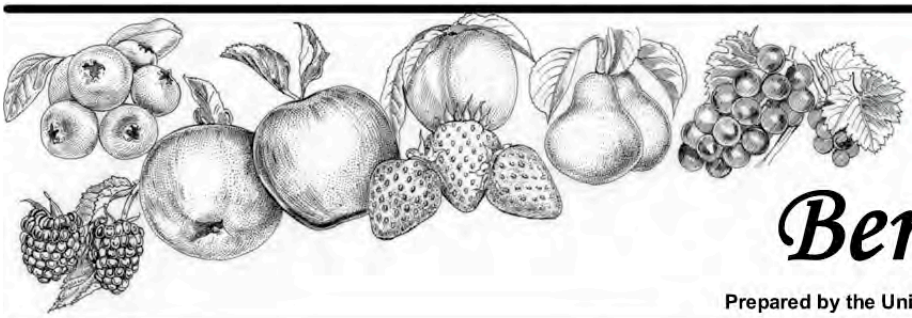

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Berry Notes

Prepared by the University of Massachusetts Fruit Team

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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:

Current Conditions:

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 temperatures increase. Also keep an eye out for strawberry sap beetle and slugs as fruit ripens. ***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 for this pest are guided by declining trap catches, which happens around the time of berry-touch. 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 2008: 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 2007, 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 24, 2007 through May 30, 2007. Soil temperature and phenological indicators were observed on or about May 30, 2007. Accumulated GDDs represent the heating units above a 50° F baseline temperature collected via our instruments from the beginning of the current calendar year. This information is intended for use as a guide for monitoring the developmental stages of pests in your location and planning management strategies accordingly.

Region/Location	2007 GROWING DEGREE DAYS		Soil Temp (°F at 4" depth)	Precipitation (1-Week Gain)
	1-Week Gain	Total accumulation for 2007		
Cape Cod	139	368	70˚F	0.01"
Southeast	131	386	75˚F	0.00"
East	139	442	65˚F	0.00"
Metro West	129	386	70˚F	0.00"
Central	125	336	55˚F	0.00"
Pioneer Valley	125	419	68˚F	0.00"
Berkshires	106	309	63˚F	0.01"
AVERAGE	128	378	67˚F	0.02"

n/a = information not available

(***Source**: UMass Extension 2007 Landscape Message #14, June 1, 2007*)

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*)

RASPBERRY

Precise Irrigation Could Boost Raspberry Health, Production

Laura McGinnis, USDA-ARS Beltsville

Where is the best place to water raspberries—from above ground or below? That's a persistent question for berry growers throughout the Pacific Northwest.

About 80 percent of the nation's raspberries are grown in California, Oregon and Washington, and irrigation methods tend to vary regionally. But are growers choosing the best watering methods to maximize their plants' growth, yield potential and general health? New research from Agricultural Research Service (ARS) scientists aims to answer that question.

Plant physiologist David Bryla and his colleagues in the ARS Horticultural Crops Research Unit, Corvallis, Ore., are examining two irrigation methods to evaluate how each affects raspberry plants' yield and susceptibility to root rot.

Improved irrigation methods could reduce the disease's frequency and severity, with major benefits for plant health and fruit production.

The scientists planted Meeker and Coho plants and watered them via overhead sprinklers or subsurface drips. They also applied varying amounts of water to different plants in order to observe the effects of over- and under-watering.

Results showed that the amount of water received affected berry yield more than the way the water was delivered. Neither irrigation method had a significant effect on yield. The sprinkler system produced more fruit-bearing canes, called floricanes, per plant and more berries per cane, but the berries were smaller, particularly on insufficiently irrigated plants.

In addition to producing larger fruit, drip irrigation considerably reduced the amount of water required. The scientists found no root rot in either cultivar.

It's worth noting that the study was conducted during the plants' first year of production, and that results may differ in older plants. Further testing will determine how mature plants respond to the same watering conditions. The scientists will also adjust the irrigation schedule, applying water more liberally before harvest, to more closely mirror a typical growing environment.

The results of this study could help raspberry growers throughout the Pacific Northwest make better informed management decisions to promote the health and productivity of their crops.

ARS is the chief in-house scientific research agency for the U.S. Department of Agriculture. (***Source**: New York Berry News, Vol. 6, No. 5, May 20007*)

BLUEBERRY

Blueberry Disease Update

Peter Oudemans, Rutgers University

This is the time of year that I expect **stem blight** to begin showing up. Symptoms include a rapid dieback of individual shoots. The leaves take on a very characteristic bronzed color. This disease is most common in Duke and the treatment is to prune out infected canes. Pruning of infected canes is critical to saving the bushes but can be a very frustrating experience because new dieback will continue to show up for several weeks. If the disease progresses into the crown it is likely that the plant will die or, at best, continue to grow but will be weak and a poor producer.

It is worthwhile at this time to remember there are several possible cane diseases other than stem blight. These are:

1. **Stem Canker**. This disease does not typically kill canes. It appears as a swollen area of the cane accompanied by vertical cracking. On older canes with well developed cankers you can expect a light crop. The best control for this disease is to prune out older canes in infected fields during the winter pruning. There are no chemical controls that have proven to be effective.

2. **Phomopsis canker**. This disease is most common in Elliott. Canes will dieback slowly and foliage will dry out but remain green.
3. **Other cankers**. There are a number of other canker diseases that occur as a result of wounding or inappropriate use of mulch. Uncomposted mulches can introduce pathogens into a field that would not normally be seen otherwise.

PEST/DISEASE/recommended material	WEEK OF MAY 28	WEEK OF JUNE 4
Plum Curculio Diazinon, Guthion, Imidan, high rates of pyrethroids	Scout clusters or use beating tray.	Continue scouting for egg scars.
Cranberry Fruitworm (CBFW) IGR's Esteem, Confirm – (early only), Spintor, Lannate, Diazinon, Imidan, Pyrethroids (Asana, Danitol), Guthion	1st sprays for high populations.	Additional treatments for high populations.
Aphids 1st choice: Provado, Actara 2nd choice: Diazinon, Lannate	Isolated fields if over 10% terminals infested. Consider materials also effective for CBFW.	Likely a primary target at this time.
Thrips Spintor, Lannate	Treat only if numbers are high, ~70/100 clusters.	Continue scouting.
Leafrollers See CBFW insecticides	Scout for larvae. Consider insecticides that are effective for other pests if needed.	Continue scouting for larvae. Use same threshold.
Gypsy Moth Mostly controlled. **Avoid** Spintor, Esteem, Actara, Provado	Scout hot spots near woods.	Should be controlled.
Anthracnose Abound, Cabrio, Captan, Pristine	Bluecrop and other susceptible cultivars should continue to receive fungicide applications	Continue with scheduled fungicide applications 10-14 day interval for susceptible cultivars
Use of Ziram should be stopped at this time so that white residues are not present on ripe fruit. Also, Switch will not be effective in hot weather.		
Root rot	Scout for infected plants	Scout for infected plants
Scorch/Sheep Pen Hill	Continue scouting for symptomatic plants	Remove diseased plant or mark for removal

(***Source**: Blueberry Bulletin, Vol. 23, No. 10, May 2007*)

Monitoring for Fruitworms

Rufus Isaacs, Michigan State University

Figures 1-2. Adults of CFW (1) and CBFW (2)

To monitor for Cranberry fruitworm (CBFW) and Cherry fruitworm (CFW) use pheromone baited traps. For each species, use one Large Plastic Delta Trap (LPD) w/ the appropriate sex pheromone lure pinned to the inside of the roof of the trap. Attach the trap to the outer canopy of the upper third of a blueberry bush on the field border. Traps should be hung adjacent to woods in "hot spots" where damage has been noted in the past. Set traps at least 30ft apart in mid to late April. Check traps weekly, record the number of moths caught. Remove moths from the sticky trap insert and replace sticky insert as needed.

After moths are caught and after petal fall (~5-15 or 5-30) bushes should be inspected for eggs and damage each week for a five minute sampling period. Working in


Figure 13. Webbing (arrow) and premature ripening of fruit caused by feeding larvae.

a "hotspot," look at as many fruit clusters as possible on 10 to 20 bushes along the field border. Looking at the fruit clusters can help you find eggs in calyx cup, larval entry holes and damage. When inspecting the fruit grasp the cluster and view with the sun over your shoulder. Carefully turn the clusters over and inspect the bottom of the fruit as well as the top for entry holes and/or frass. Record the number of cranberry fruitworm and cherry fruitworm eggs and the number of berries with damage. **Click here for more information.** (***Source**: Michigan Blueberry IPM Update, Vol. 1, No. 7, May 30*)

GRAPE

Managing Grape Berry Moth – Timing, Activity and Coverage

Rufus Isaacs and John Wise, Michigan State University

Effective control of grape berry moth with the currently available insecticides leaves less room for error in both timing and coverage than was possible in the past. This is because the remaining products either have shorter duration of residual control, or they are specific to fewer life stages of the pest than the broad-spectrum insecticides that had vapor action. Maintaining control of grape berry moth requires a combination of good timing, high insecticide activity and excellent cluster coverage. Our ongoing research addresses each of these components of berry moth IPM, and this update will cover them in turn.

Timing

To time sprays for this pest, monitoring traps and weekly scouting of vineyards can be used to know when moths and larvae are active. This can be focused on vineyard hot spots, but it is useful to spread scouting across your farm to know where grape berry moth activity is greatest. Most growers know hotspots on their farm, but this monitoring can also tell you *when* the pest is active in different blocks.

Generation 1

Moths emerge in late April or early May, usually around 200-250 growing degree days (GDD base 50) from March 1. This year, we saw the first moths in traps on April 22 in Lawton and April 27 in Scottdale. In recent years in a trial in Paw Paw, we have found the first eggs on clusters around 650 GDD, which typically occurs when the number of moths peaks in traps and when the vines are at trace bloom. This year is no exception, as the first few grape berry moth eggs have been detected in a farm in Berrien County where the warm weather has brought the vines and the insect activity forward.

Egg-laying by the spring generation moths increases during bloom, and so if using a broad spectrum insecticide, the 10 days post bloom spray will be an effective way to control the larvae and eggs present at this time. Treatments applied earlier than the post-bloom timing can be washed off or degrade before most of the egg-laying and are unlikely to protect the clusters from feeding by berry moth larvae. If growers are aiming to reduce costs in vineyards where a crop is expected, scouting clusters just after bloom can be used to determine the level of infestation by this pest and whether an insecticide is warranted at the post-bloom timing. Although there is no formal threshold developed for first generation berry moth, if only a small proportion of clusters have larvae or if the level of feeding is low, there will be minimal effect on yield. Since clusters set only about a third of the potential berries produced, clusters can withstand some feeding and this is worth considering when weighing up the cost of a spray.

Generations 2 and 3

These generations are harder to time sprays for because there is less likely to be a distinct increase in moths in traps and the generations overlap. From our detailed sampling for eggs in borders of high risk vineyards for grape berry moth, we see some egg-laying during the first half of July and a period of more intense egg-laying that starts around berry-touch in early August and continues through until harvest. This may be partly from moths moving into vineyards from the woods, and partly from the offspring of the earlier generations.

Insecticide activity

When selecting an insecticide, there are many options for berry moth control. Some of these are selective for this pest, while others will also provide control of leafhoppers, rose chafer and other insects that can occur during bloom.

The selective insecticide Intrepid has shown good effectiveness against berry moth, and we have tested it in the mid-season timings in July and August at the 12 oz rate. Although this is more expensive than many standard insecticides, the product lasts a long time (two to three weeks depending on the rate) and is resistant to wash-off. This helps make it an effective tool to use against the high

pressure of egg-laying seen late in the season, when maintaining control would otherwise require multiple sprays. This works on the molting system of the larvae, disrupting normal development and because it is selective, Intrepid will not control leafhoppers or beetles. It also has a 30-day PHI. Another selective insecticide to consider is *B.t.* (Dipel, Javelin, Deliver etc.), which only targets the larvae of berry moth. Both of these selective insecticides need to be eaten to be effective, so their activity is greatest when temperatures are above 70ºF. Intrepid is quite stable and resistant to wash-off once sprayed providing good residual control, whereas B.t. formulations degrade under ultraviolet light, providing three to five days of activity.

Most pyrethroids are inexpensive insecticides with broad insect activity. They have relatively short residual control in the hotter summer weather when growers might be spraying for the second or third generation of grape berry moth. In our 2006 trials with Danitol, Baythroid and Capture, the lower rates of these products declined in activity against grape berry moth after nine days. If using a pyrethroid to control grape berry moth along with Japanese beetle in the hot sunny conditions of July or August, using the full rate will provide the best residual control. Despite the temptation to look only at the price per acre when making decisions, be sure to rotate this class with other chemical classes to avoid resistance developing.

Excellent control of grape berry moth has consistently been seen in our spray trials using either Danitol at 10.6 oz/acre or Imidan at 2 lb/acre (and buffered to pH 6). Venom provided good control of the lower, early season populations and is now registered for this use. We also have tested programs containing the new pyrethroid Capture in the first half of the growing season, and this has performed as well as the standard insecticides.

Coverage

Getting cluster coverage with your spray material is essential for berry moth control. As the canopy becomes denser after bloom, increase the water volume and slow down to ensure the pesticide has a chance to contact the pest. If the spray doesn't hit the cluster, a significant investment of time and money is being wasted. To illustrate this, our research in a mature Niagara vineyard found that an airblast sprayer operated at 20 gallons of water per acre gave only half the control of grape berry moth compared with one running at 50 GPA. These results emphasize the need to make sure your sprayer is getting good coverage of the clusters, because it can make a big difference for control. (***Source**: Michigan Fruit Crop Advisory Team Alert, Vol. 22, No. 8, May 29, 2007*)

General Information

Reading the Pesticide Label is More Important than Ever Before

Tom Butzler, Penn State Coop Extension

Read almost any document today as it pertains to pest management, and if pesticides are recommended, there are some directions or a paragraph on pest resistance and how to properly manage the problem. Most farmers have been aware of issues surrounding pest resistance but there has been a greater effort the past several years by industry and educators to trumpet this message.

Pest resistance is nothing new in agriculture. Literature shows that insects were the first organisms in the US to develop resistance to the products that were supposed to give some level of control. One of the first documented cases of insect resistance occurred in California in the mid 1900"s when red scale on citrus trees was no longer controlled with hydrogen cyanide. With the advancements in pesticide chemistry, during and after World War II, it was thought that the issue of pest resistance was a concern of the past. Insects soon developed resistance to these new chemistries and the issue in insecticide resistance continues today.

Fungicides were not to escape this problem either as resistance became a problem shortly after the introduction of systemic fungicides in the 1960"s. There was an assumption several decades ago that weeds were unlikely to develop resistance. That theory fell by the wayside when the first herbicide resistant weed, field bindweed, made its appearance in the early 1970s.

Scientists and industry have aggressively addressed this issue by forming groups to facilitate the effective management of pesticide resistance, to prolong the effectiveness of "at risk" fungicides, and to limit crop losses should resistance occur. These groups are:

- Fungicide Resistance Action Committee (FRAC)
- Insecticide Resistance Action Committee (IRAC)
- Herbicide Resistance Action Committee (HRAC)

It is only the past several years that these groups and their work have been receiving a lot of attention. One of the reasons is what is showing up on the front of pesticide labels. For example, let"s say you wanted to control early blight on tomato and you chose Flint. On the front of the pesticide label, you will notice the following code.

This information tells you that the product is a fungicide and falls into Group 11. This code was developed by FRAC to help identify fungicides by their mode of action. For

fungicide resistance management, do not tank mix or alternate fungicides with the same FRAC number in a spray program.

Continuing with the early blight and Flint example, you would want to apply another fungicide seven days later. Some of your options include Cabrio, Quadris, Bravo, and Dithane. Looking at these labels, both Cabrio and Quadris fall into Group 11, meaning all fungicides within this chemical group share a common mode of action.

Using chemicals that share a common mode of action repeatedly can lead to the development of resistance. The labels for Bravo and Dithane show that they fall into a different group and could be utilized in a rotation with products in Group 11. Similar type codes have also been developed by IRAC and HRAC.

Although pesticide labels are not the most exciting read, it is critical that you are aware of the information located within the text. It not only contains information that is important to your health but information that will help prolong the life of these crop protectants. (***Source**: The Vegetable & Small Fruit Gazette, May 2007*)

Protecting Honey Bees from Chemical Pesticides

Maryann Frazier, Penn State University

Honey bees are vulnerable to many of the insecticides used to control damaging pest species by fruit, vegetable, nut, and seed growers. Growers dependent on honey bees for the pollination of their crop(s) must constantly maintain a delicate balance between protecting their crops from pests and pathogens, and protecting the insects that are necessary to pollinate these crops.

The recent dramatic die-off of tens-of-thousands of honey bee colonies has left many beekeepers devastated and possibly many growers without the quantity and quality of bees needed to pollinate crops this spring and summer. A research group; the Colony Collapse Disorder Working Group (see MAAREC.org) is trying to determine what factors are responsible for these unprecedented colony losses. Chemical contamination is one of the possible contributing factors that is being investigated. These include chemicals being used within the hive for mite and disease control as well as chemicals pesticides used on crops that may inadvertently find their way into hives. Until we have more documented information, it is advisable to use pesticides with care, erring on the precautionary side.

The neonicotinioids are a relatively new class of insecticides that impact the central nervous system of insects. They act either as contact insecticides or applied to plants, they are translocated throughout the plant tissue, making all parts of the plant toxic to pests that ingest them. While imidacloprid registered in 1992, is the best-known insecticide in this class, there have been a number of new neonicotinoids introduced since then (clothianidin, acetamiprid, thiamethoxam, etc.). Their use has increased dramatically over the past few years and they are now the most widely used group of insecticides in the US. Their many uses include: seed treatments for corn, cotton, canola and sunflowers; foliar sprays of fruit, nut and coffee crops; granular and liquid drench applications in turf, ornamentals and fruit crops and in forests; and in California the number one use of imidacloprid is for the control of structural pests.

There is conflicting information about the affects of neonicotinoids on honey bees, and different chemicals in this class are known to vary in their toxicity to bees, however the EPA identifies both imidacloprid and clothianidin as highly toxic to honey bees. For example: "Clothianidin is highly toxic to honey bees on an acute basis (LD50>0.0439 mg/bee). It has the potential for toxic chronic exposure to honey bees, as well as other non-target pollinators through the translocation of clothianidin resides in nectar and pollen. In honey bees, the affects of this toxic chronic exposure may include lethal and/or sub-lethal effects in the larvae and reproductive effects on the queen" [EPA Fact Sheet on Clothianidin]. Documented sub-lethal affects of neonicotinoids include physiological affects that impact enzyme activity leading to impairment of olfaction memory. Behavioral affects are reported on motor activity that impact navigation and orientation and feeding behavior. Additional research has found that imidacloprid impairs the memory and brain metabolism of bees, particularly the area of the brain that is used for making new memories (Decourtye et al., 2004). Recent research done on imidacloprid looked at crops where imidacloprid was used as a seed treatment. The chemical was present, by systemic uptake, in corn and sunflowers in levels high enough to pose a threat to honey bees (Bonmatin et al., 2003 and 2005). In 2002 a broad survey for pesticide residues in pollen was conducted across France. Imidacloprid was the most frequently found insecticide and was found in 49% of the 81 samples (Chauzat et al., 2006).

In addition, there is concern about the practice of combining certain insecticides and fungicides. A North Carolina University study found that some neonicotinoids in combination with certain fungicides, synergized to increase the toxicity of the neonicotinoid to honey bees over 1,000 fold in lab studies (Iwasa et al., 2004). Both the neonicotinoids and the fungicides (Terraguard and Procure) are widely used. This synergistic effect needs to be looked at more carefully.

Below is a summary of the chemical and brand names of the commonly used neonicotinoids and their toxicities to honey

bees. ***We are asking growers who are using these materials and who are dependent on honey bees for pollination, to use caution when selecting and applying these materials.*** Below are more specific recommendations for growers.

Neonicotinoids' Toxicity to honey bees

Chemical	Brand Name	Acute Contact	Acute Oral
thiamethoxam	Actara, Platinum, Helix, Cruiser, Adage, Meridian, Centric, Flagship	Highly toxic	Highly toxic
clothianidin	Poncho, Titan, Clutch, Belay, Arena	Highly toxic	Highly toxic
imidacloprid	Confidor, Merit, Admire, Ledgend, Pravado, Encore, Goucho, Premise	Highly Toxic	Highly toxic
acetamiprid	Assail, Intruder, Adjust	Toxic	Toxic
thiacloprid	Calypso	Toxic	Toxic
dinotefuran	Venom	Highly Toxic	Highly Toxic

Recommendations for Growers

- Know the pesticides you are using and their toxicity to bees (do not depend on third party to provide this information).
- READ the LABEL AND FOLLOW THE LABEL DIRECTIONS
- **Never** use a neonicotinoid pesticide on a blooming crop or on blooming weeds if honey bees are present.
- The use of a neonicotinoid pesticide pre-bloom, just before bees are brought onto a crop **is not recommended**. If one of these materials MUST be used pre-bloom (for example at pink in apples), select a material that has a lower toxicity to bees (acetamiprid or thiacloprid) and apply only when bees are not foraging, preferably late evening.
- Do not apply these materials post bloom (example petal fall) until after the bees have been removed from the crop.
- Blooming time varies depending on varieties. Bees pollinating one variety or crop may be at risk while another post-bloom crop or variety is being treated. Also while crops may have completed blooming, bees may be visiting blooming weeds in an around crops. Be aware of these situations and avoid the application of pesticides on a non-blooming crop if there is risk of drift onto blooming crops and weeds if bees are present. If a spray must be applied, use the least toxic material and apply when bees are not foraging.
- Protect water sources from contamination by pesticides. If necessary, provide a clean source of water close to colony locations prior to their arrival in the orchard or crop.

For more information on CCD visit the Mid-Atlantic Apiculture Research and Extension Consortium website: www.MAAREC.org

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(***Source****: The Vegetable & Small Fruit Gazette, May 2007*)

How Organic Mulches Suppress Weeds

Elsa Sánchez, Penn State University

I recently read the article "Compost as an Alternative Weed Control Method" by Monica Ozores-Hampton from the University of Florida (1998: HortScience 33:938-944). The article reviewed literature on organic mulches and compost for managing weeds.

Weeds are suppressed by organic mulches and compost by two methods: they physically prevent weeds from growing and as they decompose, chemicals that are toxic to plants are produced as part of the breakdown process which can prevent weed seed germination.

Physically Preventing Weeds

Organic mulches (sawdust, straw, bark, etc) can be as effective as herbicides based on some research trials. They also can improve soil health by minimizing soil erosion and compaction. Their use has also resulted in increased yields (compared to not mulching or not using herbicides). Depending on crop, fruit quality can also been improved by preventing direct contact between the fruit and soil.

The effectiveness of organic mulches for suppressing weeds is dependent on the thickness of the mulch layer, with thicker layers resulting in fewer weeds. A four to six inch mulch layer has been found generally effective. Germination of weed seeds is lesser with thicker layers and has been linked to changes in light levels, temperature and moisture. The effectiveness of organic mulches for suppressing weeds is also dependent on the type of organic mulch, weeds species present and environmental conditions.

Phytotoxic Effects during Composting

During the composting process, organic materials (animal manures, leaves, paper, wood chips, straw, textiles, etc.) are decomposed by microbes which over time convert the organic material into compost. Decomposition results in the release of nutrients in plant-available form from compost. However, chemicals toxic to plants are also released including acetic acid, acetaldehyde, ethanol, acetone, ethylene and allelopathic compounds. These chemicals are typically not present in mature or finished compost. Some research has shown than phytotoxic compounds tend to disappear more quickly when a static pile system is used compared to a windrow system.

Immature compost should not be applied to soils because phytotoxic chemicals are present. The most phytotoxic chemical in decomposing compost is acetic acid which can inhibit seed germination of crops and weeds. In one trial immature (4-week-old) sewage sludge-based compost (strict regulations exist for applying sewage sludge to agricultural lands) was applied to the alleys between raised beds and successfully suppressed weeds for 8 months due to physical restriction and the phytotoxic chemicals in the compost. Immature compost can also decrease oxygen levels and increase temperatures in the soil which can negatively affect plant root growth.

The Bottom Line

Organic mulches (newspaper, broiler litter mulch, oak bark, etc.) have been used very successfully for managing weeds in many crops. Studies have concluded that organic mulches suppress weeds by inhibiting germination physically and chemically. However, since they are not applied until after crop seedling emergence has occurred, the negative effects of toxic compounds have not been observed. In the last issue of the Gazette I reported on a trial were newspaper mulches were evaluated for weed management in a cucumber crop. In that trial, all of our mulch treatments suppressed weeds to below yield-depressing levels. However, there are also some issues to be aware of before using them. Organic mulches can create a habitat for small animals (voles, mice) that can damage crops. This doesn"t happen every year or in every field, but it can be an issue. A few years back we had a strawberry trial and used straw mulch covered with a row cover for winter protection. In the spring about 1/3 of the plants had been damaged by voles who had taken up residence in the straw. Organic mulches can maintain soil moisture, limiting the amount of irrigation crops may need. However, they can create moist environments that can favor root rots, especially in a wet year. Organic mulches may provide less weed suppression and can be more expensive than herbicides. They also need to be replenished to maintain their depth as they break down.

Finally, if buying compost, consider storing it if it is immature until it matures. When mature compost is incorporated into soil can result in increased crop yields and improve soil health. (***Source**: The Vegetable & Small Fruit Gazette, May 2007*)

Upcoming Meetings:

June 1, 2007 – SETTING UP A DRIP IRRIGATION SYSTEM, Brookdale Fruit Farm, 36 Broad St/Rt. 30, Hollis NH. 5:30 – 8:00 For more information contact George Hamilton at 603-641-6060 or george.hamilton@unh.edu

June 6, 2007 – SMALL FRUIT & VEGETABLE TWILIGHT MEETING, McKenzie's Farm 71 Northeast Pond Road, Milton 03851 5:30 – 7:45. Topics include greenhouse/tunnel tomatoes, plasticulture strawberries, summer-bearing raspberries. For more information contact Geoffrey Njue at 603-749-4445.

June 19, 2007 - 4-7 PM Warner Farm Sunderland, MA – UMASS VEGETABLE IPM FIELD SCHOOL. Cost $20. For more information, go to http://www.umassvegetable.org/ed_programs/meetings/winter_meetings.html or call Ruth Hazzard at 413-

545-3696 or email rhazzard@umext.umass.edu.

June 19, 2007 – MASSACHUSETTS CULTIVATED BLUEBERRY GROWERS ASSOCIATION – Summer Meeting, Ripely Farm, 794 Beech Hill Rd., Granville, MA. 12 noon. For more information contact Elisabeth Patt at 781-585-3233.

June 20, 2007 - UMASS TURF RESEARCH FIELD DAY - , Joseph Troll Turf Research Center, South Deerfield, MA. Field Day 2007 will focus on the research currently taking place at the Joseph Troll Turf Research Center as well as on research being conducted at other locations by University of Massachusetts Turf Program faculty, staff, and graduate students. For attendee/exhibitor registration information, visit: www.umassturf.org/education/annual_events/field_day.html

July 12, 2007 - SUMMER MEETING OF THE MASSACHUSETTS FRUIT GROWERS' ASSOCIATION, INC. IN COOPERATION WITH THE UMASS FRUIT PROGRAM – Bolton Orchards, Bolton, MA For complete information, see http://www.umass.edu/fruitadvisor or http://www.massfruitgrowers.org.

July 12, 2007. *Small Fruit Tour***,** Germantown, NY. Currants, Gooseberries, Brambles, Mountain Range Farm. For more information contact Kathy Heidenreich at mcm4@nysaes.cornell.edu .

July 18, 2007 - SUMMER MEETING & TRADE SHOW of the Massachusetts Nursery Landscape Association (MNLA) and Massachusetts Flower Growers Association (MFGA) in cooperation with the UMass Extension Floriculture, Landscape, Nursery and Urban Forestry Programs - Tower Hill Botanic Garden, Boylston, MA To register go to www.mnla.com or call 413-369-4731.

July 19, 2007. *Small Fruit Twilight Tour***.** NYS Agricultural Experiment Station, Geneva, NY. Black and Red Raspberries, For more information contact Kathy Heidenreich at mcm4@nysaes.cornell.edu .

July 24, 2007 - 4-7 PM Foppema's Farm Northbridge, MA UMASS VEGETABLE IPM FIELD SCHOOL. Cost $20. For more information, go to http://www.umassvegetable.org/ed_programs/meetings/winter_meetings.html or call Ruth Hazzard at 413-545-3696 or email rhazzard@umext.umass.edu

July 25, 2007. *Summer Fruit Tour.* NYS Agricultural Experiment Station, Geneva, NY. Cordon training of Ribes, Ribes disease control, small fruit insect research updates. For more information contact Kathy Heidenreich at mcm4@nysaes.cornell.edu .

August 2, 2007. *High Tunnel Small Fruit Tour*, Ithaca, NY. Black raspberries, Blackberries, Cornell University College of Agriculture and Life Sciences. For more information contact Kathy Heidenreich at mcm4@nysaes.cornell.edu .

August 8, 2007 - 4-7 pm Golonka Farm Hatfield, MA UMASS VEGETABLE IPM FIELD SCHOOL. Cost $20. For more information, go to http://www.umassvegetable.org/ed_programs/meetings/winter_meetings.html or call Ruth Hazzard at 413-545-3696 or email rhazzard@umext.umass.edu.

August 10-12, 2007 - NORTHEAST ORGANIC FARMING ASSOCIATION (NOFA) 33 rd ANNUAL SUMMER CONFERENCE – "A CELEBRATION OF SUSTAINABLE LIVING" at Hampshire College in Amherst, MA. For the full schedule of activities and further information go to www.nofamass.org, or contact Julie Rawson at at (978) 355-2853 or julie@nofamass.org.

August 14-15, 2007. *NASGA Summer Tour*, Niagara Falls Canada and Niagara region of New York. See news brief below or for more information contact Kevin Schooley at kconsult@allstream.net or visit www.nasga.org .

August 15, 2007 4-7 pm Paradise Hill FarmWestport, MA UMASS VEGETABLE IPM FIELD SCHOOL. Cost $20. For more information, go to http://www.umassvegetable.org/ed_programs/meetings/winter_meetings.html or call Ruth Hazzard at 413-545-3696 or email rhazzard@umext.umass.edu

August 21, 2007 - AGRICULTURE RESEARCH DAY - 4-7 pm UMass Crops Research and Education Center, South Deerfield, MA. Hear about the latest research on a wide range of topics in vegetable crops, cover crops and crops for fuel! Join us to celebrate the new equipment workshop being built by the College of Natural Resources & the Environment to support research at South Deerfield. Bring disease samples to a free onsite diagnostic clinic! Registration: $20 per person (3 or more per farm, $15 per person). Refreshments will be served. Pesticide recertification credit has been requested. For more information contact Ruth Hazzard (545-3696) rhazzard@umext.umass.edu or Steve Herbert (545-2250) sherbert@umext.umass.edu.

August 21, 2007 - ANNUAL MEETING of the CAPE COD GROWERS' CRANBERRY ASSOCIATION 9am - 1pm - UMass Cranberry Experiment Station, Wareham, MA. In addition to the business meeting, there will be a tradeshow, lunch, and a tour and ribbon-cutting ceremony for the newly renovated State Bog. Lunch tickets must be purchased in advance. For further information contact CCCGA at 508-759-1041 or e-mail info@cranberries.org