



Berry Notes

Prepared by the University of Massachusetts Fruit Team

March 2009 Vol. 21, No. 3

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

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UPCOMING MEETINGS

Message from the Editor

Good Agricultural Practices (GAP) Food Safety Training -

Wednesday May 6, 2009 1:00-5:30 PM at the UMass South Deerfield Research Farm

Foodborne outbreaks linked to fresh produce have increased in recent years. To address this issue, UMass Extension, the UMass Department of Nutrition and the MA Department of Agricultural Resources have teamed up to implement a USDA Good Agricultural Practices (GAP) Training Program for growers and other fresh produce handlers. This event will be held Wednesday, May 6 from 1-5:30 PM at the UMass South Deerfield Research Farm, River Road, South Deerfield. Attendees will learn about bacteria associated with fresh produce, strategies for controlling food safety hazards in all phases of production and USDA Third-Party GAP Audits. Participants will receive a GAP manual, a certificate of participation, and one pesticide credit is offered. Presenters include: Rich Bonanno, Ph.D., UMass Extension Educator; David Nyachuba, Ph.D., Assistant Professor, UMass Department of Nutrition; Scott Soares, Commissioner, MA Department of Agricultural Resources and Mike Botelho, MA Department of Agricultural Resources. Preregistration is required. Registration deadline: April 27, 2009. To register send \$50.00 payable to the University of Massachusetts to: Shirley A. Mietlicki-Floyd, UMass Department of Public Health, 205 Arnold House, 715 North Pleasant Street, Amherst MA 01003-9304

New Interactive Online IPM Training Tool - available from Ontario.

This interesting new tool can be viewed at <http://www.omafra.gov.on.ca/IPM/english/index.html>. This is an interactive educational tool for learning about Integrated Pest Management in several crops. The site features:

- photo galleries,
- pest scouting calendars, and
- identification keys,
- additional resources

Ontario CropIPM includes modules for:

- Brassicas
- **Strawberries**
- Peppers
- Cucurbits
- Sweet corn
- Tomatoes

New Publication from Penn State: Using Organic Nutrient Sources - is now available through Penn State Cooperative Extension at <http://pubs.cas.psu.edu/Publications.asp> or <http://pubs.cas.psu.edu/FreePubs/pdfs/uj256.pdf>. The publication is intended to help growers interpret soil test recommendations for using organic nutrient sources. This valuable publication includes information on :

- USDA National Organic Standards Summary on Soil Fertility Mgt
 - National Organic Standards Summary for Fertilizers and Soil Amendments Use
 - Balance and Imbalance of Nutrients in Organic Nutrient Sources
 - Nutrient Availability from Organic Nutrient Sources
 - Soil pH, Calcium, Magnesium Levels
 - Recommendations for Nitrogen, Phosphate, and Potash
 - Soil Organic Matter Content
 - Mineralization • Using Compost • Using Manure And much more....
-

STRAWBERRY

Spring Strawberry Chores

Sonia Schloemann, UMass

Established plantings:

1. **Straw mulch removal** – Remove straw mulch from strawberry rows in late-March to early April. Keep straw between the rows to help suppress weeds and reduce splashing from rain or irrigation. For fields where delaying bloom to avoid frost is desired, delaying mulch removal can be a useful technique. Check plants frequently and be sure to remove mulch before any plant growth begins. Delayed mulch removal can delay bloom by up to a week.
2. **Floating row covers** – Set out floating row covers as soon as straw mulch is removed on fields where early bloom is desired. Remember to remove row covers as soon as plants beneath them are blooming to insure good pollination of the flowers. Failure to remove row covers can result in poor pollination and misshapen unmarketable fruit.
3. **Spring weed control** – Calibrate weed sprayer before season starts. Apply pre-emergent herbicides to dormant strawberries. See the 2008-09 New England Small Fruit Pest Management Guide (www.umass.edu/fruitadvisor) for detailed recommendations as well as the last issue of Berry Notes (March 2009 Vol. 21, No. 3) for new materials for 2009.
4. **Frost Protection** – be sure that overhead irrigation for frost protection is in place and running properly before it is needed. Pump failures and blown irrigation lines are no fun at 2:00 in the morning. The next issue of Berry Notes will carry detailed information about frost protection.
5. **Insect and disease management** – Calibrate sprayer before season starts. See article in this issue for more information. Order scouting supplies (traps, pheromones, etc.) and anticipated spray materials and store properly.

New plantings:

1. **Site preparation** – Prepare field properly well in advance of planting. This means doing site work (e.g., drainage, running irrigation mains, picking stones, etc.), and making soil adjustments (e.g., soil pH, organic matter, etc.).
 2. **Preplant weed management** – Some pre-plant herbicides must be applied 30 days prior to planting. Keep this in mind. Some herbicides can be applied shortly before or after planting See the 2008-09 New England Small Fruit Pest Management Guide (www.umass.edu/fruitadvisor) for detailed recommendations as well as the last issue of Berry Notes (March 2009 Vol. 21, No. 3) for new materials for 2009.
1. **Planting** –
 - a. Check condition of plants on arrival and contact nursery if you have concerns.
 - b. Keep dormant plants moist (but not wet) and cold (32°F) until planting.
 - c. Lay out planting scheme before taking plants out of cold storage or have field ready before delivery if no cold storage is available.
 - d. Make sure transplanter is in good running order before planting day.
 - e. Soak roots in water for up to an hour before planting. Do not allow plants to sit in water much longer before planting but make sure they are moist until planted.
 - f. Set plants so the middle of the crown is at the soil surface (not too deep or too shallow). This may take some fine-tuning of the planter.
 - g. Irrigate immediately after planting to settle soil around the plants.
 - h. Recheck planting depth after irrigation and make adjustments as needed.

Spring Bramble Chores

Sonia Schloemann, UMass

Established Plantings:

1. **Pruning and trellising** - Finish pruning before budbreak by removing spent floricanes and thinning remaining canes to 6-8" apart. Keep row with to no more than 18" at the base. These practices allow for good air circulation and light penetration within the canopy and benefit fruit quality.
2. **Spring weed control** – Calibrate herbicide sprayer before season starts. Apply pre-emergent herbicides according recommendations in the 2008-09 New England Small Fruit Pest Management Guide (www.umass.edu/fruitadvisor) and information in the last issue of Berry Notes (March 2009 Vol. 21, No. 3) for new materials for 2009. Hand-weed trouble spots with perennial weeds if needed.
3. **Insect and disease management** – Calibrate sprayer before season starts. See article in this issue for more information. Order scouting supplies (traps, pheromones, etc.) and anticipated spray materials and store properly. A dormant lime-sulfur application can help control cane and spur blights.

New Plantings

1. **Site preparation** – Prepare field properly well in advance of planting. This means doing site work (e.g., drainage, running irrigation mains, picking stones, etc.), and making soil adjustments (e.g., soil pH, organic matter, etc.).
2. **Preplant weed management** – Some pre-plant herbicides must be applied 30 days prior to planting. Keep this in mind. Some herbicides can be applied shortly before or after planting See the 2008-09 New England Small Fruit Pest Management Guide (www.umass.edu/fruitadvisor) for detailed recommendations as well as the last issue of Berry

Notes (March 2009 Vol. 21, No. 3) for new materials for 2009.

3. Planting –

- a. Check condition of plants on arrival and contact nursery if you have concerns.
- b. Keep dormant plants moist (but not wet) and cold (32°F) until planting. Plant as soon as is feasible after delivery.
- c. Lay out planting scheme before taking plants out of cold storage or have field ready before delivery if no cold storage is available.
- d. If using a transplanter, be sure it is in good running order before planting day.
- e. Soak roots in water for up to an hour before planting. Do not allow plants to sit in water much longer before planting but make sure they are moist until planted.
- f. Set dormant plants at the same depth as they were in the nursery. This may take some fine-tuning of the planter. Trim 'handles' to 6" at planting.
- g. Irrigate immediately after planting to settle soil around the plants.
- h. Apply a layer of organic mulch to help suppress weeds until plants are well established. Mulching is only recommended in raspberries during the establishment year. In subsequent years, mulch can lead to rot at the base of canes from excess moisture.
- i. Seed row middles to slow growing sod such as hard fescue to reduce soil erosion.

Blueberry Disease Fast Fact Sheet; Mummy berry

Dena Fiacchino, Cathy Heidenreich, and Wolfram Koeller, Cornell University



Figure 1.

What: Mummy berry is caused by the fungus, *Monilinia vaccinii-corymbosi*, and is one of the most important blueberry diseases in New York State. If left untreated, mummy berry can reduce yields by 30-40%. Early control and detection is necessary to reduce the impact of this disease.

When: The fungus overwinters in infected berries, or “mummies” on the soil under bushes. Mushroom-like structures (apothecia) grow out of the mummies (Figure 1). In early spring, ascospores are released from the apothecia to infect the newly emerging leaf tissue. These spores are disseminated by wind and rain. This step is the primary or shoot blight phase of the disease. Shoot blight symptoms typically develop 2 weeks after infection. Infected shoots and leaves wilt, turn brown, and die (Figure 2). Masses of secondary spores (conidia) are produced on infected shoot surfaces



Figure 3.

(Figure 3), which then infect flower blossoms, starting the second phase of the disease.

Where: Mummy berry occurs in most regions where blueberries are commercially grown. This fungus only infects cultivated blueberries and a few wild blueberry species. Generally, the disease is introduced from neighboring infected plantings or from wild blueberries in nearby woods.

How: Under moist conditions in early spring, apothecia begin to form from mummified fruit remaining on the soil surface. The apothecia slowly develop as moisture levels and temperatures rise. At low temperatures such as 35° F, spores mature slowly taking 10+ hours to release, however at an increased temperature of 61° F, apothecia take about 4hrs to fully mature.



Figure 2.

Conidia form on infected shoots, then are carried to flower blossoms by wind and pollinating bees (who are tricked by color changes and sugar secretion into thinking that the infected leaves might be flowers). Once the fungus has been introduced to the flower, it will germinate with the pollen and slowly infect the developing fruit. Evidence of blossom infection does not appear until the fruit begins to ripen. As normal berries ripen, the infected berries begin to shrivel and turn a pinkish color. (Figure 4) These "mummy berries" become filled with fungus, and have a hard grayish white center.

They fall to the ground, shrivel up becoming pumpkin-shaped, and turn dark brown or black. These serve as an inoculum source the following spring when apothecia form and disease cycle begins again.

Control Strategies: Mummy berry can be a difficult disease to control. An integrated pest management program including both cultural and chemical control strategies is needed for best results. The best time to achieve control of this disease is during the primary infection phase.

- Rake or disk soil beneath the blueberry bushes or cover the fallen mummy berries with a 3-4 inch mulch layer before apothecia appear in the spring.
- Apply 200lbs/A of 50% urea to burn out apothecia.



Figure 4.

- Fungicides may be used to control this disease during both disease phases. For control of the primary infection phase applications should begin at green tip and continue on 7-10 day intervals when conditions favor infection.

For secondary infection control, make applications beginning at bloom on the same type of schedule. Different fungicides are required to control primary vs. secondary infections.

For more information see *Cornell Pest Management Guidelines for Berry Crops* [or *2008 New England Small Fruit Pest Management Guide*]. Apply all pesticides according to label rates and instructions.

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3. Pritts, M.P. and Hancock, J.F. (eds.) 1992. Highbush Blueberry Production Guide. Northeast Regional Engineering Service, Ithaca, NY.
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(Source: *New York Berry News*, Vol. 5, No. 2, March 31, 2006)

Cankerworm and/or Winter Moth in Blueberries

*Bob Childs and Deborah Swanson, UMass Extension
(adapted for blueberries by Sonia Schloemann, UMass Extension)*

In recent years, many blueberry growers in eastern, and especially southeastern Massachusetts, have reported serious damage from early season feeding of a small green caterpillar originally thought to be green canker worm. Last year, we determined that this caterpillar is more likely the larval stage of an insect called Winter Moth and the potential for serious damage to blueberries and other host plants is high.

Winter Moth is a new pest in Massachusetts. Prior to its introduction, both spring and fall cankerworms were not uncommon in our area. However, the level of damage from Cankerworms was typically less severe and occurred less frequently compared to the damage we are now finding from Winter Moth. Cankerworms, both fall and spring, are native insect pests.

Cankerworm populations will appear in an area and exist in damaging numbers for several years before going into decline due to natural controls. Then they may not reappear in that area for one or more decades. The winter

moth, however, is an introduced insect pest and as such does not have sufficient natural controls yet to cause the populations to decline. Here is what we know about Winter Moth, its life cycle, damage and how to control it.

Winter Moth (*Operophtera brumata* (L.))

Origin: Winter moth is an insect pest that was introduced to North America from Europe. Its introduction has been known for years in various regions of eastern Canada, including: Nova Scotia, Prince Edward Island, and parts of New Brunswick. It has also been a pest in the northwestern region, namely Vancouver, British Columbia.

Winter Moth was introduced into the United States and has warranted control measures in Washington and Oregon. This pest is now in Massachusetts in, at least, the southeastern region and parts of Cape

Cod. It is the first known occurrence of it in outbreak proportions in New England. It is also, currently, a problem in the United Kingdom (England and Scotland).



Photographer: Louis-Michel Nageleisen, Département de la Santé des Forêts - France

Injury and Host Plants: Many different deciduous plants are susceptible. These include: oaks, maples, basswood, white elm, crabapples, apple, **blueberry**, and certain spruces such as Sitka spruce (Scotland). Young larvae or caterpillars, resembling inchworms, tunnel into and feed inside buds, especially on fruit trees (apple, **blueberry**, cherry, and crabapple) in the early spring before bud break.

These caterpillars move from bud to bud as they feed. Delayed bud opening due to cool weather conditions can lead to bud death as the caterpillars have longer time to feed. Older larvae feed in the expanding leaf clusters and are capable of creating defoliation in high populations.

Research in Canada has shown that four consecutive years of partial defoliation of deciduous hosts can lead to branch mortality while complete defoliation in each of those years leads to tree mortality. In certain regions of Nova Scotia, this pest is responsible for a 40% red oak mortality in forested stands.

Life Cycle: Moths, or the adult stage, of the winter moth emerge from the soil usually in late November and can be active into January. The adults are strongly attracted to light and can often be found flying around outside lamps or holiday lights. The male moths are 4 cm, light brown to tan in color and have four wings that are fringed with small elongate scales that give the hind margins a hairy or fringed appearance. The female is gray, wingless and, therefore, cannot fly. She emits a sex pheromone or scent that often attracts clouds of male moths.

Females are usually found at the base of trees but can be found almost anywhere. After mating, the female deposits an egg cluster on tree trunks and branches, in bark crevices, under bark scales, under loose lichen, or elsewhere. The adult moths then die and the eggs overwinter. Eggs hatch when temperatures average around 55°F. It is believed that egg hatch in Massachusetts occurs when 20 – 50 Growing Degree Days (base 50) have accumulated. This means that this usually occurs in the spring, before bud break of most of its host plants. Newly hatched larvae often crawl up tree trunks and produce a long 8 silken strand of silk which makes them air buoyant. This larval dispersal method is known as “ballooning”. In certain situations, winter moth caterpillars can arrive in areas where they have not expected to be a problem, given topography and wind patterns. Larvae are pale green caterpillars with a white longitudinal stripe running down each side of the body. Winter moth larvae are loopers or inchworms and have just 2 pairs of prolegs. At maturity, these caterpillars will

be approximately one inch long. They will feed voraciously until mid-June, whereupon they migrate to the soil for pupation. They will stay in the soil in the pupa stage until they emerge in late November as adult moths.

Feeding: In certain years, winter moth eggs may hatch in March. After ballooning, the larvae will tunnel into buds, especially the flower buds of fruits (apple, blueberry, cherries, and flowering trees). They will feed on both fruit and foliar buds but fruit buds are preferred. Once a bud has been devoured from within, the caterpillar will migrate to other buds and repeat the process. Once leaf buds open, the small caterpillars can be found within the tight clusters of new leaves during the day. During cool springs, if weather hinders leaf expansion, the winter moth caterpillar can cause high levels of injury to these leaves. Winter moth



caterpillars often leave these clusters to become free feeders at night. They may also “drop” or “balloon” to plants that are located beneath infested trees. These caterpillars may then feed on a whole host of herbaceous perennials, roses etc. that are near or beneath these trees. Winter moth caterpillars are often found in association with both the fall and spring cankerworms, which look and have similar feeding patterns to the winter moth caterpillar.

What can be done?

- **Scout:** Orchardists need to be particularly aware of the winter moth. The potential exists for both apple and blueberry crops to be heavily damaged. By the time one realizes that the flower buds have been consumed, it will be too late for action. Therefore, favored host plants in susceptible areas should be monitored carefully. Bark crevices should be inspected for egg clusters. By late winter, winter moth eggs will be reddish-orange in color. Upon hatching, winter moth caterpillars climb high into the host plant and produce a long strand of silk to make themselves air buoyant. They will be carried by the wind to a new host plant. This process of dispersal is called “ballooning”.

- A **dormant oil spray** to the blueberry bushes may be helpful in killing the overwintering eggs before they hatch. However, some egg clusters are under bark flaps and loose lichen and may be protected from oil sprays. Eggs may also be in other locations on or off the host plant. Caterpillars may also invade host plants by ballooning onto them after treatment has been applied.

- ***Bacillus thuringiensis* (B.t. (kurstaki))**, a bacterium specific to caterpillars of butterflies and moths, works very well on the younger larvae of both winter moth and cankerworms while they are free feeders.

- **Spinosad** products (SpinTor® and Entrust®), both of which are labeled on blueberries are a biorational compound that works well against both of these species.

- **Insecticidal soap** may be effective against the younger caterpillars but only when they are exposed on the host plant.

- **Chemical insecticides.** Few compounds, are labeled for this pest although many are being tested and may receive supplemental labels in the future.

Confirm® insecticide is labeled for loopers, spanworms and other lepidopterous pests in blueberry and should be

effective. Imidan® may also be effective. Consult your local supplier and always read, understand and follow all label directions for pesticide products.

- **Plants heavily defoliated** by winter moth caterpillars will be severely stressed. Blueberry bushes must put out a second flush of growth in order to survive. **Water is critical to the bushes at that time.** Supplemental watering of bushes will be necessary if a drought or little rainfall occurs naturally. (*Source: Reprinted from Mass Berry Notes, Vol. 17, No. 2, Feb 2005*)

GRAPE

Early Season Insects in Grapes

Alice Wise, Cornell Cooperative Extension of Suffolk County

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.

- **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 Loeb, 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

Sprayer Calibration

Laura McDermott, Cornell Cooperative Extension

The importance of nozzle selection and sprayer calibration cannot be overstated. There are many studies that show that hundreds, if not thousands of dollars a season can be saved with attention to spray equipment and spray application. Additionally, according to Dr. Andrew Landers, pesticide application technology specialist at Cornell University, drift from pesticide applications can be reduced by as much as 50% by correctly selecting nozzles. Perhaps most importantly, weed, insect, and disease control will be more effective if growers follow a few simple guidelines to improving their sprayer performance.

First, pesticide sprayers should be calibrated routinely. If your farm includes fields with varying terrain, the sprayer should be calibrated for terrain type. Even backpack sprayers, which are often used by small berry growers, should be calibrated routinely. Backpack sprayers should

always be calibrated by the person who is doing the spraying. When calibrating the sprayer, make sure to mimic the actual application as close as possible. Fill the spray tank half full of water and drive at the normal rate in your normal gear. Repeat the process at least 3 times



and take the average. If you are moving up and down a hill, make sure that you time the tractor travel in both directions. The purpose of sprayer calibration is to reduce error, so try hard to reduce possibilities of error while calibrating.

Secondly, before you calibrate your sprayer, make sure that your nozzles and your spray equipment are appropriate for the task. There are many nozzles on the market today, all with different functions. If you haven't recently thought about what your nozzles are doing for you, it's time to re-evaluate them. Make sure that spray patterns from the nozzles are what you expect. Inspect the hoses and filters, making sure the nozzles are not clogged. Non-uniform spray patterns caused by worn or clogged nozzles, or different angles or uneven boom height are the most common cause of poor applications. Also, check the calibration of your spray tank by using a hose-end meter. Pay attention to your spray pressure. Make sure that you are operating the sprayer under the pressure recommended for your nozzle type. Keep the spray pressure consistent. Faulty spray pressure will cause your spray patterns to break down resulting in untreated areas in the field.

Thirdly, simplify your life by keeping your calibration equipment together. You will be much more likely to calibrate your sprayer if you assemble your "kit" ahead of time. Keep calibration directions, records of prior calibrations, tape measure, stop-watch, pencils, calculators, calibration jug, distance markers, and plastic gloves in a tote. Keep extra nozzles, washers, and other spare parts along with simple tools in a tool kit to carry on your tractor.

Fourth, spray when the least possible drift will result. Consider low-drift nozzles, and drift reduction strategies

like keeping the boom close to the target, using drift retardant adjuvants and spraying when wind is low will help you reduce losing your spray material to an undesirable target.

Lastly, be safe. Make sure to wear the Personal Protective Equipment (PPE) listed on the pesticide label.

Be sure you have the proper type of gloves, respirator and footwear that are required. For directions and more information on calibrating your sprayer, see <http://www.nysaes.cornell.edu/ent/faculty/landers/pestapp/>.

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(Source: New York Berry News, Vol. 8, No. 3, April 2009)



Fungicide Update for Berries and Grapes

Annemiek Schilder Michigan State University

In the past year or two, various new fungicides have been labeled for use in berry crops and grapes; you may already be familiar with some of these, but others will be new. Not all of the new products represent new chemistries. Four major developments have driven new fungicide registrations of late and demonstrate that the disease situation in other crops can affect the availability of fungicides for berries and fruit crops as well. First of all, the threat of soybean rust has pushed along the review and registration of sterol inhibitor fungicides by the US Environmental Protection Agency (EPA); as a result, we finally received registrations for the fungicides Indar and Orbit for blueberries and cranberries. In addition, Orbit is labeled for a range of other berry crops. Various new sterol inhibitor fungicides are currently in the pipeline as well.

Secondly, an outbreak of cucurbit downy mildew has driven the development of downy mildew fungicides, and currently we have three new products, Presidio, Revus, and Tanos, in our downy mildew control arsenal for grapes. Thirdly, patents have run out on a number of proprietary fungicide products and "generic" versions are now available or being developed for some commonly used fungicides. Generic products tend to be more economical, but may not have been separately evaluated and therefore you may not find them specifically recommended in the E-154 Fruit Management Guide. Do read the pesticide label carefully, as generic products may have different labels from brand name products and from each other. Lastly, as competition by generic products in the agrichemical industry increases, some companies are starting to market pre-mix products. Mixtures of two or more active ingredients may extend

patent rights if companies can claim novel synergistic effects of the components in the mixture. This has led to the registration of a number of pre-mix fungicides, such as Adament, which is a mixture of Flint and Elite. Below some of the newer fungicides and products with expanded or modified labels:

Adament (tebuconazole and trifloxystrobin) is a mixture of a systemic (tebuconazole) and surface-systemic (trifloxystrobin) fungicide. It is a broad-spectrum fungicide that is labeled for control of multiple diseases on *grapes*, cherries, peaches, and nectarines. Adament is rainfast when dry, generally within two hours. Adament is effective against cherry leaf spot, brown rot, and powdery mildew on cherries, and powdery mildew in grapes. It has been moderately effective against Botrytis bunch rot. More research is needed to evaluate its efficacy against Phomopsis in grapes. Adament is best used as a protectant. Do not apply this product on ‘Concord’ grapes, as crop injury may result. Do not make more than two consecutive applications or a total of six (grapes) and four (stone fruit) applications per season.

Equus (chlorothalonil) has the same active ingredient as Bravo and is available as Equus 720 SST, Equus DF, and Equus 500 ZN. It is labeled for stone fruit, *blueberry*, and *cranberry*. The efficacy of this product has not been specifically evaluated in Michigan.

Indar (fenbuconazole) is a systemic sterol inhibitor fungicide labeled for control of a wide range of diseases, including those caused by *Monilinia* spp., in apples, cherries, peaches, nectarines, plums, apricots, *blueberries*, and *cranberries*. Indar is available in a 2F (flowable) or 75WSP formulation. Indar has preventative and curative properties, but it is best to use it on a preventative program. Do not make ground or aerial applications within 75 feet of bodies of water. The PHI is 30 days in blueberries and cranberries.

Nevado (iprodione) has the same active ingredient as Rovral. It is labeled for use in stone fruit, *grapes*, *strawberries*, *raspberries*, *blackberries*, *currants*, and *gooseberries*. The efficacy of this product has not been specifically evaluated in Michigan.

Orbit (propiconazole) is a systemic sterol inhibitor fungicide labeled for a wide range of diseases in *blueberries*, *raspberries*, *blackberries*, cranberries (Oregon, Washington, and Wisconsin only), *gooseberries*, *currants*, *strawberries*, and stone fruit. Orbit has preventative and curative properties. The PHI is 30 days in all berry crops, except cranberries (PHI is 45 days) and strawberries (PHI is 0 days). Do not apply Orbit to ‘Stanley’ plums within 21 days of harvest.

Orius (tebuconazole) has the same active ingredient as Elite. It is labeled for use in stone fruit and *grapes* and is available as Orius 45DF and Orius 45WP. The

efficacy of this product has not been specifically evaluated in Michigan.

Presidio (fluopicolide) is a new systemic fungicide which is active against diseases caused by downy mildews and other oomycetes in *grapes* and vegetables. This fungicide has a novel mode of action and has protective, curative, eradicated, and antispore properties. Presidio is locally systemic and translaminar and moves systemically via xylem tissue. Furthermore, Presidio is compatible with many fungicides and insecticides and is rainfast in two hours. The PHI for grapes is 21 days; no more than two sequential applications are allowed. A tankmix with another fungicide with a different mode of action must be used with Presidio for resistance management.

PropiMax (propiconazole) is a systemic sterol inhibitor fungicide similar to Orbit that is labeled for control of a range of diseases in *blueberries*, *raspberries*, *blackberries*, cranberries (Oregon, Washington, Wisconsin only), and stone fruit. Do not apply PropiMax to cherries or “Stanley-type” plums. PropiMax has not been specifically evaluated in Michigan. The PHI is 30 days for berries other than cranberries (45 days).

Revus (mandipropamid) is a new systemic fungicide which is active against downy mildew in *grapes* and vegetables. It has preventative and limited curative properties. A maximum of four sprays and two sequential sprays is allowed. The addition of a spreading/penetrating type adjuvant such as a non-ionic based surfactant or crop oil concentrate is recommended. The PHI is 14 days for grapes.

Serenade Max (*Bacillus subtilis*) is a protectant biofungicide that is OMRI listed and therefore can be used in organic production. Serenade Max is a more concentrated version of Serenade. It is labeled for use against a variety of *blueberries*, *strawberries*, *raspberries*, *blackberries*, *cranberries*, *gooseberries*, *currants*, pome fruit and stone fruit. Serenade has a zero-day pre-harvest interval and a four-hour re-entry interval. Serenade has been fairly effective against mummy berry and anthracnose in blueberry; and downy mildew, black rot, and Phomopsis in grapes. Adding a non-phytotoxic spray adjuvant, such as NuFilm is recommended.

Sonata (*Bacillus pumilis*) is a protectant biofungicide that is OMRI listed and therefore can be used in organic production. Sonata is labeled for use on *grapes*, *blueberries*, *strawberries*, *raspberries*, *blackberries*, *gooseberries* and *currants*. The label lists control of leaf rust and powdery mildew in berry crops, and powdery mildew in strawberries and grapes. Sonata has a zero-day pre-harvest interval and a four-hour re-entry interval. Sonata has been moderately effective against powdery mildew, downy mildew, and Phomopsis in grape trials in Michigan. Adding a non-phytotoxic spray adjuvant, such as NuFilm is recommended.

Tanos (famoxadone and cymoxanil) is a new, broad-spectrum fungicide for control of downy mildew in *grapes*

and suppression of anthracnose, *Pseudomonas* blight, and spur blight in *raspberries* and *blackberries*. It has curative and locally systemic properties against downy mildews. Tanos rapidly penetrates into plant tissues and is rainfast within one hour of application. It must be tank-mixed with a contact fungicide labeled for that crop (e.g., mancozeb, captan or copper). A maximum of nine applications of Tanos including other group 11 (strobilurin) fungicides is allowed per season. The PHI is 30 days for grapes and zero days for raspberries and blackberries.

Tebuzol (tebuconazole) has the same active ingredient as Elite and is available as Tebuzol 45DF. It is labeled for use in stone fruit and *grapes*. The efficacy of this product has not been specifically evaluated in Michigan.

Thiophanate Methyl (thiophanate methyl) has the same active ingredient as Topsin M. It is labeled for use in apples, pears, stone fruit, *grapes*, and *strawberries*. The efficacy of this product has not been specifically evaluated in Michigan. (*Source: Michigan Fruit Crop Advisory Team Alert, March 31, 2009*)

2009 Fruit Insecticide Registration Update

*adapted from John Wise, Rufus Isaacs and Larry Gut, Michigan State University
(adapted by Sonia Schloemann, UMass)*

This is a summary of insecticide/miticide label new additions and corrections to the 2009 MSU Fruit Management Guide (E-154). Agri-chemical labels and regulations can change quickly so use this information within the context of each compound's actual label.

Altacor (rynaxypyr; chlorantraniliprole) belongs to a new class of insecticides called the anthranilic diamides, which work on the insect by activating ryanodine receptors, thus depleting internal calcium and preventing muscle contraction. Altacor is registered in pome fruits, stone fruits and *grapes* for control of a range of pests including leafrollers, codling moth, oriental fruit moth, grape berry moth, and is also active on the apple maggot and cherry fruit fly via ingestion. Altacor has shown to be relatively safe on many beneficials. The maximum yearly amount of Altacor 35 WG that can be applied is 9 oz per season.

Assail (acetamiprid) belongs to a new class of insecticides called neonicotinoids (chloronicotinyl subclass). Assail is registered for use in pome and stone fruits, targeting aphids, leafhoppers, leafminers, psylla, plum curculio, apple maggot, oriental fruit moth, and codling moth. Assail is labeled on *grapes* for control of leafhoppers and aphids, rose chafer, phylloxera, and Japanese beetle. Assail is labeled for use on *strawberry*, *blueberry* and *caneberry* for leafhoppers, aphids, sap beetle, blueberry maggot, fruitworms, and Japanese beetle. This translaminar (locally systemic) material has long residual inside the plant. Because most of Assail's surface residue is quickly absorbed into the plant, negative impact on natural enemies is minimized.

Belt (flubendiamide) belongs to a new class of insecticides called the anthranilic diamides, which work on the insect by activating ryanodine receptors, thus depleting internal calcium and preventing muscle contraction. Belt is registered in pome fruits, stone fruits and *grapes* for control of a range of pests including leafrollers, codling moth, oriental fruit moth, and grape berry moth. Belt has shown to be relatively safe on many

beneficials. The maximum yearly amount of Belt 4 SC that can be applied is 15 fl oz in pome fruits and 12 fl oz in stone fruits and grapes per season.

Clutch (clothianodin) belongs to a new class of insecticides called neonicotinoids. Clutch is registered for use in apples, pears and *grapes*, targeting aphids, leafhoppers, leafminers, psylla, plum curculio, apple maggot, oriental fruit moth, grape berry moth and codling moth. In grapes, the multi-colored Asian lady beetle has been added to the label with a zero-day phi. This translaminar (locally systemic) material has long residual inside the plant. Clutch has a broad spectrum of pest activity, being effective on piercing/sucking insect pests, as well as controlling several internal feeding insects of fruit. Clutch 50 WDG is restricted to a total of 6.4 oz per acre per season in pome fruits, and 6 oz in grapes.

Leverage (imidacloprid + cyfluthrin) is a new insecticide that combines two active ingredients as a pre-mix formulated compound. Leverage is registered for use in pome fruits, stone fruits and *grapes* targeting codling moth, oriental fruit moth, leafrollers, aphids, leafhoppers, leafminers, psylla, fruit flies and plum curculio. Leverage holds the combined performance attributes of the imidacloprid and cyfluthrin chemistries. For the purposes of resistance management, after using Voliam flexi in a given pest generation, products containing either one of imidacloprid and cyfluthrin shouldn't be used in the subsequent generation. The maximum yearly amount of Leverage 2.7 SE (suspension emulsion) to be applied is 5.1 oz on pome fruits, 10.2 oz on stone fruits, and 8 oz on grapes per season.

Movento (spirotetramat) belongs to a new class of insecticides called the tetramic acid derivatives, which work on the insect by inhibiting lipid biosynthesis. Movento is registered in pome fruits, stone fruits and *grapes* for control of aphids (including woolly apple aphid), scale insects, mealy bugs, phylloxera and pear psylla. Movento has a unique two-way systemic

movement in the plant (phloem and xylem), such that with foliar applications it is transported to young leaf tissue, but also down to the root tips. It has shown to be relatively safe on many beneficials. The maximum yearly amount of Movento 2F that can be applied is 25 oz in pome fruits and 15.3 oz in stone fruits, and 12.5 oz in grapes per season.

Mustang Max (zeta-cypermethrin) is a pyrethroid insecticide registered for use on *grapes*, *blueberries*, *caneberries*, pome and stone fruits for the control of many insect pests, including cutworms, plant bugs, leafhoppers, leafrollers, fruitworms, beetles, and fruit flies. This material is highly toxic to bees and is disruptive to natural enemies. Do not apply more than 24 fl oz of Mustang Max 0.8EC per acre pre season.

Tourismo (flubendiamide/buprofezin) is a new insecticide that combines two active ingredients as a pre-mix formulated compound. Tourismo is registered for use in pome fruits, stone fruits and *grapes* targeting codling moth, oriental fruit moth, leafrollers, grape berry moth, fruitworms, mealybug, cutworms and scale insects. Tourismo holds the combined performance attributes of the flubendiamide and buprofezin chemistries. For the purposes of resistance management, after using Tourismo in a given pest generation, products containing either one of flubendiamide and buprofezin shouldn't be used in the subsequent generation.

Voliam flexi (thiamethoxam + chlorantraniliprole) is a new insecticide that combines two active ingredients as a pre-mix formulated compound. Voliam flexi is registered

for use in pome fruits, stone fruits and *grapes* targeting codling moth, oriental fruit moth, leafrollers, grape berry moth, aphids, leafhoppers, leafminers, psylla, cherry fruit fly and plum curculio. Voliam flexi holds the combined performance attributes of the thiamethoxam and chlorantraniliprole chemistries. For the purposes of resistance management, after using Voliam flexi in a given pest generation, products containing either one of thiamethoxam and chlorantraniliprole shouldn't be used in the subsequent generation. The maximum yearly amount of Voliam flexi 40 WDG to be applied is 16 oz on pome fruits, 14 oz on stone fruits, and 9 oz on grapes per season.

Zeal (etoxazole) is a growth regulator miticide labeled for use in apples, cherries and *strawberries* for the control of mites. Zeal is primarily active against major tetranychidae mites (spider mites and red mites) in the egg and larval stages of growth, providing control ranging from eight weeks to full season depending on mite pressure, the extent of tree vegetative growth, and predator mite populations. Zeal controls susceptible mites by inhibiting the molting process through disruption of the cell membrane. Since Zeal's activity depends upon mite development, control may not be observable for several days. Etoxazole exhibits pronounced translaminar movement in plant leaves, enhancing activity when the pest is located on the undersides of leaves. Zeal is not known to have risk of cross-resistance with other currently registered miticides. Zeal is restricted to one application per acre per season. (*Source: Michigan Fruit Crop Advisory Team Alert, March 31 2009*)

UPCOMING MEETINGS:

April 16, 2009: *Introduction to Berry Growing Workshop*, Chemung County CCE, Elmira NY. See news brief that follows for details.

April 21, 2009: *UMass Tree Fruit Twilight Meeting*, 5:30 to 7:30 PM, [Bashista Orchard](#), 159 East St., Southamptn, MA 413-527-9091 (a light meal will be served). Note that there is a \$25 fee charged at the door for tree fruit twilight meetings. (\$20 for [MFGA](#) members.) One pesticide re-certification credit will be offered. Meetings are held rain or shine. For more information go to www.umass.edu/fruitadvisor . Or call Jon Clements, 413-478-7219

April 23, 2009: *UMass Tree Fruit Twilight Meeting*, 5:30 to 7:30 PM, [Belkin Family Lookout Farm](#), 89 Pleasant St., South Natick, MA 01760 508-653-0653 (coffee and donuts will be served). Note that there is a \$25 fee charged at the door for tree fruit twilight meetings. (\$20 for [MFGA](#) members.) One pesticide re-certification credit will be offered. Meetings are held rain or shine. For more information go to www.umass.edu/fruitadvisor . Or call Jon Clements, 413-478-7219

April 22, 2009: *NH Fruit Growers' Twilight Meeting* 5:30 PM - 8:00 PM at Riverview Farm in Plainfield, NH. Contact George Hamilton for further details, at UNH CE Hillsborough County, 641-6060 or george.hamilton@unh.edu

April 23, 2009: *Introduction to Berry Growing Workshop*, Seneca County CCE, Waterloo NY. For more information: Patti Paine Battley, 315-539-9251, or pap11@cornell.edu .

April 29, 2009: LOFT Berry Field Meeting, Behling Orchards, Oswego, NY. For more information :Kim Hazel, (585) 798-4265 - ext. 26 or krh5@cornell.edu.

April 20, 2009: *Small Fruit IPM Scout Training – Session III*. Green Acres Farm, Rochester, NY. For more information: Lutie Batt, 585-786-2251 or lcb37@cornell.edu.

May 6, 2009: *Good Agricultural Practices (GAP) Food Safety Training*, 1:00 to 5:30 PM, UMass South Deerfield Research Farm. Pre-registration is required. Registration deadline: April 27, 2009 To register send \$50.00 payable to the University of Massachusetts to: Shirley A. Mietlicki-Floyd, UMass Department of Public Health, 205 Arnold House, 715 North Pleasant Street, Amherst MA 01003-9304

May 12, 2009: *Small Fruit IPM Scout Training – Session IV*. Green Acres Farm, Rochester. For more information: Lutie Batt, 585-786-2251 or lcb37@cornell.edu.

Massachusetts Organic Gardening Workshop Day

NOFA/Mass

April 18, 2009

NOFA/Mass presents our second annual Statewide Spring Organic Gardening Day. On April 18, there will be organic gardening workshops in every region of the state ([see map and full details here](#)). Growing our own food is an excellent way to save money, lessen our carbon footprint, improve our health, and connect with neighbors and nature. Isn't now a good time to learn skills that will help you plant a garden and make it productive throughout the year?

Topics that will be covered at these workshops:

- * Starting garden beds
- * Seed starting
- * Organic soil fertility
- * Organic soil amendments
- * Mulches and cover crops
- * Weeds, disease and pests
- * What to plant when
- * Crop spacing
- * Succession cropping

These workshops are all being led by experienced gardening educators, and they are intended to meet the tremendous resurgence of energy and action for backyard and community gardening. In addition to explaining and demonstrating some key steps that can empower you to start your own garden, these workshops provide a great opportunity for you to come forth with your questions about beginning the process of gardening. Whether you are a complete newcomer to gardening or you just feel that you could use some brushing up on growing skills and concepts, these workshops are for you.

Workshops are being held in the following regions and towns:

Boston/North Shore – Mattapan, South Natick and Newbury

Southeast Mass – Middleboro and Cohasset

Central Mass – Worcester, Barre and Winchendon Springs

Western Mass - West Springfield, Wendell, Chesterfield, Sheffield, Pittsfield

[Download and Print Registration Form](#) to mail in with check or money order.

[Register online](#) for any one of these workshops with Credit Card or ECheck. For questions or more information contact Ben Grosscup at ben.grosscup@nofamass.org or visit the [NOFA/Mass website](#).