lee Stivers, Penn State University

Backpack sprayers are very useful tools for crop farmers to have on hand. Whether your farm is large or small, newly established or centuries old, certified organic or conventional, there is a spot for a backpack sprayer or two on your farm. However, to make the most of a backpack sprayer, we recommend that you make some upgrades to the sprayer wand assembly and of course, keep your sprayer calibrated.

There are a many advantages to using backpack sprayers on the farm. Commonly used for spot-spraying herbicides, backpack sprayers can also be used to apply fungicides, insecticides, foliar fertilizers, and many other products very efficiently. Backpack sprayers are inexpensive, so you can have multiple sprayers set up for specific uses. Backpack sprayers are simply designed, so are easy to fill, clean, repair and maintain. Unlike larger sprayers, backpack sprayers are connected directly to the operator's arm and brain, allowing higher precision applications.

John Grande and Jack Rabin of Rutgers did some really great work on backpack sprayers a few years ago, and have posted a comprehensive set of resources for growers on selecting the best models for their needs, upgrading standard parts to improve function, calibrating backpack sprayers, and measuring small amounts of products as used in backpack sprayers. In this article, we'll concentrate on just a couple of these.

Spray wand conversion: Most backpack sprayers are generally well designed and built, with the exception of the spray wand. The spray wand consists of a flexible hose connected to the tank pump, a stiff wand with a trigger handle, and a simple flood nozzle at the end. These parts are usually made of plastic, with little to no ability to make adjustments. John Grande has developed a method to dramatically improve the functionality of a backpack sprayer by replacing the plastic spray wand with one custom assembled using compatible, off-the-shelf components from a sprayer supply company. The total cost of retrofitting a backpack sprayer with a new wand is around $200.

Note: information for this article is drawn from "Don't Overlook Backpack Sprayers for Small-Scale Farms" by John Grande and Jack Rabin, Rutgers.

The new wand includes several key components. First, it includes **a CF valve**, which solves a key problem of calibrating a backpack sprayer with a typical wand. In most backpack sprayers, the output from the nozzle increases and decreases as the pressure in the tank varies. You can't really calibrate a sprayer unless the flow rate is uniform over time. With a CF valve built into the spray wand, the sprayer will only spray when the tank pressure is high enough to maintain output pressure and hence, flow rate. When the pressure drops below the CF valve's working pressure, flow stops completely, a clear sign to the operator that they need to pump more air into the tank in order to continue spraying.

Another important component of the retrofitted wand is the inclusion of a **standard nozzle body and cap**. This allows you to change nozzles depending on the product, application, or conditions. It is a simple thing to switch between flat fan, hollow cone and flood nozzles, or nozzles of different droplet sizes. Finally, adding a **barbed swivel** to the wand so that it can be easily pointed and positioned makes operating the sprayer a lot more comfortable.

Sprayer calibration: Now that you have the backpack sprayer retrofitted, it is important to calibrate it so that you can apply products accurately and according to labelled rates. Three factors are required to be determined for calibration:

A constant spray output or volume. The retrofitted wand will give us a constant output, and the manufacturer of the nozzle will provide the output rate for each nozzle at a given pressure. But you can check the output rate by following these steps: Half fill the sprayer with water, pump the sprayer, point the tip into a container, and squeeze the trigger handle for one minute (timed). Determine the volume collected per minute and convert the flow rate to gallons per minute by dividing by 128 (since there are 128 ounces in one gallon). Now you have nozzle output in gallons per minute (GPM).

A constant walking travel speed. It is very important to practice your walking speed, and to do this on the actual ground you will be walking on when operating the sprayer. Mark off 100 feet on the uneven ground, and time how long it takes to walk it. Do this several times so that the time is consistent. Most people's comfortable walking speeds fall in the range of 2.0 MPH (34 seconds to walk 100 feet) to 2.5 MPH (27 seconds) to 3.0 MPH (23 seconds). Now you have your walking speed in miles per hour (MPH).

Knowing and maintaining the spray width. Each nozzle type is manufactured with a spray angle and a recommended spray height which provides a known width listed in the parts catalog. Make sure you hold the boom at a constant height when spraying. 20" and 30" widths are common for 110 degree nozzles.

Alternatively, you can spray water on an asphalt surface and measure the effective band width.

You now have the measurements you need to calculate the output of your sprayer, as you will be operating it, in gallons per acre (GPA).

GPA = (Nozzle GPM X 5,940) / (MPH X spray width inches)

If gallons per 1,000 square feet is more useful for your purposes, substitute 136 for 5,940 in the formula above.

Further details on backpack sprayer selection, modifications, and calibration can be found at *Don't Overlook Backpack Sprayers for Small-Scale Farmers.*

(***Source:*** *Vegetable and Small Fruit Gazette, April 3, 2015*)

Endosulfan Phase-out Update

Rick Foster, Purdue University

Endosulfan (Thionex, Thiodan) is being phased out. Its use on nectarines, peaches and sweet cherries expired on July 31, 2012. The label for pears expired on July 31, 2013. It cannot be used after July 31, 2015 on apples or blueberries and July 31, 2016 is the last day it can be used on strawberries. Endosulfan cannot be used on any crop after July 31, 2016. Again, existing stocks cannot be used after the listed dates. (***Source****: Facts for Fancy Fruit, Vol. 15, Issue 1. April 6, 2015*)

Northwest Berry Nutrient Management Guides

Peerbold Crop Management

[**Editor's Note**: These are some excellent guided for nutrient management of berry crops from the Pacific Northwest.]

- **Nutrient management in blueberries** (OSU)
- **Nutrient management in caneberries** (OSU)
- **B.C. interactive berry management guides**
- **June bearing strawberries fertilizer guide** (OSU)
- **Growing day-neutral strawberries in Western Washington** (WSU)

(***Source****: Small Fruit Update, Week 17, April 22, 2015*)

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 21, 2015 - *Fruit Twilight Meeting* at UMass Cold Spring Orchard, 393 Sabin St., Belchertown, MA. 5:30 PM. 1 pesticide credit will be offered. Light dinner will be served. $20 meeting fee. Contact: Jon Clements, 413-478-7219. Pre-registration is not necessary. For more information see: https://extension.umass.edu/fruitadvisor/upcoming-events.

April 21, 2015 - *EPA Worker Protection Standard Train-the-Trainer Course for Organic and Non-certified Pesticide Users* at Brigham Hill Community Farm, 37 Wheeler Rd, North Grafton, MA 01536. 9am to 1pm. All farm workers should be trained in the EPA Worker Protection Standards (WPS). If your farm uses any pesticides, including those approved for Organic production, all employees MUST be trained in WPS by Federal law. For more information contact Lisa McKeag at 413-577-3976 or lmckeag@umext.umass.edu or go to http://ag.umass.edu/events/epa-worker-protection-standard-train-trainer-course-for-organic-non-certified-pesticide-use-0.

April 22, 2015 - *Fruit Twilight Meeting* at Carlson Orchards, 115 Oak Hill Rd., Harvard, MA. 5:30 PM. 1 pesticide credit will be offered. Light dinner will be served. $20 meeting fee. Contact: Jon Clements, 413-478-7219. Pre-registration is not necessary. For more information see: https://extension.umass.edu/fruitadvisor/upcoming-events.

April 23, 2015 - *Fruit Twilight Meeting* in cooperation with University of Rhode Island at Goodwin Brothers Farms Stand, 458 Greenville Rd., North Smithfield, RI. 2 pesticide credits. Light dinner will be served. $20 meeting fee (except RIFGA members). Contact: Jon Clements, 413-478-7219, or Heather Faubert, 401-874-2967. Pre-registration is not necessary. For more information see: https://extension.umass.edu/fruitadvisor/upcoming-events.

April 28, 2015 - *EPA Worker Protection Standard Train-the-Trainer Course for Organic and Non-certified Pesticide Users* at Brookfield Farm, 24 Hulst Road, Amherst, MA 01002. 9am to 1pm. All farm workers should be trained in the EPA Worker Protection Standards (WPS). If your farm uses any pesticides, including those approved for Organic production, all employees MUST be trained in WPS by Federal law. For more information contact Lisa McKeag at 413-577-3976 or lmckeag@umext.umass.edu or go to http://ag.umass.edu/events/epa-worker-protection-standard-train-trainer-course-for-organic-non-certified-pesticide-use-0.

June 17, 2015 - *Farm Food Safety for Post-Harvest Handling and Small-Scale, Low-Cost Facility Design* at Red Fire Farm, 184 Meadow Road, Montague MA 01351 from 2pm to 6pm. This program will focus specifically on washing/packing facilities and low-tech & low-cost design for very small farms. Topics will also cover wash water sanitizer usage, sanitizer level monitoring, and other aspects of post-harvest handling using farm food safety good agricultural practices. More information on registration, and other dates/locations for similar workshops will be available soon. Contact Amanda Kinchla at amanda.kinchla@foodsci.umass.edu or 413.545.1017 for more info.

June 24, 2015 - *UMass Agricultural Field Day* at UMass Crop and Animal Research and Education Center, River Rd. S. Deerfield MA from 9:30am-4pm. Tour the farm and learn about the agricultural research projects happening this summer. Lunch included! Projects will include but are not limited to:

- Cover Crops in Potato Production
- Dual-Purpose Cover Crops for Fall Nutrient Capture and Additional Forage Production
- Production of Quality Malt Barley in New England
- Hardwood Biochar Amendment of Agricultural Soils
- Growing Mustard as a Biofumigant Cover Crop
- Evaluation of Reduced Risk Pesticides for Cabbage Root Maggot Control

Contact Kelly Kraemer at kkraemer@umass.edu or 413-545-5221 for more information.