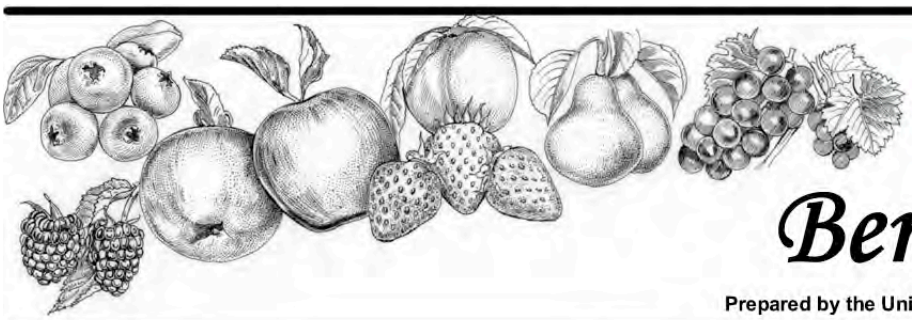

UMassAmherst EXTENSION

Berry Notes

Prepared by the University of Massachusetts Fruit Team

June 1, 2006 Vol. 18, No. 8

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

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Crop Conditions

IN THIS ISSUE:

Strawberries – row-covered fields have begun harvesting. Other fields are progressing toward harvest which may begin within 7-10 days. Clipper damage is past in most areas, but tarnished plant bug is still active. Two-spotted spider mite may also begin to build up as the temperatures increase. Also keep an eye out for strawberry sap beetle and slugs as fruit rilpens. ***Raspberries*** – summer bearers are in pre-bloom to bloom. Avoid insecticide applications during bloom. Be ready for fungicide applications to control botrytis gray mold during bloom. Also, scout for symptoms of orange rust. ***Blueberries*** – are past bloom in most areas. Continue to scout for signs of cranberry fruit worm. Fist sprays are guided by declining trap catches which are around the time of berrytouch. Get ready to set out traps for blueberry maggot. More on this next time. Winter Moth continues to threaten blueberries in some areas. Caterpillars are too large for B.t. products to be effective. See the Winter Moth fact sheet for control options. Blueberry Sawfly has been identified in Western Massachusetts on lowbush blueberries causing significant amounts of damage. To learn more about this pest, go to www.nsac.ns.ca/wildblue/facts/insects/sawfly.htm. ***Ribes*** – fruitset appears to be excellent. Watch for Imported Currant Worm and Currant Borers at this time. Also watch for powdery mildew infections. ***Grapes*** - are in pre-bloom but early varieties may reach bloom in some areas very soon. This is the most important stage for disease management in grapes. Grape berry moth has not yet been found in vineyard traps, but is expected to show up soon. Also scout vineyards for grape cane girdler, flea beetle larvae and European red mite at this time.

SARE Grower Grant Applications for 2007: Now is a good time to start thinking about ideas that might be suitable for the SARE Grower Grant program. Applications are not due until December 2006, but ideas take time to germinate and grow into good proposals. To help you begin thinking about potential projects, visit the SARE Grower Grant site at http://www.uvm.edu/~nesare/FGinfo.html. Contact me if you have an idea that you want to discuss.

ENVIRONMENTAL DATA

The following growing-degree-day (GDD) and precipitation data was collected for a one-week period, May 18, 2006 through May 24, 2006. Soil temperature and phenological indicators were observed on May 24, 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	60	194	58˚F	0.50"
Southeast	52	217	58˚F	0.49"
East	51	243	60˚F	0.50"
Central	40	171	45˚F	1.59"
Pioneer Valley	33	249	60˚F	0.91"
Berkshires	20	177	63˚F	1.39"
AVERAGE	46	208.5	57.3˚F	0.90"

n/a = information not available

(***Source**: UMass Extension 2006 Landscape Message #13, May 26, 2006*)

STRAWBERRY

Cool, Wet Weather Conducive to Angular Leaf Spot of Strawberries

Annemiek Schilder, Michigan State University

In the Midwest, angular leaf spot (also called bacterial blight) is the only reported strawberry disease caused by a bacterium, namely *Xanthomonas fragariae*. This bacterium has been hitchhiking around the United States on strawberry planting material, since it was first reported in Minnesota in 1960. Although the disease has not been a major problem, it can occasionally become serious. Economic damage is mainly due to blackening of berry stem caps, which mars the appearance of berries. However, severe leaf spotting can also result in premature leaf drop which may affect plant vigor and yield. Among strawberry cultivars, Allstar, Redchief, Glooscap, Kent, Lester and Lateglow are known to be fairly susceptible.

Typical symptoms of angular leaf spot are small, angular water-soaked spots on the lower leaf surface. Spots may coalesce resulting in larger lesions and necrotic areas. On the upper leaf surface, the lesions look like irregular reddish-brown spots and could easily be mistaken for scorch. It is important, therefore, to inspect both the upper and lower leaf surface. Angular leaf spot lesions are distinctly angular and translucent when the leaf is held up against the light, whereas scorch lesions are more rounded and not translucent. Under humid conditions, a shiny or slimy bacterial exudate can be seen on the lesions on the lower leaf surface. The exudate eventually dries out into a scaly, whitish film. Heavily infected leaves may die, especially if major veins are infected, and the infection may even become systemic. The pathogen can infect all plant parts, except berries and roots. However, berry stem cap infections can be serious, resulting in blackened caps and unattractive fruit.

The bacteria overwinter in old infected leaves and crowns. Primary infection of new growth in the spring occurs by rain or irrigation water splash. The bacteria enter plants through wounds or by actively swimming into natural plant openings (such as stomata, the plant's breathing pores) aided by dew, rain or irrigation water. Development of the disease is favored by moderate to low daytime temperatures (around 68ºF), low nighttime temperatures (near or below freezing), and high relative humidity. Long periods of leaf wetness due to heavy dew, irrigation, or prolonged rains also favor disease. Young, vigorous leaf tissues are more susceptible to the disease than older leaves.

Angular leaf spot can be managed by using clean planting material, adequate plant and row spacing, and removal of infected plant debris after harvest. If leaf spots are common during fruit development and the weather is conducive, there is a risk of berry stem cap infection. It is therefore important to protect the berry stem caps from infection by applying protective sprays. Copper products, such as Kocide and Cuprofix, applied on a regular basis are the most effective products for control, but care has to be taken to avoid phytotoxicity, which manifests itself by purplish discoloration on leaves. Adding lime as a safener is recommended, particularly since the cool, slow-drying conditions that promote the disease also promote copper uptake by the plant. (***Source**: Michigan Fruit Crop Advisory Team Alert Vol. 21, No. 7, May 23, 2006*)

Focus on Important Arthropod Pests of Strawberry

Greg English-Loeb, Cornell University

The field season is upon us and it is time to review the potential insect and mite pests that might show up in your strawberry planting. At any time during the season even a cursory look at your plants will reveal a number of different kinds of insects present; some of them will be potential pests, some beneficial, and the rest more or less harmless. It can be overwhelming to try to sort out the good guys from the bad. Hopefully this review will help focus in on the major threats to be on the watch for. Before getting into the specific pests, I have a few notes on changes in pesticide availability for strawberries.

Figure 1

Figure 2

There is a new miticide now labeled for use in strawberries, Zeal Miticide or a newer formulation called Zeal Miticide 1 (etoxazole). Zeal is predominantly toxic to the eggs and young immature mites. Hence, you need to use it a bit earlier during the population build up to achieve control before reaching an economic threshold. The current economic threshold is five mites per leaf or about 25% of leaves infested (see below for more information on spider mites). Zeal has a12 hour re-entry interval and one day to harvest restriction. Zeal will not control cyclamen mite.

In insecticide news, Entrust, the organic formulation of Spintor (spinosad), has a label for strawberries, specifically for use against leafrollers and thrips. Neither leafrollers nor thrips are typically serious issues in strawberries, however.

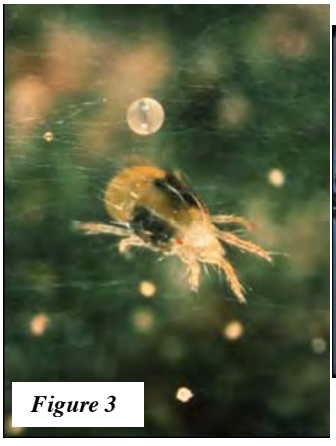

Figure 3

During the prebloom period the strawberry bud weevil (clipper) (Fig. 1) is the main arthropod pest to watch out for. As I write this on May 12, the Earliglow and Cavendish in my planting in Geneva, NY are at about 10% bloom and therefore, given a bit of heat, will be mostly past the vulnerable bud stage. By the time this article reaches you, your plantings may also have advanced enough to escape this potential pest. I emphasize potential pest since in recent years we have learned that many strawberry cultivars, such as Jewel and Seneca, can tolerate a fair amount of bud loss before showing yield reduction. However, at sufficient densities, clipper can still be a problem. As a rough rule of thumb, treat for clipper when you observe more than one clipped primary or secondary flower bud or more than 2 tertiary buds per truss, on more than one truss per foot of row or more than one injured truss per foot of row (see **Fig. 2** for example of clipped buds). Clipper often is a more severe problem along borders of plantings, near woods. When monitoring for clipper, check 2-foot sections of rows in five different areas and average the results. Lorsban [chlorpyrifos], Brigade [bifenthrin], and Danitol [fenpropathrin] are labeled for clipper in New York. These are all broad-spectrum materials that will kill beneficial insects so use only when necessary.

Also during the prebloom period (and extending through harvest and sometimes after renovation) two-spotted spider mite (**Fig. 3**) can be a problem in some plantings. Look for whitish or yellowish stippling on leaves (**Fig. 4**). When monitoring for spider mites, you should sample 60 leaflets from a cross section of the planting and inspect for mites.

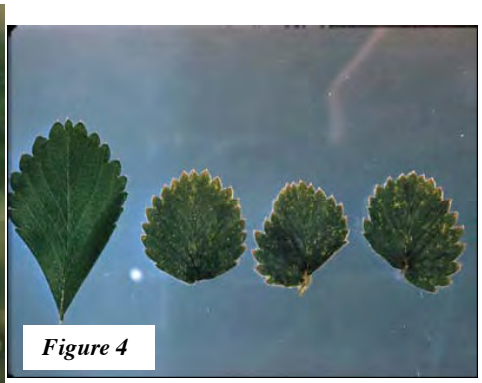

Figure 4

Current threshold is 5 mites per leaf or about 25% of leaflets have at least 1 mite. This is likely a conservative threshold for a healthy planting. There are several compounds labeled for mites on strawberries in New York: Kelthane [dicofol], Vendex [hexakis], Agri-mek [abamectin], Savey [hexthiazox], Zeal (etoxazole). Acramite (non bearing crops), Danitol [fenpropathrin] and Brigade. Agri-mek label calls for 2 applications, 2 weeks apart. For all these materials, coverage is very important, especially on the underside of leaves.

Figure 5

Figure 6

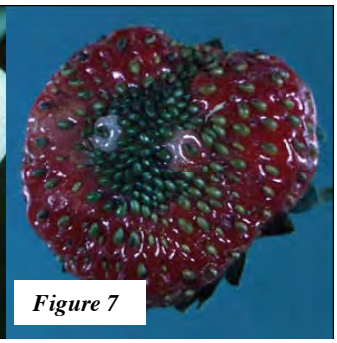

Figure 7

Tarnished plant bug (TPB) is the key insect pest of strawberries during bloom to near harvest. Both adult bugs (**Fig. 5**) and the nymphs **(Fig. 6)** cause injury **(deformed fruit, Fig. 7)** but nymphs are probably of the greatest concern for June-bearing cultivars in upstate NY. The economic threshold is half a nymph per flower cluster (you sample by tapping cluster over a white plate and counting nymphs that fall off; sample 3 clusters at five different sites in the planting). It is worth sampling for this pest on a regular basis since it varies in population size from place to place and from one year to the next. Indeed, populations of TPB seem particularly low in my plantings in Geneva this year. Spraying a pesticide when nymph counts are below threshold costs you money and can kill beneficial arthropods unnecessarily. Good weed management can help reduce problems with TPB.

Figure 8

Cyclamen mite is a potentially serious pest that seemed to show up in more fields than usual three years ago but was not very prevalent recently. The mites get active in the spring with populations peaking after bloom. The mites like to feed on young leaf tissue (just as the leaves are unfolding). The mites themselves are difficult to see without a good hand lens (**Fig. 8**). Examine the base of a young leaflet just as it begins to unfold. Cyclamen-damaged leaves tend to be stunted and crinkled (**Fig. 9**). Note that sometimes herbicide damage can resemble damage symptoms from cyclamen mite so it's important to confirm mites are present. Prior to bloom or after renovation are good times to treat for this pest. Kelthane and Thiodan [endosulfan] are labeled for use against cyclamen mites. Use lots of water for thorough coverage.

Figure 9

Spittlebug starts appearing on leaves, stems, and flowering racemes about bloom time and extending into harvest. They overwinter as eggs in the soil and hatch out as temperatures rise in the spring. The nymphs crawl up the plant and begin feeding on the xylem tissue (the water conducting vessels of the plant). There are not a lot of nutrients in xylem and therefore nymphs need to process a lot of sap, extracting the few nutrients out for their use and excreting the remaining water. This water is frothed into white spittle (**Fig. 10**), which helps protect the nymphs from desiccation and natural enemies. You can often find several nymphs within spittle mass. Feeding by spittlebugs, if extensive, can stunt plants and reduce berry size. Perhaps more importantly, the spittle masses are a nuisance to pickers. Threshold for spittlebug masses is 1 mass per foot row. Thiodan, Brigade, Danitol, and Provado are labeled for use against spittlebugs. Weedy fields tend to have more problems with spittlebugs.

Root weevil There are several species of weevils that can be pests of strawberry (in order of decreasing size: black vine weevil, rough strawberry weevil, and strawberry weevil). The adults (**Fig. 11**) are black in color with small indentations along their elytra (outer, hardened wing that covers the back of the beetle below the head region). The larvae (**Fig. 12**) feed on roots and crowns (**Fig. 13**) and when abundant can cause serious damage to plantings. Beds with heavy infestations show distinct patches or spots that appear stunted and have reduced yields (**Fig 14**). Drought stress aggravates the injury from larval feeding. Chemical control (Brigade) is targeted at the adults that emerge in mid- to late June. Look for characteristic adult feeding damage on leaves (notching from the edge) to help determine timing (**Fig 15**). The adults feed for a few days before starting to lay eggs. Some growers have also had success controlling root weevil larvae using parasitic nematodes. These can be applied either in the spring (late April and early May) and/or in the fall.

Figure 10

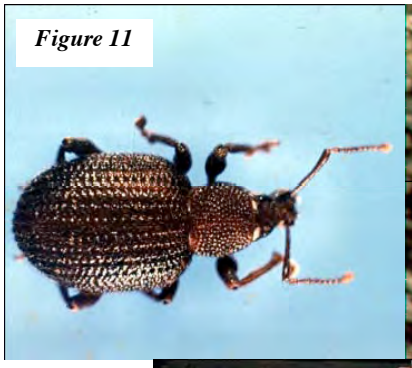

Figure 11

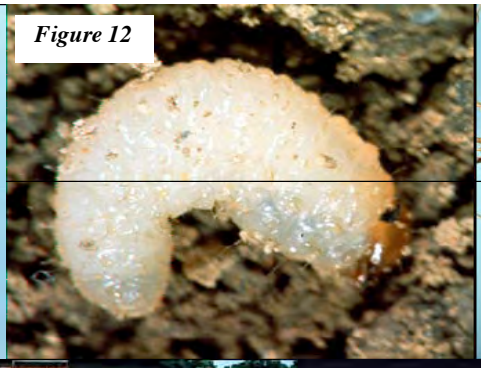

Figure 12

Figure 13

Figure 14

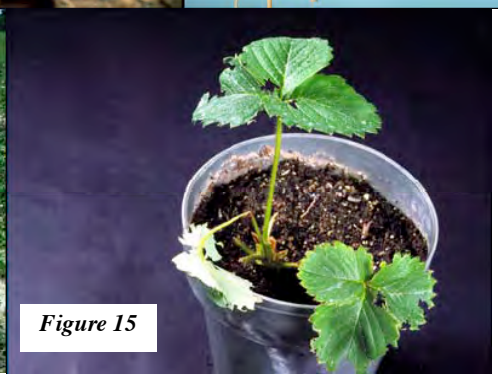

Figure 15

Use sufficient water to get good penetration. Rotation out of strawberries is the best remedy for root weevils. They are wingless and do not move a great distance. However, new plantings should be placed 50 meters or more from an infested planting.

Strawberry sap beetle (SSB). This small, brownish beetle (**Fig. 16**) seems to be increasing as a pest in New York strawberries. Both the adult beetles and the larvae (**Fig. 17**) feed on ripe and overripe fruit, although the larvae are particularly problematic since they contaminate the fruit. SSB overwinters as adults along the edge of woods or hedgerows, moving into strawberry fields as the fruit begins to ripen. The adults are quite secretive, spending time on the under side of fruit touching the ground and scampering away when disturbed. After completing development on the overripe fruit, the larvae drop into the soil to pupate, emerging as adults later in the summer. In July and August SSB moves to other fruit crops like raspberries, cherries, blueberries, peaches and melons. They are generally not considered serious pests on these alternative crops since they tend to restrict their activity to cull fruit on the ground, although melons are vulnerable since they sit on the ground and we have observed SSB up in the raspberry canopy feeding on fruit. We still are exploring the best ways to control SSB. The first line of defense is sanitation in the strawberry field and other fruit crops. The less overripe and damaged fruit left in the field the less opportunity there is for successful SSB reproduction.

However, keeping fields free of overripe fruit is difficult to achieve in practice, especially for U-pick operations. There

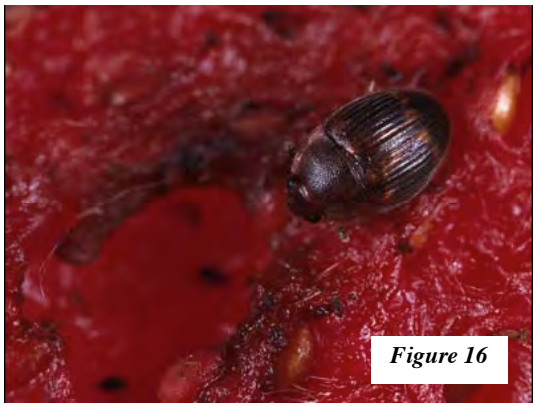

Figure 16

are two pyrethroids that are labeled in New York for SSB control: Danitol and Brigade. Note that Brigade does not have a preharvest interval while for Danitol it is 2 days. However, Brigade is more expensive. For both materials, good coverage is likely to be important for its control. Note that SSB probably does not move into strawberry fields in significant numbers until fruit begins to ripen. (***Source**: New York Berry News, Vol. 5, No. 5, May 24,2006*)

2006 NASGA Summer Tour August 22-23-24

Plan to join us for the 2006 Summer Tour, in Beautiful Maine. Hosted by Dr. David Handley, and the Maine Vegetable and Small Fruit Growers Association

The NASGA summer tour is a fabulous opportunity to meet other growers and get great new ideas. This 1.5 day tour features 8 stops which include research, production, blueberries, raspberries and of course strawberries. The third day is optional for those who wish to include some shopping as part of their trip.

Mark your calendars now! Thank you to David Handley for organizing this learning event.

NASGA Summer Tour 2006

Holiday Inn by the Sea, Portland, Maine

Tuesday, August 22 (begins at noon)

1 Highmoor Farm, Maine Agricultural Experiment Station, Monmouth
→*Tree fruit, vegetable & berry research trials*

2 David Pike's Farm To You, Farmington
→*Plasticulture, innovative equipment*

3 Stevenson' Strawberries, Livermore (ice cream snack)
→*Premiere PYO strawberry operation, matted row, trickle irrigation*

Wednesday August 23 (all day)

1 Dole's Orchard (Earl Bunting)
→ *PYO strawberry & raspberry operation, with nice stand and orchards*

2 Cherryfield Foods Wild Blueberries, Gray
→ *Wild blueberry fields and packing plant*

3 Arrive Gillespie Farms, New Gloucester
→ *Large strawberry & vegetable operation, wholesale market*

4 Chipman Farms, Poland Spring (lunch)
→ *PYO strawberries, entertainment farming*

5 Maxwell's Farm, Cape Elizabeth
→ *Historic coastal farm with PYO strawberries and retail stand*

6 Harbor/Dinner Cruises Portland harbor and serves lobster dinner

Thursday, August 24

Optional bus ride to Freeport, L.L. Bean & Outlet shopping on your own

See registration brochure or NASGA website for more information. Reserve your space on the bus now.

RASPBERRY

Raspberry -- Fruit Rot and Cane Botrytis

Sonia Schloemann, UMass Extension

The fungus *Botrytis cinerea*, causes blossom blight, preharvest rot, postharvest rot, and cane infections in raspberries. It overwinters on canes, in dead leaves and as mummified fruit. Spores are produced in spring and begin a new infection cycle. A moist, humid environment is ideal for spore production and spread. All flower parts except sepals are very susceptible to infection by spores that land on flowers although these infections are latent; or dormant, until fruit ripens. In other words, no symptoms are visible at first. Because of this, growers must be aware of when their fields are in a susceptible growth stage and take measures to protect them

from infection during that time. Other plant parts, as mentioned above, are also susceptible to infection and can cause cane leaf blights.

Wet weather or a lot of overhead irrigation is also necessary for high levels of infection to occur. Therefore, air circulation within the canopy, especially in the fruit zone, is very important. This is accomplished through good pruning practices in the dormant season. If significant wetting periods occur during bloom, the likelihood of infection by Botrytis is very high, and control measures may be needed.

Symptoms: Rotted fruit, usually with tufts of gray fungus growing on surface. Pale brown lesions may appear on primocane leaves in mid- to late summer. Cane infections appear as tan to brown lesions often encompassing more than one node. These lesions can girdle the cane causing eventual cane collapse. Cane lesions exhibit typical concentric "watermark" patterns from fall through late winter.

Cultural control

1. Create an open plant canopy to promote optimal air circulation and drying conditions by using good pruning practices.

2. Avoid excessive nitrogen fertilization, which can promote excessive vegetative growth, and control weeds. These practices also improve air circulation, increase light penetration, and speed drying of plant surfaces after irrigation and rain.

3. Pick fruit in the coolest part of the day. Keep harvested fruit in shade while in the field, then move to cold storage as soon as possible.

4. Irrigate in early morning whenever possible so plants dry quickly. Switch from overhead to drip/trickle irrigation.

Chemical control Spray first at 5% bloom and then again 7 to 10 days later. More applications during the growing season aid control in wet weather. Thorough coverage and canopy penetration are essential.

Fungicide options are listed below (alphabetically, not in order of efficacy).

1. **Captan 80 WDG** at 2.5 lb/A. Do not apply within 3 days of harvest. 72-hr reentry.

2. **Elevate 50 WDG** at 1.5 lb/A. Do not use more than 6 lb/A/season. Can be used up to and including the day of harvest. 12-hr reentry.

3. **Pristine** at 18.5 to 23 oz/A. Do not use more than 2 consecutive applications or more than 4 times/year. Can be used day of harvest. 24-hr reentry.

4. **Rovral 4 Flowable** at 1 to 2 pint/A plus another fungicide with a different mode of activity. Can apply the day of harvest. Fungal pathogens have shown resistance to the action of Rovral when used exclusively. Alternate or tank-mix with other registered fungicides. Also limit to two applications per year. 24-hr reentry.

5. **Switch 62.5 WG** at 11 to 14 oz/A. May be used up to and including the day of harvest. Do not apply more than twice sequentially or use more than 56 oz/A/season. 12-hr reentry.

Raspberry Fruitworm

With the raspberry fruitworm, it is the worms or larvae that usually cause the most damage. However, the adult beetles are also capable of causing considerable injury to unopened buds and unfolding leaves and open flowers. The raspberry fruitworm prefers red and purple raspberries.

Symptoms

To the unsuspecting, the first evidence of a problem may be the presence of small yellowishwhite worms adhering to harvested fruit. However, there are actually numerous signs earlier in the season that can lead to detection. Infestations in early season are to be suspected if longitudinal holes in the foliage give leaves a tattered appearance. Such foliage injury is caused by adults (Figure 24) feeding on unfolding leaves, often skeletonizing them. As blossom buds appear, they are attacked by the adult beetles feeding on the inside. Numerous beetles may destroy the entire cluster of buds.

Fruitworms attack raspberry receptacles (Figure 25) and, at times, the carpels of the berry. In tunneling through the receptacles, the larvae cause extensive damage, often loosening berries to the extent that they may fall off. In some plantings, more than half of the berries are infested with larvae. With such heavy infestations, some of the wormy berries arrive at the market or processing plant with noticeable presence of worms, leading to rejection of fruit.

Seasonal History and Habits

Adult beetles emerge from the soil during late April and early May, about the time the first leaves of raspberries are beginning to unfold. They begin to feed along the midrib of partially folded leaves and are found on the midrib of young leaves. Beetles later seek protection between the blossom buds where they attack the soft tissues of the supporting pedicles. As buds begin to separate, the insects attack the blossom buds, making large entrance holes to feed on floral parts. The females deposit their eggs most commonly on swollen, unopened blossom buds. However, at times eggs may be laid inside buds or on developing fruit. The grayishwhite eggs (about 1 mm [1/25- inch] long) hatch after a few days, and the larvae commonly bore through the bud and enter the receptacle where they begin to tunnel. As the larvae increase in size, the tunnels are made larger, ultimately becoming grooves in the receptacle adjacent to

the berry. When infested fruit is picked, the larvae may become displaced and remain attached to the cuplike interior and thus are transferred to the harvesting basket. Those that remain on the receptacle soon drop to the ground where they pupate and remain over winter.

Description

The fully grown worm is slender, 5.75 to 6 mm (1/4 inch) in length, 0.53 mm (1/50 inch) wide, nearly cylindrical, tapering towards either end. Each segment has two transverse rows of sparse, lightcolored stiff hairs.

Control

It is helpful to maintain good weed control. Time chemical control applications to when fruiting buds first form and just before blossoms open. SpinTor, carbaryl, malathion and Pyrellin may be recommended. (***Source**: Brambles - Production Management and Marketing, Bulletin 782-99*)

BLUEBERRY

Bloom is a Good Time to Start Control of Fruit Rots in Blueberries

Annemiek Schilder, Michigan State University

Fungal fruit rots, especially anthracnose caused by Colletotrichum acutatum, continue to be of economic concern in blueberries. Losses can occur before as well as after harvest. The cultivars Jersey, Bluecrop, Rubel and Blueray are very susceptible to anthracnose fruit rot, whereas Elliott is quite resistant. Alternaria fruit rot is sometimes found on Bluecrop berries before harvest and affects most varieties after harvest. Botrytis fruit rot is not as common in Michigan, but may be a problem in years when cool, wet weather prevails during the flowering and fruit development period. These rots can be distinguished to some extent with the naked eye: anthracnose is characterized by wet, pink to orange spore masses; Alternaria fruit rot by a dark green velvety mold and Botrytis by fluffy, tan to gray fuzzy mold on the berry surface. See the blueberry web site (www.blueberries.msu.edu) for pictures of symptoms.

The anthracnose fungus overwinters in dead fruiting twigs, but has also been found to overwinter in live, dormant buds. The infected buds typically die in the spring and support sporulation of the fungus. A twig blight, which is difficult to distinguish from Phomopsis twig blight, can also result from bud infection. With anthracnose there are two important periods when the infection risk is high because of peak spore release:

1) From pre-bloom to about pea-size berry (due to overwintering inoculum), and

2) From first blue fruit until the end of harvest (due to sporulating berries that infect surrounding berries). Fungicide spray programs should focus on these periods.

There are several fungicide options for control of blueberry fruit rots. The strobilurin fungicides **Abound** (azoxystrobin), **Cabrio** (pyraclostrobin) and **Pristine** (pyraclostrobin + boscalid) are excellent for controlling anthracnose fruit rot. They are (locally) systemic and considered "reduced risk." Since Pristine has two active ingredients, it tends to have a broader spectrum of activity than Abound and Cabrio. However, at the rates recommended for blueberries, Pristine is rather expensive. Applications can also be made between harvests, since the pre-harvest interval is 0 days.

Switch (cyprodinil and fludioxonil) is a systemic fungicide with a unique mode of action. Switch has activity against anthracnose, Alternaria fruit rot and Botrytis fruit rot and would be a great option if you are trying to control multiple fruit rots at once.

Elevate (fenhexamid) is primarily a Botryticide with suppressive activity against mummy berry.

Captevate (a pre-mix of Elevate and Captan) has efficacy against anthracnose also.

(***Source**: Michigan Fruit Crop Advisory Team Alert Vol. 21, No. 7, May 23, 2006*)

Preparing for Fruitworm Management in Blueberries

Rufus Isaacs and John Wise, Michigan State University

In the past week, monitoring traps in commercial blueberry farms in Van Buren County have caught their first cranberry fruitworm (CBFW), but only single moths have been seen in a few traps. Cherry fruitworm (CFW) moths have been trapped for a few weeks in the same region, but also at very low numbers (one or two moths per traps per week). These first captures indicate the flights of these important early-season insects are just beginning, but this is a little too early and the number of moths is too low to warrant any insecticide sprays in response. We have another series of cool, wet days ahead with predicted night-time lows in the 40s through the coming weekend. Under these conditions, temperature-based development of insects is slowed and moths are unlikely to fly when it is cold, windy and wet. This means that mating and egg-laying are also unlikely.

Monitoring traps should be checked again this week and again when it warms up next week. We should then expect the rest of the CBFW and CFW flights to start. Once a consistently increasing number of moths of either species are being caught in monitoring traps and early varieties are entering the susceptible stage when blooms start dropping and fruit set begins, these fields should be considered for protection against fruitworm larvae. Monitoring for the presence of fruitworm eggs on fruit can be used to better indicate the time when fruit protection is needed, though these are small and difficult to see.

Growers typically can manage both fruitworm pests together, but in recent years when there has been a cool period during blueberry bloom, the timing of CBFW and CFW have not overlapped. Instead, the earlier cherry fruitworm went unnoticed and the larvae were already inside fruit when CBFW control programs started. Monitoring for both insects in hotspots on the farm is a good idea, as insurance against missing one of these early pests. This is particularly important in early varieties where it is most likely that the fruit will be picked when CFW larvae are still developing inside the fruit.

There is an array of insecticides available for control of fruitworms, but their performance characteristics are not all the same, and only some of them can be used during bloom. During bloom, options for control are limited due to the need to protect bees. Two products registered for use during bloom and/or in the presence of pollinators have provided consistent control of fruitworms in trials at the Trevor Nichols Research Complex and at grower fields. These are the *B.t.* products (such as Dipel ® and Javelin ®) and the insect growth regulator Confirm ®. These products must be actively eaten by the larva to be effective, so they are best applied when daily temperatures are likely to reach 70 °F. This may be difficult during the predicted weather this year, so take note of this limitation when selecting when to use these products. *B.t.* products have short residual activity, providing up to five days active residue depending on the weather conditions. Confirm is more resistant to breakdown, giving between seven and 14 days activity, and it is quite rainfast, which can be a useful property in Michigan spring weather. These products are most effective when applied on top of fruitworm eggs (see table), before larvae hatch, so they are eaten as the larvae emerge from the egg. Another option for control of cranberry fruitworm is the growth regulator Esteem ®. This insecticide disrupts the adult moth's ability to make eggs and disrupts hatching of eggs and molting of larvae and is most effective when applied just before egg-laying. When thinking about application timing during bloom, getting the most out of your insecticides will require close scouting of fields with high fruitworm pressure. As with all fruitworm control applications, excellent coverage of fruit clusters is required to ensure that eggs and/or larvae come in contact with the insecticide.

After bloom, the range of options for fruitworm control increases with Guthion ®, Imidan ®, Asana ® and Sevin ® being the most effective of the broad-spectrum insecticide options. With all these products, maintaining good coverage is still important to get residue to the parts of the berry where fruitworms are found. Recent research trials in Michigan have demonstrated that Confirm ® and SpinTor TMapplied after bloom to fields with low or moderate fruitworm pressure can also achieve control of fruitworms with minimal negative impact on natural enemies such as parasitic wasps, ladybeetles and lacewings.

Correct timing and coverage are critically important, so regular scouting of fields, use of sufficient spray volume to get good fruit coverage and selecting appropriate spreader-stickers can increase activity of most insecticides applied for fruitworm control.

The accompanying table and figure are designed to summarize several key factors that can help you select an insecticide for your Integrated Pest Management program. **(view image)**

Details of insecticide options and timing for fruitworm control in blueberry

Compound Trade Name	Chemical Class	Life-stage Activity	Optimal Spray Timing	Pollinator/Parasitoid Toxicity rating *
Guthion/Imidan	Organophosphate	Eggs, Larvae, Adults	100% Petal Fall	H
Lannate/Sevin	Carbamate	Eggs, Larvae, Adults	100% Petal Fall	H
Asana	Pyrethroid	Eggs, Larvae, Adults	100% Petal Fall	H
SpinTor/Entrust	Naturalyte	Eggs, Larvae	Early fruit set over/under eggs	M
Dipel	*B.t.*	Larvae	Early fruit set over eggs	S
Confirm	Growth regulator (MAC)	Eggs, Larvae	Early fruit set over eggs	S
Esteem	Growth regulator (juvenoid)	Eggs, Larvae	Early fruit set under eggs	S

** Pollinator/Parasitoid Toxicity rating; S – relatively safe, M – moderate toxicity, H – Highly Toxic.*

(***Source**: Michigan Fruit Crop Advisory Team Alert Vol. 21, No. 6, May 16, 2006*)

GRAPE

Shoot Thinning in Grapes

Bruce Bordelon, Purdue University

Annual pruning of grapes is necessary to balance the amount of fruit production with the amount of vegetative growth to insure economic yields of high quality fruit. Pruning severity is based on the strategy of 'balanced pruning,' which dictates the correct number of buds to retain, or 'crop load,' which determines the number of clusters to retain. Both methods are based on the vine's pruning weight or 'vine size', which is an indication of the vine's capacity to ripen the crop. Many growers prune vines lightly during the early spring to assure adequate bud number following winter injury, and in case of damage by a late frost or freeze. Now that the danger of frost and freeze is (mostly) over (we hope) and grape shoots are growing rapidly, growers should go back through the vineyard and determine if crop load adjustment is needed. The crop load is adjusted by removing shoots and/or clusters. At this time, shoot thinning is the most important practice. New shoots are easily broken off by hand without the need for pruners. Growers should pay close attention to the fruitfulness of shoots. Shoots from primary buds have full fruiting potential, whereas secondary buds and latent buds on older wood produce shoots with little or no fruiting potential, depending on cultivar. Ordinarily, all secondary shoots and shoots from older wood should be removed. Shoots should be spaced evenly along the trellis if possible and at a density of about four to six shoots per foot of row. Cluster thinning (removing one or more of the clusters on each shoot) should be delayed until later. Timing depends on desired results. Cluster thinning done before bloom results in the least yield reduction because the remaining cluster(s) generally set more berries. This is desired for seedless table grapes. However, on most wine grapes, and especially tight clustered cultivars, cluster thinning after bloom can result in looser, less rot susceptible clusters. Keeping records of average cluster weights and vine yields can help determine the appropriate amount of fruit to retain now. (***Source**: Facts for Fancy Fruit, Vol. 06, No. 03, May 18, 2006*)

Long Island Vineyard Update

Alice Wise and Wayne Wilcox, Cornell University

Grape Berry Moth: If interested in mating disruption with pheromone ties, these should be going out in the vineyard now. This technology is most appropriate for > 5 acre blocks with low to moderate GBM pressure. Isomate-GBM Plus pheromone ties should continuously release pheromone the entire season; reapplication should not be necessary. A rate of 200 ties/A is recommended. Grower experience with pheromone ties has been mixed so if you plan to try them, give it a fair chance by following these recommendations. The difficulty with this product– for low to moderate pressure blocks, is it easier and more economical just to suffer low to moderate GBM damage or to hope a leafhopper treatment in late June also controls berry moth? A question only the vineyard manager can answer based on experience and intuition.

3M Sprayable Pheromone Mating Disruption for GBM is no longer being manufactured. There may still be product available. Entomologist Greg English-Loeb recommends 2 apps @ 2 week intervals per GBM generation. Sprays do not have to be directed at the cluster zone. Neither of these products is OMRI listed.

Powdery Mildew: A synopsis of information presented by pathologist Wayne Wilcox along with local observations. Powdery mildew has emerged as one of the more difficult fungal diseases to manage.

Most important points:

1) PM functions as a 'compound interest' type of disease. With favorable conditions, a few infections can become many in a short period of time. Days in the 80's and nights in the 60's-70's (i.e. all summer) are optimum. Temperature is the most important factor governing the rate of reproduction, with a new generation every 5-7 days under good conditions.

2) Relative humidity is not quite as important as temp; that said, 85% is the optimum (i.e. all summer). Vineyard sites with poor airflow and high RH are at higher risk for PM.

3) Berries are highly susceptible to infection for about a month after set. After that, they become highly resistant to immune.

4) Failure to control berry infections can lead to big problems with rot organisms.

Regarding overwintering inoculum:

1) Cluster infections, which often appear in the absence of canopy infections, do not contribute greatly to the pool of overwintering inoculum;

2) Infections that don't appear until very late season also do not contribute to overwintering inoculum. It takes cleistothecia (the overwintering structure) a month under fall temps to form; thus infections most of us see in October are not the end of the world.

Wayne Wilcox has been conducting a nifty set of experiments looking at the importance of shade in PM development. Read the details in his annual overview. The take home message from this work is that shaded areas of the vineyard, or even within a vine, are more susceptible to infection. More evidence for the importance of a well filled but not excessively dense canopy.

What to do about PM control for 2005? Quintec is strictly a protectant fungicide for PM only (no black rot or downy mildew control) and it has absolutely no postinfection or eradicant activities. Tank mix with sulfur for resistance management.

Pristine is a combination of a strobie (pyraclostrobin) and a second unrelated compound (boscalid). Pristine also provides good control of BR and DM (the strobie component contributes this). Additionally, Wilcox rates Pristine as good to very good for Botrytis control, though the higher rate is necessary (see annual overview for details). Endura is the boscalid only component for control of PM and Botrytis only. As long as the price is reasonable, Endura may be most useful for native growers because Pristine is known to cause injury to Concords.

Quintec and Pristine should be viewed as the 'big guns" for PM control. This means they should be used when vines are at their most susceptible, prebloom and early postbloom. Observe label restrictions on number of sprays per season. Do not use more than two consecutive sprays; rotate in a material with different chemistry after that. **Note**** Resistance is still a concern with Pristine and Quintec. Use them wisely, follow recommendations. Throwing a little sulfur in the tank when berries are most susceptible is cheap insurance.

The older strobies (Abound, Sovran, Flint) are still useful in some vineyards. Keep app's to 2 preferably nonconsecutive sprays, use a higher rate of material, stick to a 10 vs. a 14 day interval and make sure coverage is excellent and tank mix with sulfur. Do not use any of the strobies alone for PM control. Abound should still work for BR and DM plus it is a reduced risk material, so there are reasons for some growers to continue using it. Sidebar: the strobies don't do so well on Phomopsis, although inoculum levels and associated pressure for this disease typically dissipate after bloom. Sidebar no. 2: Research in Virginia indicates that there may be downy mildew resis tance to Abound. This reinforces the notion to keep app's per season to 2; rotate with other effective DM materials if the weather is conducive; and 3) scout your vineyards.

Other options – sulfur works well. Remember its limitations: short intervals and it washes off. The DMI's (sterol inhibitors such as Nova, Elite, Procure, Rubigan) still have some resistance issues as well. It is somewhat site specific but certainly keep your eyes open if using them. Apparently there was a report from France indicating that when tank mixed, sulfur reduced activity of the DMI's. Wilcox was skeptical about this but not 100% sure.

Contact materials are the final group. One advantage to most of these materials is that are considered organically acceptable. In order to use them effectively – think of coverage, coverage, coverage. Of JMS Stylet Oil (and new oil entry PureGreen), Kaligreen, Nutrol, Oxidate and Serenade, only JMS Stylet Oil has consistently provided good PM control. It too has its limitations – incompatibilities with other materials and a very real phytotoxicity risk if applied in temperatures >85F. It seems prudent to use Stylet Oil early season then after bloom only for PM clean up or perhaps for its miticidal effect. Local research done in 2003 at the research vineyard indicates that Stylet Oil is an excellent end of the season spray, providing long-term control of PM equivalent to sulfur. Sometimes winemakers like to minimize end of season sulfur sprays to avoid fermentation issues. In same research, two sprays of Stylet Oil, as has been shown in other studies, did depress Brix slightly. However, a single end of season Stylet Oil likely has minimal effect on fruit and is a good choice to prolong PM control into the harvest season. In 2005, Stylet Oil used season long provided excellent PM control, better than a sulfur based program, but again did depress Brix slightly. We are evaluating treatment wines to judge if other components were affected. This season again, we will be evaluating a season long Stylet Oil schedule and its effects, if any, on fruit quality. (***Source**: Long Island Fruit & Vegetable Update, May 26, 2006*)

General Information

Good Article on 'new chemistry' Insecticides

Jon Clements, UMass

The most recent issue of Maine's "Apple Pest Report" by Glen Koehler mentioned an excellent article by our own **Bob Childs** titled "New Products and How they Work." Products being insecticides (mostly). Although Childs deals with the nursery and landscape industry, as Glen points out " The article is written for ornamental plant

pest managers, so some of the brand names are unique to that market. But the same materials are registered for apples: e.g. acetamiprid = Assail, thiamethoxam = Actara." It's good reading if you have a chance and will help you better understand your insecticide options. The article is here:

http://www.umassgreeninfo.org/fact_sheets/ipmtools/insect_products_05.pdf

Haygrove Hosts Series of "Grower to Grower" Meetings

Haygrove Tunnels will co-host "Grower to Grower" meetings at farms in eleven US states and Ontario. The Canadian meeting is the big one, featuring 22 acres of Haygrove tunnels covering tomatoes, raspberries, strawberries - and a barbeque. The meetings are scheduled during the growing season, so growers can see for themselves just how much difference Haygroves make, and they start at 6 PM unless otherwise noted. (Call 519-426-3099 to register free *before* June 9 -- $20 late registration fee)

→	June 15	Hellers Orchard, Wapwallopen PA, cherries
→	June 18	Strawberry Tyme, Simcoe Ontario, tomatoes, **raspberries**, **strawberries** (2 PM)
→	July 6	Michigan State University, Clarksville MI, cherries (11:30 AM)
→	July 11	Schacht Farm, Canal Winchester OH, tomatoes, **strawberries**
→	July 14	Cedar Meadow Farm, Holtwood PA, tomatoes, **raspberries** (2:30 PM)
→	July 14	Riverview Produce, Leola PA, heirloom tomatoes, various trial crops
→	July 19	Penn State University, Rock Springs PA, PSU high tunnel day (all day) (No Haygroves -- poly trials, Haygrove's Luminance poly vs. others)
→	July 24	Kansas State University, trials of various crops
→	July 25	Four Corners Farm, South Newbury VT, **strawberries, raspberries**
→	July 25	Biver Farms, Edwardsville IL, tomatoes, **raspberries**
→	July 26	Michigan State University, SW Research Farm, Benton Harbor MI, numerous crops including tomatoes, **strawberries**, cherries, **raspberries**
→	July 27	Stuckwish Farms, Vallonia IN, tomatoes, specialty peppers
→	July 28	Elmwood Stock Farm, Georgetown KY, various crops
→	Aug 2	Peregrine Farm, Graham NC, heirloom tomatoes, cut flowers
→	Aug 3	Weyanoak Farms, Charles City VA, cut flowers, **strawberries**
→	Sept 7	Oyster Pond Farm, Orient NY (Long Island), **raspberries, strawberries**
→	Sept 12	Mutual Farm Mgnt., Traverse City MI, wine grapes, includes wine tasting
→	Oct 11	University of Kentucky, Lexington KY, colored peppers, tomatoes, **strawberries** (3PM)
→	Nov 8	Virginia Tech, SPAREC Blackstone VA, **strawberries** (9 AM)

Call 866-HAYGROVE for directions to the meetings.

Upcoming Meetings

June 2006 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.

June 6 Outlook Farm, 136 Main Road (Route 66), Westhampton, MA

DIRECTIONS: I-91 to exit 19 (Northampton); Route 9 west through Northampton village to Route 66 west. Continue app. 7.3 miles to Outlook Farm on the left. If these directions are not clear, call Wes Autio at 413-545-2963; Jon Clements at 413-478-7219; or Brad Morse at 413-529-9388.

June 7 Sunny Crest Orchards, 24 Hawkins Lane, Sterling, MA

DIRECTIONS: I-190 EXIT 6 toward STERLING / CLINTON (LEOMINSTER RD /MA-12 S). Turn LEFT onto CHOCKSETT RD. CHOCKSETT RD becomes MA-62. Turn RIGHT onto REDSTONE HILL RD. Turn LEFT onto HAWKINS LN. If these directions are not clear, call Wes Autio at 413-545-2963; Jon Clements at 413-478-7219; or Sunny Crest Orchards at 508-612-6627.

June 8 Young Family Farm, 242 West Main Road (Route 77), Little Compton, RI

!!! IN COOPERATION WITH RHODE ISLAND FRUIT GROWERS' ASSOCIATION !!!

DIRECTIONS: I-195 E toward CAPE COD (Crossing into MASSACHUSETTS). Merge onto MA-24 S via EXIT 8A toward TIVERTON R.I. / NEWPORT R.I. (Crossing into RHODE ISLAND). Take the FISH ROAD exit- EXIT 6. Turn SLIGHT LEFT to take the FISH ROAD ramp. Turn LEFT onto FISH RD. Turn RIGHT onto BULGARMARSH RD / RI-177. Turn LEFT onto RI-77 / MAIN RD. End at 242 W Main Rd (6.7 miles from RI-177). If these directions are not clear, call Heather Faubert at 401-874-2750; Jon Clements at 413-478-7219; or Tyler Young at 401-635-8864.

June 13, 2006, Vegetable and Fruit Twilight Meeting for Commercial Growers, UNH Cooperative Extension at Ledgewood Farm, Rt. 171 Moultonborough, NH. 5:00. Program includes Farm Overview, Season Extension and Pest Mgt for Vegetables and Strawberries, Vegetable Production and Pest Management in High Tunnels, and Sprayer Calibration Demonstration. Pesticide recertification credits available. For information and directions, contact Tina Savage at 603-539-3331 or at tina.savage@unh.edu.

June 17, 2006 Massachusetts Cultivated Blueberry Growers Association, 12 Noon. at Vandervalk Farm in Mendon MA. Bring your own chair and picnic lunch. Hosts will provide drinks and dessert. Oesco Inc. and Harris Irrigation will have an equipment display. Jim Moore will speak about the Southern Mass Ag Partnership (SEMAP), and a farm tour and Q&A session will be held. For directions call 508-473-7418.

June 30, 2006 High Tunnel Workshop, UNH Cooperative Extension at Woodman Farm in Durham, NH. 9:30 am – 4:00 pm. Cost $40. For information and directions, contact Cheryl Estabrooke at 603-862-3200.

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.

August 22-24, 2006 North American Strawberry Growers Association Summer Tour, Pourtland Maine. For more information visit, www.nasga.org.

Renewable Energy for Farms and Greenhouses - A Series of Twilight Meetings

Sponsored by The University of Massachusetts Extension Agriculture and Landscape Program, Community Involved in Sustaining Agriculture (CISA) and Donald Campbell Associates

We will be exploring renewable energy systems for farms and greenhouses this summer and fall through a series of twilight meetings. Plan to join us for one or all meetings to learn how alternative energy sources might fit into your business. These meetings will provide information on funding opportunities and feature vendors and experts with a wealth of knowledge and experience. For more information, including opportunities for sponsorship, or to pre-register, contact Tina Smith, Extension Floriculture Program, 413-545-5306, tsmith@umext.umass.edu or Ruth Hazzard, Extension Vegetable Program, 413-545-3696, rhazzard@umext.umass.edu.

Solar Energy
Wednesday, July 26, 2006
4:00 pm – 7:00 pm
Riverland Farm, Sunderland, MA
Host: Scott Reed

Riverland Farm grows 11 acres of organic vegetables and U-pick cut flowers on the banks of the Connecticut River in Sunderland, MA. This past winter, Riverland installed solar panels (photovoltaic modules, also known as PV) as an awning to generate solar electricity to power their coolers and farmstand, as well as to provide a dry, shady area for customers. Other local farmers will be present to discuss their use of PV to power remote water stations, electric fences and drip irrigation.

Additional Speakers:

Mike Kocsmiersky of Kosmo Solar installed the system and will share his expertise.

Bruce Howden, Howden Farm, Sheffield - Howden Farm currently uses a 1.1 kilowatt solar electric system to power drip irrigation for growing fruits and vegetables on their farm

Elizabeth Smith, Caretaker Farm - Caretaker Farm uses stand-alone solar power systems to pump water for their livestock and to supply power for electric fencing.

Don Campbell, Consultant, Donald Campbell Associates - Don will talk about the process of fitting a farm's needs to the types of renewable energy systems currently available including solar hot air systems to supplement heat for greenhouses.

Wind and Solar Energy
Thursday, September 7, 2006
3:00 PM – 6:00 PM
Lion Spring Farm, 236 Dedham, St. Dover, MA
Host: Bob Loebelenz

Lion Spring is a small diversified farm, now engaged in the breeding of Massachusetts Thoroughbred horses. The farm also grows vegetables and herbs for local gourmet restaurants and have a collection of chickens who supply farm fresh eggs for retail sales. On site there is a 4.8 kilowatt photovoltaic system and 3.1 kilowatt wind turbine all feeding a battery bank.

Additional Speakers:

Henry Dupont, Lorax Energy Systems on licensing and choosing turbines

Warren Leon, Renewable Energy Trust on state funded opportunities for renewable energy

Don Campbell, Consultant, Donald Campbell Associates

Don will talk about the process of fitting a farm's needs to the types of renewable energy systems currently available

Field Corn Biomass for Heating Greenhouses
Wednesday, October 4, 2006
3:00 PM – 6:00 PM
Kosinski Farm, Westfield, MA
Host: Mike Kosinski, Kosinski Farm

Kosinski Farm grows 140 acres of blueberries, apples, grain corn, vegetables and tobacco. Five greenhouses provide flower and vegetable plants for retail sales at their farm stand and use in the field. Blueberries, apples and butternut squash are major wholesale crops.

Mike began heating one greenhouse with his own corn three years ago and has been expanding his use of corn for heat each year. This year he is installing two larger stoves with automated auger stoking systems. Field corn fits well into his vegetable rotation. The corn is dried off-site and trucked back to the farm. His production costs are about $60-$65 per ton of corn, which is about one-third of the cost of heating oil ($2.45 per gal.) based on energy costs per BTU.

Additional Speakers:

Rob Rizzo, Mt. Wachusett Community College - Rob uses a variety of renewable energy sources including wood chips, wind and solar power and has reduced the energy costs at the college by 5%.

Bill Llewelyn, Five Point Farm, Northfield - Bill grows and sells corn for energy use. This season he harvested 1,000 tons of corn.

Christine Serrentino, From Field to Table - Christine will talk about the science and economics of burning corn.

Don Campbell, Consultant, Donald Campbell Associates - Don will talk about the process of fitting a farm's needs to the types of renewable energy systems currently available