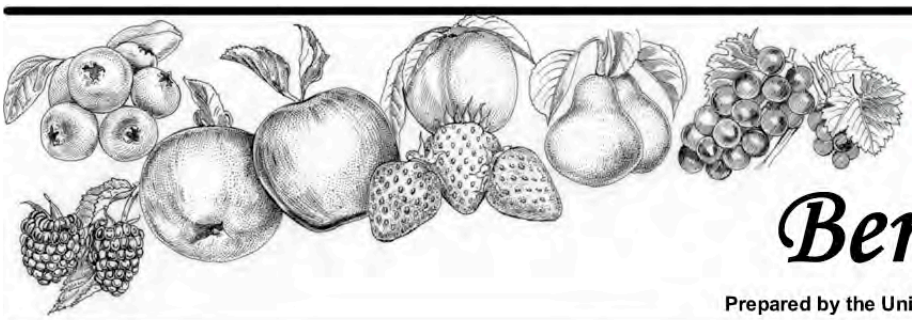

Berry Notes

Prepared by the University of Massachusetts Fruit Team

April 2007 Vol. 19, No. 5

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 are beginning to show new leaves. New fields area being planted where fields are not too wet. In established fields, growers are removing any remaining straw mulch, applying row covers and setting up irrigation for frost protection (see below and last issue of Berry Notes for more on frost protection). Preemergent herbicide applications can be made now. See New England Small Fruit Pest Management Guide for materials and rates. **Raspberries** are also beginning to show new growth. Delayed dormant applications of lime sulfur should only be made before bud are ½" long. Preemergent herbicide applications can be made now. See New England Small Fruit Pest Management Guide for materials and rates. **Blueberry** fruit buds are swelling and leaf buds are beginning to show green tissue. This means that mummy berry shoot strike infection can occur. Warm, wet weather should encourage mushroom development. The first winter moth caterpillar was observed on Monday, April 23rd. They are eyelash size and feeding in the expanding buds of hardwood trees, ornamentals and blueberries. **Grapes** are breaking dormancy at inland locations. Coastal vineyards are still dormant. Pruning should be finished at this point. Some growers are applying dormant sulfur and copper sprays to reduce overwintering phomopsis. Follow label directions to avoid phytotoxicity. See New England Wine Grape Growers Resource Center (www.newenglandwinegrapes.org) for fact sheets on phomopsis and other grape diseases.

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ENVIRONMENTAL DATA

The following growing-degree-day (GDD) and precipitation data was collected for a one-week period, April 19, 2007 through April 25, 2007. Soil temperature and phenological indicators were observed on or about April 25, 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)
	2-Week Gain	Total accumulation for 2007		
Cape Cod	34	60	50˚F	1.00"
Southeast	44	77	54˚F	0.27"
East	57	96	48˚F	0.00"
Metro West	45	77	50˚F	trace"
Central	43	48	40˚F	0.00"
Pioneer Valley	64	85	51˚F	0.00"
Berkshires	23	31	51˚F	0.15”
AVERAGE	44	68	49˚F	0.21"

n/a = information not available

(***Source**: UMass Extension 2007 Landscape Message #9, April 27, 2006*)

STRAWBERRY

Frost Protection: Tips and Techniques

Kathy Demchak, Penn State University

Damage from freezes and frost is of concern from bud break in the spring through flowering and fruit set. The blossoms are tender and are the plant part most commonly damaged by low temperatures. Since loss of the blossoms means a loss of fruit for the year, frost protection is of great concern.

Critical Temperatures for Frost Damage

Damage occurs when water in the plants' cells freezes, thus causing the cells or cell parts to rupture. The temperature at which this occurs depends on the water content and concentration of water vs. solutes in the plant tissue. Therefore, the temperature at which damage occurs varies with the crop and growth stage. Table 1 lists commonly-accepted critical temperatures for strawberry and blueberry blossoms at different stages of bud development. These values are not absolute, and within reason, it is better to err on the side of safety when protecting crops from frost damage.

Table 1. Critical temperatures (degrees F) for cold damage of flower buds based on stage of development. Note with blueberries, there is considerable variability in temperatures at which damage was reported for these growth stages.

Strawberries	Critical temp.	Blueberries	Critical temp.
Bud emergence	10˚F	Bud swell	15-20˚F
Tight bud	22 ˚F	Tight cluster	18-23˚F
"Popcorn"	26 ˚F	Separate flowers visible	22-25˚F
Open blossom	30 ˚F	Late closed blossom	25-26˚F
Green fruit	28 ˚F	Open blossom	27˚F
		Petal fall	28˚F

Sources: Strawberry Critical Temperatures - K. Perry and B.C. Poling, North Carolina State Univ.; and Richard Funt, Ohio State Univ.; Blueberry Critical Temperatures - Fruit Crop Advisory Team Alert, Vol. 18, No. 3. "Protecting

Types of Frosts and Freezes

Radiant frosts and freezes occur on calm, clear nights with no cloud cover. Heat is lost from the soil and plants, and radiates back to the sky. *Advective freezes*, sometimes called windborne freezes, are caused when a cold air mass moves into the region accompanied by with a lot of wind. It is difficult to protect against this type of freeze.

Environmental Factors Affecting Frost Occurrence and Protection

Air temperature is the measurement used for initiating or stopping frost control practices, and can be taken with either a dry-bulb or wet-bulb thermometer. *Dry-bulb temperatures* are the type commonly referenced in literature and in weather forecasts. *Wet-bulb temperatures* are obtained from a thermometer that is covered with a wet wick. Air is moved over the bulb causing evaporative cooling to occur. The wet-bulb temperature is useful because it essentially is what

the plant temperature will be once the irrigation is started and evaporative cooling has taken place.

Wind speeds of more than a few miles per hour can make frost protection difficult, especially in an advective freeze. Light breezes, however, tend to mix the air and can increase temperatures at ground level in the case of radiational frosts. Temperatures tend to be more uniform even across a distance of miles when windy conditions exist.

The *dew point* is the temperature at which the relative humidity reaches 100% as the air cools. At this point, water vapor in the air condenses into fog or dew, which gives off heat, slowing the temperature drop. The risk of having a frost becomes greater as the dew point becomes lower. If the dew point is below freezing, so that condensation and heat release does not take place until below freezing, temperatures can drop to damaging levels extremely rapidly. In this case, the white crystals typically seen in a frost or freeze may not form, a condition sometimes referred to as a "black frost".

Relative humidity is the amount of moisture contained in the air relative to the maximum amount that could be held. It changes with temperature and can change quickly with the air mass.

Site-Specific Effects on Frosts/Freeze Occurrence

Site selection is the most important step for frost or freeze protection of a small fruit crop. The best site is one downwind from or closely surrounded by a large body of water. Topography also affects frost occurrence. Cold air is heavier than warm air, and therefore flows downhill. Temperatures are often higher at the tops of slopes, while cold air which collects in the lower areas (frost pockets) is often 4° to 5°F lower. Southern slopes are generally warmer than those facing north, but plants on Southern slopes will also come out of dormancy earlier, possibly negating this benefit in many instances.

Soil moisture has an effect. Moist soil holds more heat and radiates heat back to the environment for a longer time than dry soil. If the soil is dry, plantings should be irrigated a day or two ahead of an expected cold snap to allow time for heat to be captured.

Soil texture and compaction are also factors, as heavier soils with more clay retain heat better than sandy soils. Sandy soils are also often lighter in color and hence tend to reflect more sunlight, rather than absorbing it in the form of heat.

Ground cover affects the amount of heat absorbed by and released from the soil. A bare, undisturbed moist soil with no ground cover can release enough heat to raise the temperature 2 to 3 degrees in the plant canopy as compared to a sod-, grass-, or straw mulch-covered soil.

Methods for Protecting Plants from Frosts and Freezes

Floating row covers are useful especially for small acreages of low-growing crops or when water for overhead irrigation is not available. The amount of frost protection obtained varies with the weight and fiber arrangement of the row cover. Usually the amount of protection increases with the weight, though differences in texture make this correlation less than perfect. Row covers weighing 0.6 ounces per square yard typically can give 2° or 3°F protection during a radiational frost, while nursery foam covers or a double layer of row covers can give more than 10°F of protection. Weather conditions prior to the frost affect the amount of protection obtained from row covers, since little or no heat may accumulate under the row cover on cloudy windy days. When row covers are used for frost protection, they should be pulled over the crop during mid-afternoon to allow heating to take place. Row covers can also be used in conjunction with sprinkler irrigation on top of the row cover. Row covers used in this way typically cut the amount of overhead irrigation needed for frost protection by about 50% on average.

Heating or burning is an old method of frost protection, but is not practical for low-growing small fruit crops like strawberries, and is infrequently used. However, if fires or heaters are used, several small ones are better than one large one.

Wind machines work if a temperature inversion occurs (warm air present above a cold layer) and if there is no wind as with radiant-type freezes. They mix the air by pulling down the warm air from above to replace the colder air trapped near the soil surface. They only provide a few degrees of protection, and therefore are sufficient protection primarily for crops that bloom relatively late when frosts are usually less severe.

Sprinkler irrigation works well on all small fruit crops, but needs to be used carefully. Because sprinkler irrigation use can result in the application of large volumes of water to the crop, use should be delayed until greater than 10% of the blossoms are in danger of being damaged. This does not necessarily mean that 10% of the blossoms are open. Sprinkler irrigation for frost protection works because water gives off heat when it changes from a liquid to a solid (i.e., freezes). Frost protection using irrigation works only if the system is fully functional prior to the frost event, so test it to ensure it works.

A common recommendation is to start the system when the temperature at plant level falls to 4°F above the critical temperature (for example, 34°F for open strawberry blossoms). If the dew point is below freezing, irrigation must be started at a higher temperature. Under conditions with wind or low humidity, damage can occur when the air temperature is several degrees above the freezing point because of evaporative cooling. Because of this, the wet

bulb temperature is often a better indication of when the irrigation system should be used rather than dry bulb (standard) temperature. Irrigation should be operating by the time the wet bulb temperature equals the critical temperature.

Most overhead sprinkler systems are designed to deliver 0.1 to 0.2 acre-inches of water per hour and are useful for radiant freeze or frost protection when wind speeds are light and temperatures are not below the mid-twenties. Microsprinklers provide more uniform distribution than those having larger droplets and/or those covering a larger area. However, the rate at which water freezes depends on several environmental factors, including air temperature, humidity, and wind speed. When breezy conditions (5 mph) are forecast overnight, water supply lines should be moved closer together. At 5- 10 mph, protection will be spotty. When wind speeds exceed 10 mph, the risks for crop damage from evaporative cooling may outweigh the potential benefits.

Overhead irrigation pipes and sprinklers can be set up on row covers, and irrigation started after the temperature under the row covers drops near the critical temperature. This is the safest way to protect crops in the case of advective freezes, and greatly reduces the amount of water used regardless of the type of frost event. Because of the necessity of and time required for removing and re-applying the row covers (they can just be gathered into the row middles in which the irrigation pipes are located), this method is best suited for small acreage plantings. Be sure to uncover the plants as early in the day as possible so that drying of the foliage and pollination can take place.

Taking Temperature Measurements: Accurately Depicting Crop Conditions

Temperature sensors must be calibrated to be sure the temperature you are reading is correct. Calibrate them by immersing the sensor in a water and crushed ice slurry, gently stirred, which will be at 32°F. Note that with liquid-in-glass min-max thermometers, the top of the thermometer needs to be immersed. Adjust subsequent readings accordingly.

With low-growing plants such as strawberries, the coldest temperature in a field is often near the surface where the strawberry plants grow. Readings should be made at the plant canopy level. In blueberry plantings, several measurements should be taken at different places in the field at the various heights of the plant canopy.

Liquid-in-glass thermometers, usually relatively inexpensive in price, can vary in their readings. However, they usually vary less than dial thermometers, and are a good value. *Thermocouple thermometers* are generally capable of measuring a wide range of temperatures, and have a very good percentage accuracy, such as being within plus or minus 0.05% of the temperatures in their ranges. Because the range can be huge, the accuracy may still only be one or two degrees. The thermocouple probes themselves are quite cheap, but the device to which they connect that produces the readable output can be pricey. *Thermistor thermometers* are probably the best option for accuracy, as they are designed to read a relatively narrow temperature range, and have a good percentage accuracy. There are models that will be accurate to within plus or minus 0.5 degrees F with prices in the moderate range. Calibration is still recommended.

Digital readouts give the impression that, because the reading can be noted to the closest tenth or hundredth of a degree, the device must be accurate. This is not necessarily the case. The reading may be very exact, but also very wrong. Accuracy is how correct the device is. For example, a certain digital thermometer may be advertised as having a resolution of 0.1 degrees, but an accuracy of + or - 2 degrees. Accuracy is the important figure. Sometimes you'll see a notation that a thermometer is accurate to a certain percentage within its range. As an example, if the device is listed as being accurate to within 0.5% in its range, and its range is -60° to 140°F, it would be accurate to within 0.5% of this 200 degree range, or, to within plus or minus 1 degree of any temperature read between -60° and 140°F. This does not mean that it is accurate to within 0.5% of any given temperature.

Electronic devices and plug-in probes offer some useful advantages over standard thermometers. For example, if a probe is positioned under a row cover with connecting wires outside of the row cover, the temperature under the row cover can be measured easily. Also, even once irrigation is turned on, the temperature in the field can be monitored. Note that with some electronic devices, the number display is not meant to withstand temperatures below freezing, so the display could "black out" when you need it the most! So, use the display portion in the field only when obtaining the reading.

Frost alarms and alerts are especially valuable if your field is further than walking distance away from where you live. Once the temperature drops to a certain point, the alarm either sounds a buzzer, calls you on the phone, or flashes a light, depending on the model. If you get a model that calls you, it will likely need to be located where there is access to a phone line. A recent addition to frost protection gadgetry is a device that flashes a light that is color-coded to the temperature. This means that it is possible to track the temperature in your field from indoors, or monitor fields in several locations at one time. *(Reprinted from: The Penn State Vegetable and Small Fruit Gazette, Vol. 11 N0. 4, April 2007.)*

Chateau WDG Herbicide in Strawberries

Doug Doohan, The Ohio State University

Valent recently received EPA approval for Chateau WDG herbicide on strawberry. Chateau is good news, but berry growers need to proceed with a degree of caution as we all learn more about just how this product fits into matted-row and plasticulture systems in the north. The supplemental label for Chateau (EPA Reg'n # 59639-119) authorizes Pre-Transplant applications to new plantings, late-fall or early-spring applications to established dormant plantings, and shielded sprayer applications to row middles once the crop emerges from dormancy. Reading between the lines (if it's not obvious), Chateau burns non-dormant strawberry leaves and fruits, thus the need for caution.

This registration is one that calls for some careful on-farm grower experimentation while we work out the crop safety considerations. Right now the early-spring application is the one of greatest current interest to growers as well as the one of greatest concern because of potential for crop injury. Regardless, I've already consulted with one who intends to use Chateau on his established fields because of severe weed problems – if this applies to you, listen up. If your weed problem justifies it, apply Chateau as soon as you remove the mulch. The longer mulch is left on the crop, the more sensitive-new-growth will be developed. Delaying Chateau application after mulch removal will further the development of new growth, all of which will be burnt off by the herbicide. Don't be surprised if your field temporarily looks like you sprayed with Gramoxone, but don't despair. Based on experience in research plots with similar herbicides such as Goal and Blazer the crop will quickly recover and within a couple of weeks you will not likely be able to tell the difference between sprayed and unsprayed areas. In trials with Goal applications immediately after mulch-removal, crop-yield was unaffected although earliness was delayed by 2 or 3 days.

Chateau is also registered Pre-Transplant. The supplemental label states that PreTransplant should only be used when berry plants are transplanted into plastic mulch. However, Valent Company representatives have told me that is incorrect, and PreTransplant applications are safe to standard matted-row plantings on bare ground as well. Regardless of matted-row or plasticulture system, Chateau must be applied 30 days before planting.

Chateau is applied at 3 oz/A and is primarily a soil-active, residual herbicide, meaning it mainly controls weeds during emergence and control of sensitive weeds is extended for several weeks following application. Premergence control of a wide-spectrum of broadleaf weeds can be expected including pigweeds, mustards, jimsonweed and nightshades, lambsquarters, marestail, mallow, and chickweed. Some emerged broadleaf weeds will be suppressed and control will be improved by including crop oil concentrate at 1% or non ionic surfactant at 0.25% of final spray volume.

Potential users of Chateau should obtain a supplemental label, as the strawberry use is not yet listed on the Section 3 label. The supplemental label can be obtained on the Internet at the Valent Web Site (http://www.valent.com/), or from crop-protection dealers. (***Source**: Ohio Fruit ICM News, Volume 11 (10) April 16, 2007*)

RASPBERRY

Raspberry (Rubus) - Anthracnose

Jay W. Pscheidt, Oregon State University

Cause: *Elsinoe veneta*, a fungus widespread in the Pacific Northwest in black and occasionally in red raspberry cultivars. All black raspberry cultivars are susceptible. The disease is not always severe enough to warrant the cost of spraying. It is particularly serious if rains continue late in spring, when spots on canes may be plentiful enough to retard sap flow, thus girdling the canes. Early-season infections are more severe than late-season ones.

Symptoms: Circular sunken spots, about 0.12 inch or more in diameter, form on lower canes. At first, infections are purplish; later the center turns gray. As canes age, spots become sunken, and margins are raised and purplish. Current-season canes show initial symptoms near the ground. Most infection occurs on

Note the oval lesions with gray centers and purple borders.

the side of the cane toward the plant's center and from 6 to 30 inches up the cane. Infection often results in uneven berry ripening.

Cultural control:

1 Use certified planting stock.
2 Cut away old fruiting canes close to the ground and burn them at once.
3 Remove all infected and dead canes after harvest.
4 Maintain less dense, narrow rows for better air circulation.
5 Resistant red raspberry cultivars include 'Willamette', 'Heritage', 'Chilcotin', 'Nootka', and 'Meeker'.

As canes age, spots become sunken, and margins are raised and purplish.

Chemical control:

1 Late dormant or delayed dormant. Further control not needed in most years.

a. Bordeaux 8-8-100.

b. Fixed coppers such as Cuprofix Disperss, Kocide, Nordox, Nu-Cop, Copper-Count-N or C-O-C-S. 24-hr reentry. O

c. Lime sulfur (29%) at 6 to 12 gal/100 gal water. Polysul, Lily Miller Dormant Spray for Disease and Bonide Lime Sulfur Spray are registered for home use. 48-hr reentry.

d. Sulforix at 3 gal/100 gal water. 48-hr reentry.

2 When new canes are 6 to 12 inches high.

a. Abound at 6.2 to 15.4 fl oz/A. Do not apply more than two (2) sequential applications or more than three (3) applications per year. May be applied on the day of harvest. 4-hr reentry.

b. Cabrio EG at 14 oz/A. Do not apply more than twice sequentially or more than four times per year. May be used at harvest. 24-hr reentry.

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

d. CaptEvate 68 WDG at 3.5 lb/A Do not apply more than two (2) consecutive application, within 3 days of harvest or more than 17.5 lb/A/season. 72-hr reentry.

e. 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.

References:

Munro, J.M., A. Dolan, and B. Williamson. 1988. Cane spot *(Elsinoe veneta)* in red raspberry: Infection periods and fungicidal control. Plant Pathology 37:390-396.

(**Source:** Oregon State University Extension *Fact Sheet* Series)

BLUEBERRY

Fungicide Label Update for Blueberries

Annemiek Schilder, Michigan State University

Indar (fenbuconazole) has finally received a full registration for use in blueberries, which means that we do not have to request a Section 18 anymore. The fungicide will be available in two formulations: Indar 75WSP (water soluble packets) and Indar 2F (flowable). Indar 2F should be available at distributors in May, although quantities may be limited. They have the same active ingredient and are for all practical purposes the same. A fungicide efficacy trial in Michigan in 2006 showed that Indar 2F worked as well as Indar 75WSP. Both products list the following diseases on the label: Alternaria, anthracnose, leaf spot and blotch, mummy berry, Phomopsis, powdery mildew and rusts. In Michigan, however, we have not seen any efficacy of Indar against anthracnose, and we have not tested it against leaf diseases since these are not common in Michigan. The diseases that Indar has repeatedly shown good efficacy against are mummy berry and Phomopsis canker and twig blight.

The application rate for Indar 75WSP is 2 oz per acre; a maximum of four applications (8 oz) may be made per season. The application rate for Indar 2F is 6 fl oz per acre; a maximum of four applications (24 fl oz) may be made per

season. Apply Indar in a minimum water volume of 10 gal/acre, if applied aerially, and 20 gal/acre if applied by ground. The pre-harvest interval is 30 days, and the re-entry interval is 12 hours. Do not make ground or aerial applications within 75 feet of streams, rivers, ponds, lakes or reservoirs. Since Indar is the least systemic of the sterol inhibitor fungicides, a non-polymer containing spray adjuvant approved for use with registered pesticide products, e.g., a crop oil, may be added to spray solutions according to the manufacturer's use instructions to improve disease control by aiding penetration of Indar into the plant tissue. This may be helpful when applying the fungicide after an infection period to enhance curative activity. Reduced efficacy may occur if water containing suspended soil particles, such as water from ponds, streams or unlined ditches is used.

Indar belongs to the sterol demethylation inhibitor (DMI) class of fungicides (Group 3). Since certain fungi can develop resistance to this class of products, the use of Indar 2F should be part of a resistance management strategy that includes alternation and/or mixing with fungicides that have a different mode of action. Examples of fungicides to alternate with earlier in the season are Topsin M + Captan, Bravo and Captevate, whereas Pristine, Abound, Cabrio and Switch are good options when the weather warms up and more diseases need to be controlled (e.g., between pink bud and petal fall).

A new fungicide that is now labeled and may be of interest to blueberry growers is **Prev-Am** (sodium tetraborohydrate decahydrate, simply stated: boric acid). This is a fungicide as well as an insecticide/miticide, and can also be used as an adjuvant with other fungicides. In fungicide efficacy trials in Michigan in 2005 and 2006, Prev-Am showed good efficacy against anthracnose fruit rot. The application rate for disease control is 50 fl oz per 100 gallons and sprays should be applied every 7 to 10 days. The pre-harvest interval is 0 days and the re-entry interval is 12 hours. Do not apply this product aerially or through any type of irrigation system. The label lists Botrytis and powdery mildew as target diseases, and aphid, leafhopper, lygus bug, mealy bug and mite as target insects. However, we have not yet tested the product for these uses in Michigan. Be sure to read tank-mixing instructions on the label. (***Source**: Michigan Fruit Crop Advisory Team Alert, Vol. 22, No. 1, March 27, 2007*)

GRAPE

Early Season Insects in Grapes

Alice Wise, Cornell Cooperative Extension of Suffolk County

Early Season Insects: Generally early season insects are a curiosity more than a concern, the exception being European red mites. Scouting, which we all should be able to do at this time of year, is important in catching any developing problems.

• **Flea beetle** – Flea beetles or steely beetles are small (5 mm), shiny black beetles. They overwinter as adults. They attack both wild and cultivated grapes by boring into swollen buds, hollowing out the inside. Damage is more common near shrubby or wooded areas. Sometimes it is difficult to discern between flea beetle and cutworm injury.

• **Cutworm** – This general term applies to the larvae of a large number of lepidopterous species. These nocturnal feeders chomp on buds and will also feed on young leaves. In some eastern grape growing regions, cutworm is a pest problem that sometimes requires treatment, infestations are apparently worse with cool spring weather. Bud swell for an extended period gives the larvae more opportunity to feed. Damage is also more likely if there is mulch and/or weeds under the trellis as these provide daytime cover for larvae. This damage is not uncommon on Long Island but it does not appear to be so serious as to warrant treatment. As buds swell, take a couple of walks around the vineyard, particularly where previous cutworm damage has been seen. In the 06 Recommends, Sevin, Danitol and Imidan are listed as control options.

• **Grape plume moth** - Signs of grape plume moth (GPM) feeding have been increasingly common in local vineyards. First seen a few years ago on Long Island, this prebloom pest is actually the hairy larva of the plume moth. More advanced cases involve webbing together of leaves and even clusters. If the mass is examined, usually frass and sometimes the larvae may be present. You might also see a vine or part of a vine with basal leaves full of large holes. Expect to see more problems on edge rows. According to Cornell entomologist Greg EnglishLoeb, Sevin and Bt's should work. He recommends a 20% threshold, that is, 20% of shoots/clusters affected before treatment is warranted. If the infestation involves primarily clusters, the risk of crop loss is higher and a slightly more conservative threshold would be warranted. Often the window for treatment is gone by the time damage is seen. Experience with infestations at the research vineyard: the damage looks worse than it actually is and crop loss was minimal. Also, by the time the canopy filled the trellis, it was difficult to tell where the plume moth damage had been. Still, we are seeing more and more of GPM on Long Island and the situation merits watching.

• **European red mite** - Very stunted, pale shoots may mean a mite outbreak. Upon close examination, leaves are loaded with tiny red mobile mites. It is common for a small area – one side of a vine, one vine or a couple of vines – to be infested while neighboring vines have few or no mites. Thus, these early spring outbreaks are usually spotty, not well distributed through a block. It is difficult to predict exactly where these infestations will take place. If you can't walk your blocks, tractor scouting is a good way to spot mite infestations because the pale, stunted shoots will stand out. Logically, it seems the best chances for early infestations lie in blocks with heavy mite populations the fall prior. But that's just a guess.

European red mite early season infestations happen periodically in local vineyards. The need for treatment depends on the number of hot spots in a block. Use of JMS Stylet Oil or Purespray Green Oil prebloom likely keeps these early infestations in check and is the recommended treatment given the narrow options in miticides. The big advantage to early season oil – miticides can be saved for later in the season (if needed) when oil application becomes tricky due to heat, incompatibility with materials such as sulfur and issues with Brix accumulation. However, if sulfur and/or captan are part of your early season schedule, horticultural oils cannot be used due to incompatibility issues.

Miticide options other than oil are as follows. Prebloom miticide treatments are not common but neglect of a significant mite infestation at this time can really set vines back. Due to limited products and expense, materials must be chosen carefully. Lower rates are appropriate at this time of year.

Acramite 50 WS – Has reduced risk status, only one application per season permitted. Use a minimum of 50 GPA water, 12 hr. restricted entry interval (rei). Minimal impact on natural enemies. Acramite has continued to work well in research plots at LIHREC.

Agri-Mek 0.15EC and **ABBA** (generic label) – Restricted use materials with a 12 hr. rei. Do not apply within 150 ft. of water and include an NIS (non ionic surfactant). Labeled for two spot but not for ERM. Use a minimum of 50 GPA water. Two apps/season permitted but Agri-Mek is most effective on tender young foliage. A lower rate + generic label may make this cost competitive.

Danitol 2.4 EC– Restricted use, 24 hr. rei. Harsh on mite predators. Use no more than 2 apps/season for resistance management. Do not use within 100 ft. of water.

JMS Stylet Oil and **Purespray Green** – Horticultural oils can do a good job of ERM control if coverage is excellent. Both have a 4 hr. rei. Not compatible with sulfur, captan and other materials – check label for details. JMS has both a standard and an organic formulation. Purespray Green is similar to JMS in formulation and thus should work in a similar manner.

Kelthane 50 WSP – Restricted use. Kelthane has a status of registered – discontinued. According to the PIMS website, 'the registrant is no longer producing and shipping this product into NYS and intends to remove them [it] from registration on the expiration date listed'. Existing supplies can be used – double check the PIMS or DEC website to make sure the product is still registered before using it. Has a 48 hr rei, 2 apps/season. Some growers have noted reduced efficacy in recent years.

M-Pede – This insecticidal soap is OMRI listed. It is labeled for control of ERM on grapes with a 1-2% v/v solution for motile stages. The label suggests enhanced residual control when tank mixed with Kelthane or Vendex. Experience with materials such as M-Pede suggest that its best use would likely be for low to moderate infestations. Keep an eye on infested blocks to judge to need for follow up. Do not expect to successfully use this type of product on a raging infestation of mites. Also check label carefully for potential incompatibilities with other spray materials. Sulfur, adjuvants and penetrants and foliar fertilizers are all listed as incompatible.

Vendex 50 WP – Restricted use, 48 hr. rei, 2 apps/ season. Label gives a range of 1-2.5 lbs/a. If you have seen reduced efficacy in recent years, use a higher rate. Compatible with predatory mites.

Zeal Miticide 1 - Experience with Zeal indicates that it is best used earlier in the season, not on a raging infestation. It can take a week or so for Zeal to control mites. In research plots, after about 10 days, Zeal was one of the better miticide treatments. Zeal is reduced risk. Zeal is labeled for two-spot but there is a 2ee for European red mite. Make sure both labels are on hand. (***Source**: Long Island Fruit & Vegetable Update, No. 6&7, APRIL 20 & 27, 2007*)

General Information

Summary of Pesticide Changes for Small Fruit in 2007

adapted from Kathy Demchak, Penn State University

First, Nemacur use is being discontinued, though sales are permitted until May 31, 2008, and growers may continue to use existing stocks.

In order to provide consistency across strobilurin fungicide recommendations, the maximum number of recommended applications of group 11 (strobilurin) fungicides is

decreased to 4 per crop year for strawberries, and 3 for brambles and blueberries. For small fruit crops, group 11 fungicides are Abound, Cabrio, and one of the active ingredients in Pristine. This is not due to a change in labeling, but rather to provide consistency across labels and to delay development of resistance.

Strawberry insecticides and fungicides:

- Admire 2F at 16-24 fl oz/a is added for white grub control before planting.
- Procure 50WS at 4-8 oz/a and Quintec at 4-6 fl oz/a are added for powdery mildew management. Both Procure and Quintec have a 1-day PHI.
- For two-spotted spider mites, Oberon 2SC at 12-16 fl oz/a (3-day PHI) is added and a note is made that the registration of products containing dicofol (Kelthane and Dicofol) is being discontinued, though existing stocks may be used.
- For whiteflies, Oberon 2SC (3-day PHI) at 12-16 fl oz/a and Esteem 0.86EC at 10 fl oz/a (2-day PHI) are added.

Strawberry herbicides:

- note the importance of following applications of Sinbar to non-dormant strawberries during the planting year with 0.5 -1.0 inches of water.
- Chateau WDG at 3 oz/a is added for preemergent control of broadleaved weeds and some grasses. Applications of Chateau can be made to dormant strawberries in late fall of the transplanting year and in fall or early spring of harvest years.

Bramble insecticides and fungicides:
The last date for which Guthion could be used on brambles (Sept. 30, 2006) is now past, so Guthion is no longer allowed.

Blueberry insecticides and fungicides:
Indar 75WSP at 2 oz/a is added for control of mummy berry primary and secondary infections. Indar has a 30-day PHI.

The Ziram formulation is changed from Ziram 76WDG to Ziram Granuflo. The rates remain the same.

Surround 95WP at 12.5-50 lb/a is added to the list of materials for plum curculio management at petal fall and for blueberry maggot management at fruit maturation, but only within the first 3 weeks after fruit set due to white residues on the fruit.

Concerning new materials mentioned above, Chateau, Indar, Quintec, Procure, and Oberon have 12-hr REI's. Surround's REI is 4 hours. As always, the label is the law and is the final word on how pesticides should be used. (***Source**: Penn State Fruit Times, Vol. 26, No. 4, April 24, 2007*)

Protecting Honey Bees from Chemical Pesticides

Maryann Frazier, Penn State University

Honeybees 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 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 several 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 neonicotinoids 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 feed on the plants. 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 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, 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 honeybees, and different chemicals in this class are known to vary in their toxicity to bees, however the EPA identifies both imidacloprid and colthianidin 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 honeybees 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

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 with insecticides. Also while crops may have completed blooming, bees may be visiting blooming weeds in and 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 only 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 additional information please visit the MAAREC web site at: http://maarec.cas.psu.edu/index.html

References:

EPA Fact Sheet on Clothianidin Decourtye, A., C. Armengaud, M. Renou, J. Devillers, S. Cluzeau et al.(2004).

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(***Source**: Penn State Fruit Times, Vol. 26, No. 4, April 24, 2007*)

Upcoming Meetings:

May 2, 9, 16 and 23, 2007 - **Exploring The Small Farm Dream**: A four-session course for those who are considering farming as a business.

Offered at the UMass Cranberry Station
1 State Bog Road
East Wareham, MA 02538
4 Sessions May 2, 9, 16 and 23, 2007
6:00 PM to 9:00 PM

For more info, contact Rick Chandler, MDAR, 25 West Experiment Station, UMass, Amherst, MA 01003
Email: rchandler@umext.umass.edu
Phone: 413-577-0459

UMass Extension Fruit Twilight Meetings

Date	Meeting/event	Location	Time	Information
May15	Fruit Team Twilight Meeting	**UMass Cold Spring Orchard**, 391 Sabin St., Belchertown MA	5:30 PM	Jon Clements 413-478-7219
May16	Fruit Team Twilight Meeting*	**Brookdale Fruit Farm**, 36 Broad St., Hollis, NH	5:15 PM	George Hamilton 603-641-6060
May17	Fruit Team Twilight Meeting*	**TBA**, somewhere in Rhode Island	5:30 PM	Jon Clements 413-478-7219

Pesticide re-certification credits offered at each Fruit Team Twilight meeting. Please be on time to receive credit
** In cooperation with New Hampshire Fruit Growers' Assoc. and UNH Cooperative Extension*
*** In cooperation with Rhode Island Fruit Growers' Assoc.*

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