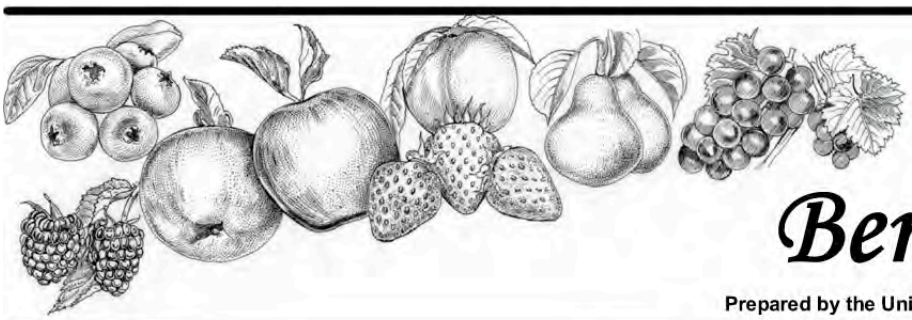

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Berry Notes

Prepared by the University of Massachusetts Fruit Team

May 1, 2006 Vol. 18, No. 6

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

Massachusetts Berry Notes Underwriters:

NOURSE Growers of the Finest Small Fruit Plants

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IN THIS ISSUE:

Message from the Editor

Two New Publications Available for Purchase – Two new pocket guides from Michigan State are available for purchase from UMass Extension. Growers who attended the New England Vegetable & Fruit Conference over the winter requested that we make these excellent guides available. A Pocket Guide for Grape IPM Scouting in the North Central and Eastern US and A Pocket Guide to IPM Scouting in Highbush Blueberries are available to purchase, each costing $15 including S&H. Please contact me at 413-545-347 or sgs@umext.umass.edu for ordering information.

Crop Conditions

Strawberry flower buds are emerging from the crown. Row-covered fields will enter the bloom period within the week. Once bloom begins, row-covers must be removed in order for pollination to occur. All fields should have irrigation in place for frost protection during bloom. Begin scouting for clipper. New fields area being planted. **Raspberry** leaves are expanding. Fall raspberry new cane growth is about 6". Watch for raspberry fruitworm feeding on new leaves. **Blueberry** fruit buds are at pink bud and will be blooming soon. Mummyberry is active at this time. Be ready for pollination with adequate numbers of bee hives. The first fertilizer application should be made now and the second in about a month. Pre-emergent herbicides may still be applied, though it is getting late for this. **Grapes** buds have burst and leaves are unfolding in some varieties. Growers will need to apply protective spray soon. Flea beetles may be out in large numbers and can cause a lot of damage. Fertilizer may be applied now as well as pre-emergent herbicides. **Currants** and **Gooseberries** are at or past bloom depending on variety and location.

ENVIRONMENTAL DATA

The following growing-degree-day (GDD) and precipitation data was collected for a one-week period, April 20, 2006 through April 26, 2006. Soil temperature and phenological indicators were observed on April 26, 2006. Accumulated GDDs represent the heating units above a 50° F baseline temperature collected via our instruments since the beginning of the current growing season. 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	2006 GROWING DEGREE DAYS		Soil Temp (°F at 4" depth)	Precipitation (2-Week Gain)
	2-Week Gain	Total accumulation for 2006		
Cape Cod	10	62	55˚F	0.50"
Southeast	18	103	58˚F	1.00"
East	25	115	50˚F	n/a
Central	18	73	41˚F	0.67"
Pioneer Valley	31	121	55˚F	1.14"
Berkshires	28	71	45˚F	1.97"
AVERAGE	21.7	90.8	50.6˚F	0.88"

n/a = information not available

(***Source**: UMass Extension 2006 Landscape Message #9, April 28, 2006*)

STRAWBERRY

Strawberry Bud Weevil (*Anthonomus signatus*)

Jeanne Ciborowski, MN Department of Agriculture, Bill Hutchison, Suzanne Wold-Burkness, Univ. of MN

Strawberry bud weevil (SBW), also known as "clipper," ranks as the number two insect problem in Minnesota strawberries (Minnesota Strawberry Growers Survey, 2001). Although infestation is not as widespread as tarnished plant bug in Minnesota, it is capable of causing economic injury in some strawberry fields.

Biology

SBW overwinter as adult weevils in fence-rows and wooded areas. Once temperatures reach 60 ° F, they move to nearby early budding plants such as strawberries. In Minnesota, SBW adults may start appearing in strawberry plantings as early as mid-May (approximately 100 DD base 50°F). They feed on the immature pollen of the blossom buds and the females deposit eggs in the buds. SBW girdles the bud and clips the stem, causing the bud to hang down or fall to the ground. In about a week, the egg hatches into a white, legless grub. The larva develops inside the bud, reaching maturity in three to four weeks. Pupation occurs in the soil and adults emerge in late June through July. After feeding on the pollen from various flowers for a short time, the new adults seek hibernating sites and remain until the next spring. Only one generation of SBW occurs per year in Minnesota.

Clipper weevils move across the field at the very slow rate of 30 feet per season, which means that after three years, a clipper infestation can usually only extend 90 feet into a new planting.

Damage

The adult female clipper punctures blossom buds, deposits an egg, girdles the bud, and proceeds to clip the stem, causing the bud to hang down or fall to the ground (see image, left). Injury is most common along edges of fields near woodlots.

Management

Monitoring: Strawberry bud weevils are small and hide in the strawberry canopy; therefore most people monitor the number of clipped buds. Monitoring should begin in early spring and continue until bloom. The traditional treatment threshold is 1 clipped bud per 2 ft of row. However, new research data have indicated that a more accurate threshold is 6 clipped buds per three feet of row, or roughly four times higher than previously thought. Scientists have shown that remaining flowers will grow larger than expected and overcompensate for the clipped bud. (New York State Pest Management Guidelines for Small Fruit Crops, 2001).

Control

Biological and Cultural Control: In most years, clipper weevil populations in one and two year fields are below economic thresholds, and therefore do not need to be sprayed.

- Some varieties, such as 'Jewel' can compensate for injury.
- Immediately plowing under old beds following harvest with removal of leaves and mulch may help by reducing the overwintering habitat of the weevil.
- Regularly rotate fields out of production so that there are few fields in production for more than three picking seasons.

Chemical Control:

Treatment must take place when blossom buds first become visible in the crown and temperatures approach 65°F.

Complete field treatment is recommended for older plantings with a history of high SBW pressure. However, a border spray may be sufficient in new plantings or in older plantings with low SBW populations. Refer to the web site above for more information on chemical control. (***Source****: Minnesota Fruit & Vegetable IPM News, Vol 1 No.4, May 31, 2004*)

Strawberry Seasonal Reminders and Updates

Dena Fiacchino, Cornell Cooperative Extension

Remember last spring? Consider frost protection now to reduce the chances of frost injury.

- √ As the temperatures vary at night, be sure to investigate overhead irrigation for frost protection. We are not close to flowering, but it makes more sense to be prepared than caught off guard.
- √ Strawberry flowers can experience frost injury at temperatures less than 28°F. When temperatures begin to drop, flowers should be protected with irrigation. When water is applied at 32°F it freezes and gives off heat. The flowers are actually protected from any further drop in temperature because with the ice formation on the plant, it will no longer be exposed to devastating temps. However, when strawberry flowers are in tight clusters they can tolerate temps as low as 22°F.
- √ Keep in mind a freeze event flowing a period of warm weather is the most detrimental.
- √ Straw mulches should have been removed as the strawberry plants are beginning to grow.
- √ Applying synthetic row covers can increase yields, accelerate plant development, and protect against fluctuating spring temperatures.
- √ Scout the fields for disease. If the was evidence of leaf spot, leaf scorch, or leaf blight on last years leaves – start developing a fungicide spray program for the upcoming season.
- √ Springtime weed control if there was no herbicide applications in the fall.
  - For over wintering broadleaf weeds, 2,4-D at 2-3 pints per acre with 25-50 gal of water per acre is labeled when strawberries are **still dormant**.
  - Poast can be used in the spring when grasses are around 6 inches tall. However, Poast cannot be used within 6 weeks after Sinbar applications. Do not mix Poast with other chemicals, and no more than 2½ pints/acre/season of Poast can be applied.
  - Stinger can be used for specific broadleaf weeds, provides good control for thistle. In established fields, apply after last picking or in early spring, but 30 before harvest. For thistle control apply early spring or later in the summer after seed dispersal. DO NOT tank mix. DO NOT apply within 6-8 hours of expected rainfall or irrigation. Apply 1/3 to 2/3 pints to 20-75 galllons of water per acre. Making 1-2 appplications per year without exceeding 2/3 pints per acre per year.

(***Source****: New York Berry News, Vol. 5, No. 4, April 24, 2006*)

RASPBERRY

Raspberry Seasonal Reminders and Updates

Dena Fiacchino, Cornell Cooperative Extension

- √ Pruning should be completed by budbreak
- √ Apply nitrogenous fertilizers; a general rate of 50lbs actual N/acre on one-year-old plants, 75lbs actual N/acre two year old or older plants. Apply at budbreak in one application or split between budbreak and June.
- √ Consider root rot control. Apply Ridomil or Aliette to control Phytophthora root rot. Ridomil is a soil drench whereas Aliette is foliar applied.
- √ Apply pre-emergent herbicides if adequate control was not applied in the fall.
- √ Prepare trellis systems while vegetative growth is minimal.
- √ Consider cane disease control. Apply a delayed dormant spray of lime sulfur at budbreak (when buds show ¼" to ½" green, sprays after that can cause leaf burn)
- √ Consider fruitworm or raspberry sawfly control if there was a problem last year. Adult emergence occurs around late April – early May. Sevin is the product labeled for control of these pests.

(***Source**: New York Berry News, Vol. 5, No. 4, April 24, 2006*)

Update on Red Neck Cane Borer

Patrick Byers, Missouri State University

At the 2006 Midwest Fruit Growers Meeting I had the opportunity to hear an interesting presentation from Dr. Donn Johnson, research entomologist from the University of Arkansas, on management of red necked cane borer. Damage from this pest can be devastating, resulting in the loss of canes, reduced yields, and overall reduction in profitability of a planting. In my contacts with Missouri's blackberry industry, growers report that damage from this pest appears to be on the increase, with economically signifi cant damage noted even in newly established plantings.

The red necked cane borer, *Agrilus ruficollis,* is a small wood boring beetle that can be come a serious pest of blackberry and raspberry. Adults are 1/4 inch long, black, with a metallic coppery-red thorax (hence the name "red necked"). The red necked cane borer overwinters in canes as larvae, which pupate in late spring. By late April to early June the adults emerge from the canes, and feed on young primocane foliage. Mating takes place, and eggs are laid on the primocanes. Eggs hatch from 4 to 24 days later, the larvae climb down the canes, and then bore into the primocane (usually within 12 inches of the soil). The larvae are white, fl attened, legless, and about 3/4 inch long when mature. The larvae tunnel in the cane in a spiral fashion, and often tunnel into the pith (Figure 1, photo courtesy of Stacy Hambelton). Infested primocanes develop thickenings or galls in the feeding area (Figure 2, photo courtesy of Stacy Hambelton). The larvae overwinter in the canes, pupate, and

***Figure 1**. Interior of blackberry cane, showing red necked cane borer feeding injury.*

***Figure 2.** Blackberry cane gall resulting from red necked cane borer feeding.*

emerge as adults the following spring.

Growers should determine the presence and extent of damage from red necked cane borer each spring. Galled canes are easy to identify during dormant season pruning. Prune out and destroy galled canes; infested canes usually winter kill, or collapse and die once growth begins the following spring. Destruction of galled canes also destroys the overwintering larvae. Destroy adjacent sources of infestation, such as wild blackberries.

Several biological controls are reported for red neck cane borer, including parasitic wasps and fungal diseases. Additional control measures are warranted if more than 10% of canes are infested.

Scout the growing primocanes in April and May to note the presence of adults. Early morning is a good time to scout for the adults on the upper foliage of the primocanes, and watch for the characteristic feeding damage on the newly expanded leaves. The usual control recommendation is two applications of a labeled insecticide, 7 to 12 days apart, timed to coincide with adult emergence. At present the only insecticide that I am aware of that is labeled for red necked cane borer control is the Pyrellin. In the past Marlate was labeled for control of red necked cane borer; older packages of this insecticide may still list brambles. Red necked cane borer insecticide applications may coincide with bramble blossoming; use precautions to avoid injuring bees. Also, the later applications may coincide with bramble harvest; observe pre harvest intervals and reentry periods as listed on the pesticide label. (***Source**: The Berry Basket, Vol. 9, No. 1, Spring 2006*)

Focus on Important Arthropod Pests of Raspberry

Greg English-Loeb, Cornell University

You can find a diversity of insects and related arthropods in a raspberry planting. Most of these are innocuous, some are beneficial and some have the potential to be pests. It behooves the grower to know something about these potential pests so they can correctly determine if they are present in their planting and what they can do about it. Obviously growers have a lot to keep track of and arthropods are just one of them, but there are some general things to know or do to help simplify the process. First, you need to regularly monitor the planting for pests or pest damage. And when monitoring, you should know what to look for and when to expect it. In this article I want to review the most likely arthropod pests you might encounter in brambles, when they are most likely to show up, what their damage looks like and what can be done about it terms of pest control.

Figure 1.

Figure 2.

Figure 3.

Figure 4.

There are a number of potential pests of raspberries to be concerned with during the growing season. Be on the alert for feeding damage from the adult raspberry fruitworm (a beetle, light brown in color, see Figure 1) on foliage and fruit buds during the prebloom period. The larvae of this beetle pest feed inside flower buds and young fruit (Figure 2). Adult feeding damage on foliage creates a skeletonized appearance somewhat similar to the feeding damage caused by larvae of raspberry sawfly (pale green caterpillar-like body with many long hairs, Figure 3, damage shown in Figure 4). Both the fruitworm and the sawfly appear during the prebloom period. Carbaryl [Sevin] is labeled for both of these pests and the timing is similar as is Spintor [spinosad].

Tarnished plant bug (TPB) is another potential problem for raspberry growers during the period from bloom to harvest. Both the adults (Figure 5) and their nymphs (Figure 6) can cause deformed fruit (Figure 7), although the deformities are not as obvious in raspberries as in strawberries where TPB is also an important pest. We do not have a good estimate of the economic threshold for TPB in raspberries but a rough guide would be 10 to 20% of canes infested with adults or nymphs. Carbaryl is labeled for control of TPB on raspberry. It's not the most effective material on plant bugs but pretty much all we have with plant bugs specifically on the label. Malathion can be effective against TPB, but I have yet to find a product registered in NY with plant bug on the label for caneberries. Note that weedy fields aggravate TPB problems since the adults and nymphs will feed on a wide variety of weed species.

Raspberry cane borer and related beetle species make their appearance during this period. The adults (Figure 8) emerge in the spring, mate and start laying eggs. Larvae (Figure 9) bore into canes during the season and for some species, the next season. They cause injury and death to canes and potentially entire crowns. The best time to kill adults is during the late prebloom period (for summer-bearing raspberries), although note that there is nothing specifically labeled for it now that methoxychlor [Marlate] is no longer available. As an alternative to insecticides, during the season remove wilted shoot tips (Figure 10) below the girdled stem (two rows of punctures around an inch apart, Figure 11) where the egg of the raspberry cane borer has been placed. Also, during the dormant season remove and destroy canes with swellings.

Figure 5.

Figure 6.

Figure 7.

Potato leafhoppers (both adults-Figure 12 and immatures) also begin appearing in New York farms after bloom. This species overwinters as adults in the southeastern USA and then migrates north in spring and early summer (it does not overwinter). They feed on a lot of different crops including many small fruits like strawberries, raspberries, and grapes. They use their soda-straw like mouthparts to pierce the water conducting vessels of the plant (xylem) and such out water and nutrients. If this were all they did, it probably would not cause much problem. But they also inject saliva into the plant and for some species this causes a strong reaction in the plant. Typical symptoms include yellowing of leaf margins and distorted and possibly stunted leaves (Figure 13). Different plant species respond differently and some are very sensitive while others are not. Raspberries, grapes, and strawberries are pretty sensitive. The adult potato leafhopper is iridescent green and wedge-shaped while the nymph is usually green and moves sideways in a unique manner when disturbed. If injury to foliage is moderate to severe, control may be necessary. Sevin [carbaryl] and Malathion 57 EC are labeled for potato leafhopper on raspberries but note there is a 7 days to harvest restriction for Sevin but only a 1 day restriction for Malathion.

Figure 8.

Figure 9.

Figure 11.

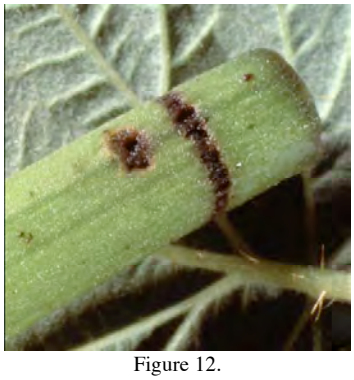

Figure 12.

I should also mention two-spotted spider mite (TSSM, Figure 14) as a potential pest. These tiny spider-like arthropods can become very numerous on foliage, causing white stippling on leaves (Figure 15). They seem to be most problematic in dry sites and/or in mild growing areas such as the Hudson Valley and Long Island, although I can usually find a few in most plantings during the summer period. Note that we don't have a good assessment of the economic threshold for TSSM on raspberries but a rough guide would be about 50% of leaves with at least one mite present. As of a couple of years ago there is a miticide registered in New York for control of TSSM (Savey DF).

Predatory mites can also provide control of TSSM. These beneficial mites are frequently naturally present in raspberry fields, especially where few broad-spectrum insecticides are used, but can also be purchased from a supply house. For both Savey and predatory mites, it's important to start control actions early before you see lots of severe injury to foliage (bronzing).

Figure 13.

Another pest that can cause serious injury to canes and the crown is the Raspberry crown borer. The larvae of this moth (Figure 16) feed at the base of the cane and into the crown over a two-year period. The first signs of a problem often appear during fruit maturation. The withering of and dying of canes, often with half matured fruit, can be a symptom of feeding damage at the base. Canes with these symptoms, and the associated crowns, should be removed during the growing season and destroyed. The adult moth actually does not appear until later in the summer (early August). It is a very attractive moth that superficially resembles a yellow jacket (Figure 17). Guthion was labeled for use against raspberry crown borer larvae through the 2006 season but will no longer be allowed after this September. For the 2006 season the pyrethroid insecticide bifenthrin (Capture) has been approved for use against crown borer. Apply to lower parts of canes and soil in fall to kill newly hatched larvae or possibly in the spring to kill overwintered larvae that are attempting to bore into canes. Research conducted at the University of Arkansas suggests the fall application is the more effective timing.

Figure 14.

Figure 14.

Figure 15.

Although this is not an exhaustive list, the pests included in this article are the most likely to cause you problems. Some other species that might show up include sap beetles feeding on ripe and over ripe fruit (picnic beetles, fig 18, have black and white spots, strawberry sap beetle, Fig. 19, is smaller and brown in color) and adult Japanese beetles(Fig. 20) feeding on foliage. For additional information consult the 2006 Cornell Pest Management Guidelines, Raspberry Production Guide, or the Compendium of Raspberry and Blackberry Diseases and Insects.

Figure 16.

Figure 17.

There are several useful web sites to consult for pest management information. Marvin Pritts of Cornell University put together a valuable diagnostic tool for the web to help you identify pest problems in small fruit crops. The web site address is http://www.hort.cornell.edu/department/faculty/pritts/BerryDoc/Berrydoc.htm. Also, a new website for bramble pest management has been recently launched by NABGA (North

Figure 18.

Figure 19.

Figure 20.

American Bramble Association). Doug Pfeiffer, Professor of Entomology at Virginia Tech, put this useful resource together. The web site is http://www.ento.vt.edu/Fruitfiles/NABGAIPMSite/NABGAIPMHome.html.

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Reprinted with permission from the North American Bramble Growers Association 2006 Conference Proceedings, p42-43.

(***Source**: New York Berry News, Vol. 5, No. 4, April 24, 2006*)

BLUEBERRY

Fertilizing Blueberries

Gary Pavlis, Rutgers University

Research conducted in the past 2 years in Michigan and New Jersey have radically changed my thinking regarding the fertilization of highbush blueberries. I summarized some of this work in my articles in this newsletter last year however new findings this winter have resulted in further changes in my recommendations. In the past, New Jersey blueberry growers would have been advised to make their first fertilizer application around this time. In fact, one blueberry grower told me that Good Friday was the traditional day for the first application. Well, things have changed! Research out of Michigan from Dr. Eric Hansen's lab, has shown that there must be leaf emergence and growth before you have uptake of fertilizer by the blueberry plant. So, if you are applying fertilizer now, you are wasting your money. This is because only 10% of what you are putting on now will end up in the plant. The correct timing for the first N-P-K application is during bloom or shortly there-after. The second application should be made in late June. So, timing is the first change we have made.

Secondly, after taking many leaf and soil samples this past year, and I have realized one very important thing. Fertilizer recommendations which are based on soil analysis are nearly worthless. Leaf and soil samples which had been taken from the same plant never agreed, and the leaf analysis shows what is actually getting into the plant. So, what do we do about this? I believe the only important thing that we learn from soil analysis is pH. Yes, pH is critical. Many growers have heard me say that the three most important things you must know to grow blueberries is pH, pH, and pH. This is especially true for growers who have plantings that are not on soils that are naturally 4.5 to 4.8. The pH of the soil must be known because leaf analysis results assumes that the pH is within the correct range. If it is not within that range, I would not rely on the leaf analysis recommendations.

So, what should growers do about fertilizing their blueberries? First, every blueberry grower should have their blueberry soils tested for pH. If soil pH is not within the 4.5-4.8 range, this should be adjusted immediately. If the pH is higher, sulfur is added. If the pH is lower, lime is added. The amount of sulfur or lime depends on your pH and I would have the pH tested in the spring and fall until the proper range is attained. Thereafter, fall pH tests are best because adjustments can be made then and the pH will be correct by bud break in the spring. Second, this year's N-P-K application should be made according to the timing

above, but realize that the amount, 600 lbs/Acre of 10-10-10 on a mature planting is largely a guess until we take leaf samples in July. After that we can make recommendations based upon the leaf analysis. Note: this can only happen if the soil pH is correct or we must continue to guess on the recommendations. Lastly, these changes are needed because even though the samples we took last year were from growers who are some of the best blueberry growers in the world, 70% of the plants were deficient in Nitrogen, and 97% were deficient in one of the micro-nutrients. Nutrient deficiencies cause decreased yield, lower fruit quality, increased disease problems and plant mortality. We need to make these changes as soon as possible. (***Source**: The Blueberry Bulletin, Vol. 22, No. 2, April 10, 2006*)

Blueberry Insects

Cesar Rodriguez-Saona and Dean Polk, Rutgers University

In this issue, we are making available two tables: One table provides the "Economically-important activity periods of arthropod pests". This table is intended to offer New Jersey blueberry growers with a phenology-based calendar on the occurrence of the key arthropod pests. The table includes the periods where scouting of each pest is most important (gray bars) and where management of each pest is most important (black bars). In addition, we present a table that provides New Jersey blueberry growers a list of new reduced-risk insecticides to be used to replace the conventional broad-spectrum insecticides for the control of key arthropod pests.

The key arthropod pests of concern early in the season in blueberry New Jersey farms are cranberry weevil, thrips, and leafrollers/spanworms.

Cranberry Weevil. Cranberry weevil adults and feeding damage to blossoms have already been observed in several blueberry farms. Adult weevil feeding damage can be distinguished by the presence of tiny holes in unopened blossoms and leaf buds.

Life cycle: Adults move from wooded areas, where they overwinter, into the fields; however, adults occasionally overwinter inside blueberry fields if left unmanaged. The adults are small (1/16 inch long), dark reddish brown beetles, with few whitish bands on the wings, and a long snout. Eggs are laid singly through the feeding holes into the flower. Larvae feed from egg hatch to pupation within the flower buds in which they were deposited as eggs. Pupation occurs within the infested flowers and adults emerge in late May. Infested flowers turn purplish, fail to open, and eventually fall to the ground.

Scouting and Control: Because weevils are abundant near the woods where they overwinter, sampling for weevils should be intensified along the edge rows near the woods. Spraying should be confined to these "hot" spots on edge rows. Treatment thresholds are 5 weevils per bush or 20% of blossom clusters with feeding injury (i.e., at least 1 injury/puncture per 5 clusters). To monitor adults, use a beating tray under each bush and hit the bush to dislodge weevils; repeat on both sides of the bush to obtain number of weevils per bush. Adults are found on sunny days. Monitor at least 10 bushes per sample site. Asana XL 6-8 fl oz per acre is recommended for cranberry weevil control.

As of this date, about 1/3 of all fields in the IPM program have weevil numbers above treatment threshold. Keep in mind that for the most part this means the field edges or about the first 10 rows. Adults are more active in warm weather, and are most easily seen feeding during sunny days. When weather turns colder the adults find shelter, either deeper in the buds, in bark crevices, or in the crown. Experience has shown that for the most part, once the beetles move into a field in the spring, they tend to stay there until they leave shortly after bloom, or until they are killed by spray material. Therefore when beating tray samples are taken, very little difference is seen on warm days vs. cooler days.

Blueberry Thrips. Thrips are very difficult to see with a naked eye because of their small size. They can readily be seen with the aid of a magnifying glass.

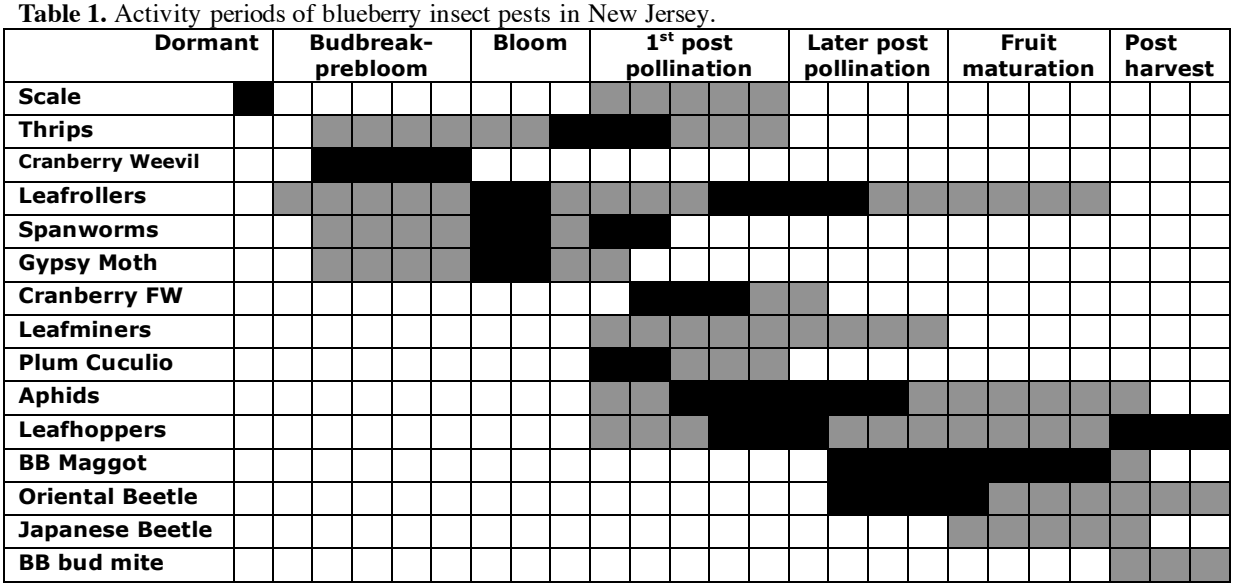
Life cycle: We do not know much about the life cycle and type of damage caused by blueberry thrips in New Jersey. Experiments are underway at the Rutgers Blueberry/Cranberry Research Center to fulfill these gaps in our knowledge. In general, thrips overwinter as adults in the soil. Adults feed on tender new plant material where they lay their eggs. Thrips feeding often cause curling in newly opened leaves. Flower thrips, such as those present in blueberries, may also cause flower buds to develop abnormally.

Scouting and Control: White sticky traps and beating trays are used to monitor thrips. SpinTor 2SC is the only insecticide recommended for managing thrips during bloom. SpinTor "is toxic to bees exposed to treatment for 3 hours following treatment," so applications should be made late in the evening (dusk), when most bees are not foraging. SpinTor should be applied at 4-6 fl oz per acre for thrips control.

Leafrollers/Spanworms. *Scouting and Control*: In the past 2-3 weeks, pheromone traps have already been capturing male redbanded leafrollers. High trap captures, however, do not mean that treatment is necessary. The combined threshold for leafrollers/spanworms is 1 larva per 100

clusters. Spanworm larvae are being found on several farms, but at very low levels. One farm has reported spanworm injury to buds. If application is needed during bee activity, Confirm 2F, SpinTor 2SC, and Bt insecticides are recommended. See restriction on SpinTor indicated above. (***Source**: The Blueberry Bulletin, Vol. 22, No. 2, April 10, 2006*)

Table 1. Activity periods of blueberry insect pests in New Jersey.



Grey bars show periods when scouting of the pest is most important.
Black bars show periods when management of the pest is most important.

Table 2. Recommendations of OP alternatives and reduced-risk insect management practices for blueberries.

Timing	Target Pest	Grower Standard	OP alternative/reduced-risk instcticides
Budbreak-Prebloom	Cranberry weevil	Asana	Asana
	Thrips	SpinTor	SpinTor
	Leafrollers	Lannate	Confirm, SpinTor or B.t.
Bloom	Leafrollers, Spanworms	B.t or SpinTor (dusk only)	B.t. or SpinTor (dusk)
	Thrips	SpinTor (dusk)	SpinTor (dusk)
Post-pollination	Cranberry fruitworm	Diazinon, Guthion, Lannate	Confirm, SpinTor, or Esteem
	Leafrollers, Leafminers	Diazinon, Guthion, Lannate	Confirm or SpinTor
	Plum curculio	Diazinon or Guthion	
	Aphids, Leafrollers	Lannate or Provado	Provado or Actara
	Thrips	Provado or SpinTor	Provado or SpinTor
Fruit maturation	Blueberry maggot	Malathion, Imidan, Sevin, or Lannate	SpinTor or Provado
	Japanese Beetle	Sevin	Provado
	Oriental Beetle	Admire	Admire
Post harvest	Blueberry maggot	Malathion, Imidan, or Lannate	SpinTor or Provado
	Leafhoppers	Malathion, Imidan, or Lannate	SpinTor or Provado
	Oriental Beetle	Admire	Admire

GRAPE

Management of Grape Insect and Mite Pests – 2006
Part I

Greg English-Loeb, Cornell University

The 2005 growing season, with warm temperatures and dry conditions, was ideal for insects and mites. Fortunately, though, insect and mite pests were not particularly problematic for area vineyards. Why? Part of the reason may be that it takes a couple of favorable years in a row to allow populations to build up. Remember that some of our worse problems with grape berry moth occurred following several years of warm growing seasons coupled with mild winters in 2000-2002. Given this winter was fairly mild, we should be on guard for significant populations of some pests if we have a growing season like last year. The spring and early summer conditions are especially important for some of our insect pests that can produce several generations during the growing season (grape berry moth, leafhoppers). When we have wet and cool temperatures in the spring, these insects get off to a slow start and they may never quite recover, even when temperatures turn above average in August and September. Conversely, when we have above average temperatures in May and June, the potential for leafhoppers and berry moth to get an extra generation in increases which leads to higher populations.

In preparation for the 2006 growing season, in this article I review the major arthropod pests of grapes, providing a brief summary of their biology and the damage they cause, including any new information that is available, and then a discussion of control options. The material I present is based on the work of many people at Cornell and elsewhere. I would like to especially acknowledge the contributions of Rick Dunst and Ted Taft and the rest of the crew at the Vineyard Lab at Fredonia, Tim Weigle of the NY IPM Program, Tim Martinson, Alice Wise, and Dan Gilrein from Cornell Cooperative Extension, Andy Musa from Penn State Cooperative Extension and Steve Hesler (my research support specialist here at Geneva), and Jan Nyrop (entomology faculty at Geneva).

Insecticide and Miticide News

I noted last year that a second pyrethoid (Capture 2EC, binfenthrin) has been labeled for use in grapes. Like the other pyrethroid, Danitol 2 EC (fenpropathrin), this is a broad-spectrum insecticide with activity against several important grape insect pests as well as spider mites. For unknown reasons, though, grape berry moth was not included on the original label. However, a new label has been approved that includes grape berry moth, eastern grape leafhopper, cutworms, Japanese beetle, and two-spotted spider mite (not European red mite which is more of a problem for our area). Rates for Capture 2 EC range from 3.2 to 6.4 fl. oz./A. Keep in mind that you may not use more than 6.4 fl. oz./A during a single season. The days to harvest for Caputre 2 EC is 30 days while it is 21 days for Danitol 2 EC. For 2006 there is a third synthetic pyrethroid that has been approved for use by EPA for use on grapes, Bathroid 2 (cyfluthrin). It has not yet received approval in NY, however. Advantages of these synthetic pyrethroids include broad-spectrum activity, relatively low mammalian toxicity and low cost. The major disadvantage is that they tend to be hard on beneficial insects and mites. One concern I have about the extensive use of these broad-spectrum products is that spider mites may develop resistance. Predatory mites, that generally do a good job of keeping spider mites under control, are very sensitive to pyrethroids.

The neonicotinoid imidacloprid can be applied as a foliar application (Provado) or as a soil treatment (Admire). Admire acts systemically while Provado does not. Up until recently only the foliar material was labeled for grapes. However, two formulations of Admire (Admire 2 and Admire Pro) are now labeled for grapes, although their usefulness in our area is limited by the fact that they work best when applied through an irrigation (drip) system. The two products mainly differ in concentration (21% active verses 42%) but generally control or suppress the same spectrum of pests (leafhoppers, mealybugs, and phylloxera). The pre harvest interval (PHI) for Admire 2 and Admire Pro is 30 days and there are limitations on the amount applied during the season (32 fl. oz. and 14 fl. oz., respectively). Note also that all the formulations of imidacloprid are now classified as restricted use in New York, which means their application is limited to persons who are certified applicators. In addition to imidacloprid there two other neonicotinoids labeled for use on grapes, Assail (acetamiprid) and Venom (dinotefuran). Assail has been labeled for use on grapes for several years now. However, the formulation of this product has changed from WSP (water soluble packet) to SG (soluble granule). Assail is not a restricted use insecticide. Venom (dinotefuran) obtained its EPA label in 2006 but has not yet received a NYS label. Assail and Venom, like imidacloprid, are particularly effective against sucking insects such as leafhoppers.

Some regulatory changes for use of Imidan (phosmet) are currently in the works. Imidan is an organophosphate insecticide and one the more effective materials for controlling grape berry moth as well as a number of other

grape pests. As an organophospahte, it has been under review by EPA as part of the Food Quality Protection Act, assessing both benefits and risks of current use practices. As a result of this review, EPA is changing the re-entry interval (REI) from 24 hours to 14 days for Imidan, starting with product being sold in July. This is quite a long REI and likely to affect use of this material in grapes. Interestingly, REI for Imidan use on some other crops (e.g. blueberries) is not going to change principally because blueberry growers were quite vocal about its benefits. Gowan and the EPA have plans to meet sometime this fall to discuss the implications of this label change for grapes, perhaps opening the door for a re-evaluation depending on whether EPA learns of serious concerns from grape growers.

We have had several new miticides labeled for use on grapes over the past couple of years including Agri-mek and ABBA (abamectin), Acarmite (bifenazate), and Nextar (pyridaben). This past year another miticide received an EPA label for grapes (Zeal, etoxazole) as well as a supplemental label for use in NY. Note, that Zeal Miticide currently only has two-spotted spider mite on the label (same is true for abamectin), although Valent is pursuing a 2 ee exemption for use against European red mite in NY (stay tuned). To make things a bit more confusing, Valent is changing the formulation of Zeal (granular) to wettable powder (it is called Zeal Miticide1). There should be a supplemental label for Zeal Miticide1 for use on grapes and we are currently checking to make sure this will be the case for New York. In other miticide news, Dupont is in the process of getting their miticide Savey DF (hexythiazox) labeled for use on grapes. Savey is specific to the egg and small instar mite stages

Finally, Dupont Company will likely obtain a federal label for use of the insecticide Avaunt [indoxicarb] on grapes this year. Avaunt is in a new chemical class of insecticide and shows fairly broad-spectrum activity against sucking insects and lepidoptera. It is fairly easy on beneficials, however. In our trials Avaunt has provided good control of grape leafhopper and grape berry moth. Use of Avaunt in New York for grapes will depend on the outcome of a review by the DEC, but this is not expected for the 2006 growing season.

Review of Key Arthropod Pests

There are over 20 insect and mite pests that attack grapes in New York, although many of these are rarely abundant enough to be of economic concern. In this review I will focus on the key grape pests that have a moderate to large pest potential. I will briefly go over basic biology and symptoms of damage and then discuss some of the control options available. More details can be found in the New York and Pennsylvania Pest Management Guidelines for Grapes: 2006 now available in print from your Regional Grape Program or on line [http://ipmguidelines.org/grapes/]. I will present these pests in the order they tend to show up in the vineyard during the season (budbreak, pre bloom, post bloom, and mid-season). As a caveat before proceeding, note that an important distinction exists between control of diseases and arthropods. Because of the small size of plant pathogens and their capacity to increase rapidly under suitable growing conditions, you often need to make chemical control decisions well before obvious symptoms are visible. Related to this, most of the fungicides act to protect foliage or fruit before infection rather than eradicate the disease. Arthropods, on the other hand, are generally detectable in the field before they cause economic injury and insecticides and miticides mostly work as eradicants. Hence, for arthropods its possible, and generally advisable, to monitor pest densities and only apply control measures when economically justified.

BUDSWELL TO BLOOM

Grape Cane Borer. In the fall the adults of this beetle bore tunnels into live 1 and 2 year old canes to create a place to spend the winter. Although this damage doesn't generally kill canes, they may be weakened and break during the growing season. In addition, initial experimental results indicate tunnels may reduce yield on a cane. In many cases damaged canes can be removed at pruning, although this adds time to the process. The larva of grape cane borer (GCB) develops in dead wood and does not cause economic damage. However, since larvae grow into adults it makes sense to try and limit reproduction. Because of the severe winters the last few years there may be a fair amount of dead wood in the grape canopy, on the vineyard floor, or in burn piles. These are all good food sources for GCB larvae. My sense is that destroying as much of this dead wood as possible before larvae have a chance to mature (end of July) would help reduce GCB adult populations in the fall, although we do not have a lot of data yet to back this up. Adults become active in the spring as temperatures warm up, especially evening temperatures, and sap begins to flow (probably as early as budswell). Egg laying gets started about budbreak and continues well into June. Our current approach to controlling GCB is to target an insecticide (Imidan 70W is the only material labeled right now) against the spring adults in order to reduce reproduction and overall population levels. In a trial conducted two years ago in the Finger Lakes we found that three applications of Imidan 70W, starting at around budbreak and repeated about every 10 days, significantly reduced damage from adults in the fall. However, in 2005 three applications of Imidan were not very effective. We also tried a fall application of Imidan, targeted against the overwintering adults, but this also had little impact on damage in the late fall/winter. Hence, we are still searching for an effective chemical control option. We have also examined the influence of removing and destroying dead wood from the canopy and vineyard floor during the spring on damage in the fall and

found some evidence that this helps. However, the process was fairly labor intensive and therefore, expensive. This season we plan to assess whether thorough chopping of pruning material, raked into the row middles, will reduce damage.

Steely Beetle (grape flea beetle). These shiny black beetles overwinter as adults and become active as temperatures increase in the spring. They feed on swollen buds prior to budbreak with the potential of causing considerable damage under the right conditions; specifically when we get a prolonged swollen bud stage. Michigan grape growers have reported a fair amount of damage from steely beetle in 2006. Look for damage from steely beetle along the edges of the vineyard. Use about 2% bud damage as a threshold for treatment. Some hybrids with fruitfull secondary buds and that tend to overcrop can probably handle higher damage levels. Note that after budbreak, the adults do not cause additional injury. Later in the season the beetles lay eggs that hatch into larvae that do feed on grape leaves but this damage is not economically important. There are several effective, broad-spectrum, insecticides labeled for steely beetle in grapes including Sevin, Imidan, and Danitol.

Banded Grape Bug and Lygocoris Bug. As growers have reduced insecticides over the past 15 years we have observed more of these plant bugs in vineyards. Both species overwinter as eggs in grape canes, emerging as nymphs shortly after budbreak to 5 inch shoot growth. The banded grape bug (BGB) nymph is greenish to brown in color with black and white banded antennae. Nymphs of Lygocoris are pale green with thin antennae and about half the size of BGB. Nymphs of both species can cause economic damage by feeding on young clusters (buds, pedicel and rachis) prior to flowering. Adults, which appear close to bloom, do not cause economic damage and for at least one of the species (BGB), become predaceous. There is only one generation per season. Monitor for nymphs at about 5 inch shoot stage by examining flower buds on approximately 100 shoots along the edge and interior of vineyard blocks. These plant bugs are sporadic from year to year and from vineyard to vineyard; most vineyards will not require treatment. But if present at sufficient numbers (1 nymph per 10 shoots), they can cause significant yield reductions and hence it is worth the time to check. Pay particular attention to vineyard edges. There are several broad-spectrum insecticides labeled for use against plant bugs (Sevin, Imidan, Danitol).

Grape Plume Moth. This is another potential pest of grapes that overwinters as eggs in canes and emerges shortly after budbreak. Larvae typically web together young leaves or shoot tips and leaves to form a protective chamber from which they feed. Sometimes the flower buds get caught up in the webbing and get fed on and this is where the potential for damage occurs. Research indicates 1) that damage tends to be concentrated on the vineyard edge near woods and 2) that it takes quite a few plume moth larvae to cause economic damage. For Niagara grapes we were unable to detect a statistical effect on vines with 20% infested shoots compared to control vines where plume moth was killed with an insecticide. Nevertheless, the trend was for reduced yield associated with high plume moth infestations (>20%). For higher value cultivars a somewhat lower threshold would be appropriate. Treatment of plume moth can be tricky for several reasons. First, the larvae develop very quickly and often have reached the pupal stage before you even recognize there is a problem. Second, larvae inside their leaf shelters are protected from insecticides. For these reasons, its important to monitor and treat for plume moth early in the season (before 10 inch shoot stage) using sufficient water to achieve good coverage. Sevin, Danitol, and Dipel (Baccilis thuringiensis or Bt) are labeled for use against grape plume moth.

(CONTINUED NEXT ISSUE)

Errata: In the last issue of Berry Notes, there was an error in the table for fungicide efficacy. It listed Scala as providing excellent control for black rot. Scala does not provide control for black rot, but is excellent for controlling Botrytis. The corrected table should read like this:

Fungicide	Phomopsis	Bitter rot	Ripe rot	Macrophoma	Black rot	Botrytis
Qol [y]	++	+++	+++	++++	+++	++
Topsin	++	+++	+	+++	+	++
Captan	++++	+++	++++	++++	+	+
Vangard/Rovral						
Elevate/Endura	0	0	0	0	0	++++
DMI [z]	0	++++	0	++	++++	0
Copper	+	+?	+?	+?	+	0
Mancozeb	++++	++++	++++	++	++	0
Scala						++++

General Information

Pricing Your Products to Survive Rising Energy Costs

Wen-fei Uva, Cornell University

It should not be a surprise to any of us by now. Due to a variety of factors, natural gas and propane prices have risen considerably over the past few years. Moreover, today's natural gas markets exhibit extreme volatility that makes it difficult for businesses to rely on conventional wisdom and past experience to try to establish an effective energy management strategy. With the high energy needs of many types of agricultural production, producers are becoming increasingly alarmed by the situation. Adding to their concerns, natural gas and electricity prices are linked more closely to one another than ever before.

What is the impact of rising energy costs? Let's look at greenhouse operation, one of the most intensive agricultural production systems, as an example. According to an informal survey of greenhouse growers around New York State, the prices they are paying for natural gas and heating oil have increased 50 percent, and the price of electricity has increased around 20 percent over the last two years. Facing the increase, many greenhouse growers have adopted or are considering adopting one or more energy saving techniques such as reducing air leaks, installing an energy conserving blanket, double covering greenhouse walls, increasing space utilization, updating heating and cooling systems for better efficiency, conserving electricity, improving management, and switching to less energy demanding crops. Combining these techniques, growers can sometimes realize energy savings of 20 to 40 percent.

However, faced with higher and more volatile energy prices, is conservation alone enough to maintain profitability and sustain business growth? I would dare to say no. Moreover, although these energy conservation strategies are all good practices to consider for better management, many of the technologies also require additional capital investment. Further, increased energy prices do not just affect heating and electricity costs. They also affect other input costs such as greenhouse plastics, fertilizer, and pots; and commonly, growers have to pay higher delivery surcharges for purchases. Besides, the costs of delivering products to customers are also higher due to higher gasoline prices.

How did these all add up? According to the Cornell Greenhouse Business Summary project, in 2003 the heating cost among New York greenhouse operations averaged around 7 percent of sales, the average cost for electricity was around 2 percent of sales, and the average cost for gas for delivery trucks was around 0.7 percent of sales. Moreover, the average costs for fertilizer, packaging materials and other greenhouse maintenance and repair supplies amounted to another 7 percent of sales. Assuming that between 2003 and 2005 the greenhouse operation has not changed any production and management strategies, and during the same period the cost of natural gas and heating oil increased 50 percent, the price of electricity increased 20 percent, and costs for other related inputs and delivery increased 20 percent. Although it is not realistic, to simplify this analysis let's hold the percentages of all other costs stable during the same period. The greenhouse operation would have an increase of production costs of around 30 percent or 5.1 percent of sales. Assuming a greenhouse business has a profit margin of 15 percent in 2003, with these increases its profit margin would decrease 5.1 percent to 9.9 percent. (***Source**: New York Berry News, Vol. 5, No. 4, April 24, 2006*)

Upcoming Meetings

May 8, 2006, 6:30PM - How to Prevent Injuries on the Farm

Diane Fisher-Katz, M.S.,M.D.T., a physical therapist from the Valley Medical Group, will be demonstrating and discussing how to prevent back, knee, shoulder and other joint injuries. Location: CISA offices. Dinner provided. Please reserve your space by calling CISA at 413-665-7100 or emailing coordinator Therese Fitzsimmons at therese@buylocalfood.com. Registration preferred by May 3rd.

May 2006 UMass Fruit Twilight Meetings

Program for all meetings:

5:30 PM Orchard tour.

6:30 PM Speaking program will include updates of current cultural practices and integrated pest management approaches. Pesticide-license re-certification credit (2 hours) will be offered. Please be there on time to receive pesticide

credits. A $10/person ($20 maximum/orchard) registration fee will be charged (at the door) for all meetings. Light refreshments will be served.

May 9 Apex Orchard, 153 Peckville Road, Shelburne, MA

DIRECTIONS: I-91 to exit 26 (Greenfield); Route 2 east 3.3 miles to Peckville Road on right. Up Peckville Road approximately 0.7 miles. Orchard straddles Peckville Road. If these directions are not clear, call Wes Autio at 413-545-2963 or Jon Clements at 413-478-7219.

May 10 Smolak Farms (www.smolakfarms.com), 315 South Bradford Street, North Andover, MA

IN COOPERATION WITH NEW HAMPSHIRE FRUIT GROWERS' ASSOCIATION **NOTE**: Channel 5 Boston Meteorologist David Epstein will be our special guest speaker. Epstein has been a promoter of local, direct-market, pick-your-own orchards during his daily weather broadcast (particularly last fall) and will use his meteorological expertise to talk about "weather that matters" to fruit growers.

DIRECTIONS: Take Route 495 to Exit 43 (Mass. Ave. - North Andover). Turn right if coming from the South. Turn left if coming from the North. Follow for 2 miles straight through traffic lights to Old North Andover Center. After you pass the brick store on the right, bear left at the fire station. Follow for 1 mile to a yellow blinking light and turn left. Follow for 2 miles and the farm is on the left. (Look for SMOLAK FARMS signs.) If these directions are not clear, call Wes Autio at 413-545-2963; Jon Clements at 413-478-7219; or Smolak Farms at 978-682-6332.

May 11 C. N. Smith Farm Inc. (www.cnsmithfarminc.com), 325 South Street, East Bridgewater, MA

DIRECTIONS: I-495 to Exit 7, Route 24 north. Route 24 north to Exit 16, Route 106 east. Go 7.5 miles, turn right onto South Street at the YMCA. C. N. Smith Farm is 0.7 miles on the right. If these directions are not clear, call Wes Autio at 413-545-2963; Jon Clements at 413-478-7219; or C. N. Smith Farm at 508-378-2270.

July 27th, 6:00 PM - Second Annual Celebration of Women in Agriculture
Cheryl Rogowski, owner of W. Rogowski Farm in Pine Island, NY and MacArthur Foundation Genius Award recipient will speak. Dinner provided. Location: Whatley Town Hall. Please reserve your space by calling CISA at 413-665-7100 or emailing coordinator Therese Fitzsimmons at therese@buylocalfood.com. Registration preferred by July 24.

Massachusetts Berry Notes is a publication of the University of Massachusetts Extension Fruit Program which provides research based information on integrated management of soils, crops, pests and marketing on Massachusetts Farms. No product endorsements of products mentioned in this newsletter over like products are intended or implied.