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Message from the Editor:

Summer Schedule for MBN: Massachusetts Berry Notes will begin its summer schedule. In the past we have produced weekly issues during the summer months. This year, we will produce an issue every other week; once at the beginning and once in the middle of each month (1st and 15th, roughly). This is a more doable schedule and will still provide good timely information to recipients.

Trouble Downloading? If you have trouble downloading the pdf files of Berry Notes from the website or from the direct emails, let me know and I can help trouble shoot the problem. Usually it is a matter of updating some free software. Call me at 413-545-4347.

USDA Wildlife Services Program: The U.S. Department of Agriculture's Wildlife Services program is available to assist fruit growers with wildlife damage management throughout Massachusetts, Connecticut, and Rhode Island. Wildlife Services may provide assistance with obtaining permits and the development of a management plan specific to most fruit growers' needs. For more information, please contact Don Wilda at (413)253-2403, or email at Donald.J.Wilda@aphis.usda.gov.

$100 Million for Supermarkets and Farmers' Markets in Pennsylvania: This week, Pennsylvania enacted an Economic Stimulus Package which provides up to $100 million of public funding in grants, low-interest loan financing and Loan guarantees to support the development of farmers' markets and supermarkets in communities where there is unmet demand in Pennsylvania. The new "First Industries" program is the most significant level of state support ever directed at solving this food distribution problem. It is a tremendous initiative for Pennsylvania since it will help the state assume a national leadership role in promoting the development of quality food resources for its citizens. The Food Trust convened the Food Marketing Task Force, the Pennsylvania Supermarket Access Campaign and the Farmers' Market Alliance, each of whom played key roles to secure the support of the legislature and the Governor to enact this policy.

Strawberry Plant Establishment

Marvin P. Pritts, Cornell Univ., Ithaca, NY

Getting plants off to a good start will pay big dividends later when strawberry plants must deal with the stresses of weather and pests. Among the most important steps in site preparation is the elimination of perennial weeds. Few herbicides are labeled for use in established strawberries, and their activity on perennial weeds is limited. Therefore, weeds are most effectively controlled before planting.

Weeds. Weeds cause a greater economic loss than diseases and insects combined. In addition, weeds also encourage the establishment of other pest populations. Eliminating weeds the year before planting is much easier than controlling them later. Too many growers plant directly into a site in which perennial weeds were not eliminated the previous summer, and then spend the next several years trying to find the right combination of herbicides to undo the damage.

Rotation, coupled with the use of a broad-spectrum postemergent herbicide the summer before planting, is an effective approach. Cover cropping the site again after the herbicide application will further suppress weed growth. Repeated cultivation or covering a site with black plastic for several months are also effective approaches. Growers should begin site preparation 2 or 3 years before the crop is planted to eliminate perennial weeds, especially if organic methods are to be used.

Fumigation at high rates will suppress weeds, although its use worldwide will likely be restricted because of environmental concerns, availability and expense. In some situations, nematodes, soil diseases, soil insects or intense weed pressure may justify fumigation. The soil should be friable, warm (>50F) and without decomposing plant material for fumigation to work properly. The best time to fumigate a strawberry field is late summer or early fall of the year prior to planting.

Nutrient amendments. Test the soil for pH, potassium, phosphorus, magnesium, calcium and boron. Sample soil in a V-shape pattern within the field, collecting from at least 10 locations. The sample should represent the profile of the top 10 - 12 inches. Plow the site, add the recommended amount of nutrients, then disc. Because soil testing procedures are not standardized across the region, follow the recommendations from the laboratory where the samples were analyzed. Do not use the test results from one laboratory and the sufficiency ranges from another.

pH. It takes one year for lime to raise, and for sulfur to lower the soil pH, so it is necessary to apply these one year in advance of planting. The more finely ground the sulfur or lime, the faster it will react with the soil. If the soil pH must be increased, a liming agent such as calcite or dolomite should be applied. Liming agents differ from one another in two important characteristics which influence their effectiveness: 1) chemical composition which affects acid neutralizing potential and fertilizer value and 2) particle size which determines liming efficiency and ease of application. Consider the relative importance of these when selecting a liming agent. For example, even though dolomite has a lower neutralizing value than calcite, it is often used at sites which require supplemental magnesium for adequate fertility. Moreover, finely ground lime is more difficult to apply than coarse particles, but it changes the soil pH more quickly.

Sulfur is effective at lowering soil pH, but time is required for bacteria to oxidize the sulfur into a usable form. Sulfur comes as a wettable powder or prills, with the former reacting faster top lower the soil pH. Aluminum sulfate is sometimes recommended for acidification because it provides an already oxidized form of sulfur, but it is expensive and six times as much is required to do the same job as sulfur. Also, aluminum toxicity can occur with large amounts of aluminum sulfate, so we do not recommend it.

Nitrogen and Phosphorus. Certain nutrients, like phosphorus, are very insoluble in water and move very slowly through the soil. It may take years for phosphorus applied to the soil surface to reach the root zone of the plant and be taken up. For this reason it is imperative to apply a sufficient amount prior to planting and mix it into the root zone. Animal manures and legumes offer a good source of slowly released nitrogen when incorporated prior to planting. Animal manures are a potential source of weed seeds, however. Manure applied to fields should be well composted and worked into the soil prior to planting to minimize any risk of fruit contamination from pathogenic bacteria.

Irrigation. The irrigation system should be in place prior to planting because transplants probably will require immediate watering. Any preemergent herbicide applied after transplanting will need to be watered in by rain or irrigation to be effective. For these reasons, the irrigation system should be operational prior to planting. Also, in early spring, the irrigation system will be a necessary tool for frost protection.

Preplant cover crops. Seeding a cover crop on the site the year before planting is an excellent way to improve soil structure, suppress weeds, and if the proper cover

crop is grown, suppress nematode populations. Benefits of a cover crop are greatest when the soil is sandy and/or the soil organic matter content is low. Most cover crops grow under the same soil conditions as strawberries. Except for additional nitrogen (40 lb/A prior to seeding) and perhaps phosphorus, other amendments are not likely to be required.

Minimum seeding rates are used when the objective is to supply an acceptable stand for harvesting the grain or straw. But when a vigorous, dense stand is desired for weed suppression and organic matter, higher seeding rates are recommended.

Preplant cover crops are usually plowed under in the late fall or early spring prior to planting. Those with low nitrogen contents (grains and grasses) should be plowed under early in the fall to allow adequate time for decomposition, unless the soil and site are prone to erosion. Legumes contain more nitrogen and decompose quickly, so they can be turned under within a month of planting. Many plant species are suitable as preplant cover crops, and each has certain advantages. In some cases, mixtures of crops are used to realize the benefits of both.

The Strawberry Production Guide (NRAES -88) provides many details on site selection and preparation, and on suitable preplant cover crops for the strawberry planting. (**Source**: *The New York Berry News, Volume 02, Number 03, March 22, 2003)*

Using Fungicides to Control Strawberry Fruit Rots in Ohio 2004

Michael A. Ellis, The Ohio State University, OARDC

The most common fruit rots on strawberry in Ohio are: Botrytis fruit rot (gray mold), caused by *Botrytis cinerea*; anthracnose fruit rot, caused by *Colletotrichum acutatum*; and leather rot caused by *Phytophthora cactorum*. Especially in wet growing seasons, successful strawberry production may depend on the simultaneous control of all of these diseases.

Generally, all three diseases do not occur simultaneously in the same planting, but this can occur. Botrytis fruit rot or gray mold is the most common disease and generally requires some level of fungicide for control each year. Anthracnose is a problem in years with warm to hot temperatures combined with prolonged rainfall prior to and during harvest. Anthracnose is generally not a problem in most plantings; however, when it does develop, it can be devastating. New fungicide chemistry with good to excellent activity against anthracnose has recently been registered for use on strawberry and should be helpful in providing effective control.

Leather rot is a problem in years with excessive rainfall or in fields with poor drainage that have standing water (all of these diseases are a problem in situations such as this). Many growers do a good job of controlling leather rot by planting on sites with good soil drainage and maintaining a layer of straw mulch to prevent contact of berries with soil. In years with excessively wet weather or on sites with problem soil drainage, fungicides may be beneficial for leather rot control.

As previously mentioned, Botrytis or gray mold is the most common disease and is probably the easiest to control with effective fungicide use. Most fruit infections by Botrytis occur only during bloom. Therefore, most growers that apply fungicide during bloom generally do a good job of controlling Botrytis and do not need to apply fungicides pre-bloom or during harvest.

If anthracnose and leather rot are not a problem, fungicide sprays during bloom only are generally all that is required. Obviously this is an ideal situation in relation to reducing costs and overall fungicide use.

In plantings and in growing seasons (warm and wet) where anthracnose or leather rot are problems, the need for a more intensive fungicide program is greatly increased. The following information provides guidelines for developing an effective fungicide program for control of the major fruit rots in Ohio.

Prebloom

In most years, there is generally little or no need for fungicides prior to bloom for control of Botrytis. If weather is exceptionally wet from rain or overhead irrigation from frost protection, some early season fungicide may be required prior to bloom. If anthacnose is a concern, especially in plastic culture berries, prebloom applications of fungicide may be beneficial in reducing the buildup of inoculum in the planting. This is especially true if prebloom temperatures are abnormally warm and conditions are wet.

Applications of Captan or Thiram alone at the highest rate (Captan 50WP, 6 lb/A; Captan 80WDG, 3.75 lb/A; Captec 4L, 3 qts/A, Thiram 75WDG, 4.4 lb/A) should be effective in reducing inoculum buildup of all three diseases. A seven day application interval should be sufficient.

During Bloom

This is the critical period for control of Botrytis. In addition, in fields infested with Colletotrichum (anthracnose), the fungus may be able to build up inoculum on symptomless (apparently healthy) foliage during warm, wet weather. Increased inoculum could result in increased fruit infections if weather remains favorable for disease development.

The main fungicides for control of Botrytis are Topsin-M 70WSB, Elevate 50WG, and Switch 62.5WG. All of these materials have excellent efficacy for control of Botrytis, but only Switch has efficacy against anthracnose. This is an important point to remember if anthracnose is a problem in the planting. I also recommend that all of these materials be tank-mixed with Captan or Thiram during bloom. Captan and Thiram are protectant fungicides that provide some additional control against Botrytis (gray mold), anthracnose fruit rot, and leather rot. In addition, mixing the materials should also aid in reducing the risk of fungicide resistance development.

Topsin, Elevate, and Switch are all at high risk for development of fungicide resistance in Botrytis. None of these fungicides should be used alone in a season-long program for Botrytis control. They all have different chemistry so they can be alternated with each other as a fungicide resistance management strategy. It is wise not to apply any of these fungicides in more than two sequential sprays without alternating to a different fungicide.

For successful Botrytis control, it is important to provide fungicide protection throughout bloom. Remember that early blooms (king bloom) may be your largest and best quality fruit, so protection needs to be started early (at least 10% bloom). The number of bloom sprays required depends upon the weather. If it is hot and dry, no fungicides are required.

All of the fruit rot diseases discussed here require water on the flowers and fruit in order to infect. If it is very dry and overhead irrigation is used for supplemental water, irrigation can be applied in early morning so that plants dry as fast as possible. Keeping plants dry reduces the need for fungicide application. Fortunately, most years are not this dry and fungicides are generally applied on at least a 7-day schedule through bloom. If it is extremely wet, a shorter interval (4-5 days) may be required in order to protect new flowers as they open.

Although Botrytis is the primary pathogen we are trying to control during bloom, the selection of the proper fungicides should also aid in reducing the buildup of anthracnose as well. This is important to remember in plantings where anthracnose is a problem or threat.

Post Bloom Through Harvest

As bloom ends and green fruit are present, the threat from Botrytis infection is generally over. Green fruit are resistant to Botrytis. If you got fruit infection by Botrytis during bloom, the symptoms (fruit rot) will not show up until harvest as fruit start to mature. At this point, it is too late to control it.

As new fruit form through harvest, the threat of anthracnose fruit infection increases. In many plantings, anthracnose is not present or is not a problem. In these plantings no additional fungicide should be required after bloom through harvest. Unfortunately, you cannot determine if anthracnose is a problem until you see it. Often, this is too late to control it.

In plantings with a history of anthracnose fruit rot, or if the disease is identified in the plantings, fungicides with efficacy for anthracnose control may be required from the end of bloom through harvest. Remember, anthracnose is favored by warm to hot, wet weather. In addition, anthracnose appears to be a greater problem in plastic culture plantings.

Quadris 2.08F, Cabrio 20EG, and Pristine 38WG are the most effective fungicides currently registered on strawberry for control of anthracnose fruit rot. These fungicides are also registered for control of powdery mildew, and they also provide good suppression of Botrytis fruit rot (gray mold). All of these fungicides are at high risk for fungicide resistance development in the anthracnose fungus. In addition, they are all in the same class of chemistry; therefore, they cannot be alternated with each other as a fungicide resistance management strategy.

In order to delay the development of fungicide resistance, the label states that no more than four applications of Quadris or five applications of Cabrio or Pristine can be made per season. In addition, the label states that no more than two sequential sprays of each fungicide can be made without switching to a fungicide with a different type of chemistry. For anthracnose control, the only fungicides that currently can be used in such a rotation are Captan, Thiram, or Switch.

The following are suggestions for developing a fungicide program for simultaneous control of strawberry fruit rots.

Fungicide and (Rate/A)	Comments
Prebloom	
Captan 50 WP (6 lb) or Captan 80WDG (3.75 lb) or Captec 4L, 3 qt or Thiram 75WDG (4.4 lb)	o Prebloom applications should be required only if excessive water from rain or irrigation is a problem early in the season. o Fungicides here could help reduce build-up of Botrytis and Colletotrichum inoculum. o In dry or more "normal" seasons, fungicide is probably not required until bloom starts.
During bloom	
Switch 62.5WG (11-14 oz) or Elevate 50WG (1-1.5 lb) or Topsin-M 70WSB (1 lb) **PLUS** Captan 50WP (4-6 lb) or Captan 80WDG (3.75 lb) or Captec 4L (2-3 qt) or Thiram 75WDG (4.4 lb) **OR** Captevate 68WDG (3.5-5.25 lb)	o This is the main time to control Botrytis, and if temperatures are high, Colletotrichum could build up in the planting. o Switch is excellent for control of Botrytis and has been reported to be good for control of anthracnose. Obviously, this is ideal. o The addition of Captan or Thiram provides additional protection against both diseases and may aid in reducing fungicide resistance development. o Topsin-M and Elevate are both excellent for control of Botrytis, but have no activity against anthracnose. Where anthracnose is not a threat, these fungicides will provide excellent Botrytis control. o When Elevate or Topsin-M are combined with the high rate of Captan or Thiram, the combination should provide some level of anthracnose control. o Captevate is a package-mix combination of Elevate plus Captan. o If anthracnose is a concern, Switch would be the fungicide of choice. None of the fungicides (Switch, Elevate or Topsin-M) should be applied more than twice before alternating with a fungicide of different chemistry. This is to aid in reducing fungicide resistance development. o Quadris, Cabrio, and Pristine are the fungicides of choice for anthracnose control, and all of them provide some control of Botrytis. Although they could be used during bloom, I prefer to use them after bloom when the threat of anthracnose fruit infection is greatest.
Post bloom through Harvest	
Quadris 2.08F (6.2-15.4 fl oz) or Cabrio 20EG (12-14 oz) or Pristine 38WG (18.5 - 23 oz) or Switch 62.5WG (11-14 oz) **tank-mixed or alternated with** Captan 50WP (3-6 lb) or Captan 80WDG (3.75 lb) or Captec 4L (1.5-3 qt)	o If more than two applications of Quadris, Cabrio, or Pristine are required, Switch can be considered as an alternating fungicide. o As green fruit develop, the threat of anthracnose infection increases, especially under warm, wet conditions. o Quadris, Cabrio, or Pristine are the most effective materials for anthracnose control. If anthracnose is a problem, the highest label rate should be used. This may be the best time to use Quadris, Cabrio, or Pristine. o Switch also has some activity for control of anthracnose. If the risk of anthracnose is high or the disease has been observed in the planting, Quadris, Cabrio, or Pristine plus Captan should be applied 7 days after the last bloom spray for Botrytis. If anthracnose remains a threat, sprays should probably be repeated on a 7 day interval through harvest. o As harvest approaches, Captan should be removed from the program. Captan applied close to harvest could result in visible residues on fruit and this can be a big problem. o Quadris, Cabrio, Pristine or Switch applied alone should result in minimal visible residues on fruit and can be applied on the day of harvest (0-day PHI). o Remember, these preharvest sprays are required only if anthracnose is a threat or problem.

The extensive use of Captan in this program could result in problems with visible residues on fruit. This needs to be considered, but under heavy disease pressure for anthracnose a high level of Captan usage may be required. The Captec 4L (flowable) should result in less visible residue than the Captan 50W (wettable powder) or Captan

80WDG formulation. The use of Quadris, Cabrio, Pristine or Switch alone in the last spray or two before harvest should aid greatly in reducing visible residues.

Leather Rot

As mentioned previously, leather rot should be controlled by good soil drainage (no standing water) and a good layer of straw mulch to prevent berries from soil contact. If leather rot is a threat or a problem, fungicides may be required. Quadris, Cabrio, and Pristine have excellent activity against Phytophthora diseases on other crops. Although not on the label, Quadris, Cabrio, and Pristine should have good activity for control of leather rot in addition to anthracnose and Botrytis gray mold. If applied at the time suggested here (green fruit through harvest) for anthracnose, Quadris, Cabrio, and Pristine may be beneficial for control of leather rot as well. Recent research at Ohio State indicated that these materials have good to excellent activity against leather rot.

Fungicides for Leather Rot Control

As previously mentioned, emphasis for leather rot control should be placed on the use of cultural practices such as planting on well drained sites or improving water drainage in the planting and a good layer of straw mulch to prevent berry contact with the soil. When needed, the following fungicides are labeled specifically for control of leather rot.

Ridomil Gold is labeled for control of Red Stele (caused by Phytophthora fragarieae) and Leather Rot (caused by Phytophthora cactorum). The label for perennial strawberries reads as follows:

"Established Plantings: Apply Ridomil Gold EC at 1 pt. per treated acre in sufficient water to move the fungicide into the root zone of the plants. Make one application in the spring after the ground thaws and before first bloom. A second application may be applied after harvest in the fall."

Note: Although not labeled for leather rot control, the early spring application for red stele control should provide some control of leather rot.

For supplemental control of leather rot, an application may be made during the growing season at fruit set. This application at fruit set (as green fruit are present) has been very effective for leather rot control.

Aliette 80WDG is labeled for control of Red Stele and Leather Rot. For Leather Rot, apply 2.5 to 5 lb/A. Apply as a foliar spray between 10% bloom and early fruit set, and continue on a 7-14 day interval as long as conditions are favorable for disease development. Applications can be made the same day as harvest (PHI=0 days). Do not exceed 30 lb product per acre per season.

Phosphorous Acid (Agri-Fos) is labeled for control of Red Stele and Leather Rot on strawberries. This material has essentially the same active ingredient as Aliette and the use recommendations for red stele and leather rot are very similar to those of Aliette; however, Aliette is a wettable powder and Agri-Fos is a liquid. Agri-Fos is recommended at the rate of 1.25 quarts per acre in 90 gallons of water or 2.5 gallons per acre in 200 gallons of water. For leather rot, apply at 10% bloom and early fruit set, then at 1 to 2 week intervals as needed. Several Phosphorous acid fungicides are currently being registered for use on several crops in the U.S. and others will probably be registered for use on strawberry in the near future.

Remember, these are only suggested guidelines for a fruit rot control program. It is always the grower's responsibility to read and understand the label. For the most current pesticide recommendations in Ohio, growers are referred to Bulletin 506-B, Ohio Commercial Small Fruit and Grape Spray Guide. [**Ed. Note**: for a copy of the New England Small Fruit Pest Management Guide, contact Sonia Schloemann at 413-545-4347 or sgs@umext.umass.edu]

If growers have questions regarding the information covered here, they should contact Mike Ellis at 330-263-3849 or e-mail: ellis.7@osu.edu. (***Source**: Ohio Fruit ICM News, Volume 8, Issue 9, March 25, 2004*

Brambles

Raspberry Anthracnose

Paul Pecknold, Purdue University

The most important spray you will apply this season for control of anthracnose on brambles is the delayed dormant spray of lime sulfur. DON'T FORGET IT! Liquid lime-sulfur at 20 gallons per acre should be applied when new leaves are exposed 1/4 to 3/4 inches; if you are late in your application and don't spray until a few leaves have unfolded, cut the rate to 10 gallons per acre. NOTE: There is greater risk of lime-sulfur burn, when applied at this later time. (Source: Facts for Fancy Fruit, 04-01 March 26, 2004)

Blueberries

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.

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

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).

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 SIZE? , 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 over-winter. Eggs hatch when temperatures average around 55 oF. 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

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.

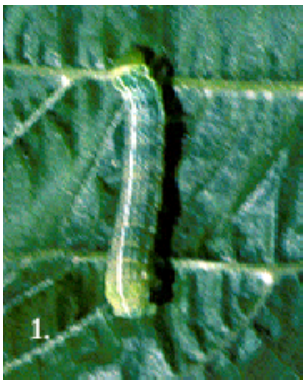
• **Chemical insecticides.** Few compounds, are labeled for this pest although many are being tested and may receive supplemental labels in the future (see next article). Confirm® insecticide is labeled for loopers, spanworms and other lepidopterous pests in blueberry and should be effective. Imidan® may also be effective. Consult your local supplier and always read, understand and follow all label directions for pesticide products.

• **Plant 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.

Evaluation of Insecticides for the Economic Control of Winter Moth in Blueberry 2002

L. K. Tanigoshi and J. R. Bergen, Washington State University

Winter moth, *Operophtera brumata* (L.) and Bruce spanworm, *O. bruceata* (Hulst) have increasingly been reported as economic, early season pests of blueberries grown in Oregon and Washington. The eggs of both species are laid during late fall and early winter. Growers often missed detection of the early hatch of these emerging moths in March to mid-April when temperatures average about 55˚F. Larvae are difficult to control because the first instar larva will burrow into and feedon unopened buds. Maturing larvae are difficult to detect until they have migrated from bud to bud and visible damage has occurred to these fruiting bodies and surrounding foliage. Winter moth larvae were collected from opening fruit buds in mid-April from Woodlands, WA and from English Laurel foliage in mid-April from Whatcom County (Fig. 1). Six reduced risk products were tested and compared with Diazinon and Capture standards. Insecticides were applied in aqueous suspensions using a Potter Spray Tower with 2 ml of each concentration applied to 4 inch blueberry fruiting twigs (Fig. 2). These were air dried, placed in a water-dental wick-vial in a 6 inch Petri dish held at lab temperature with one winter moth (Fig. 3). These replicated trials were observed 5-6 days after treatment for larval mortality.



For 2 of the 3 Potter tower bioassays, bifenthrin (Capture®) at the red raspberry and strawberry rate of 0.1 lb(AI)acre expressed 100% mortality after twenty-fours posttreatment. Bifenthrin shows an excellent potential use on blueberry for larval Lepidoptera and root weevil. Secondly, the synthetic avermectin analogue Proclaim® showed excellent control of winter moth larvae both after twenty-fours hours and 100% mortality at either 5 or 6 days posttreatment. This compound was also given potential use status on the IR-4 new products/transitional solution list, July 2002. Indoxacarb (Auvant®), the recently registered spinosad (Success®) and the insect growth regulator methoxyfenozide (Intrepid®) performed consistently well at several rates, especially after 2-6 days posttreatment. All three of these compounds are considered reduced risk products and Auvant and Intrepid have been given pending use status for blueberry by IR-4. Generally, the other insecticide tests showed significant differences from the untreated check in most cases 5 days after treatment (Tables 1-3).

Table 1. Lynden, WA, 8 May 2002.

		Percent Mortality		
Treatments	**lbs(AI)/acre**	**1DAT**	**2DAT**	**5DAT**
Avaunt WG	0.09	40ab	40bc	60a
Intrepid 2F	0.25	60ab	80ab	100a
Proclaim 5SG	0.01	100a	100a	100a
Success 2SC	0.10	80a	100a	100a
Untreated check		0b	0c	0b

Percentages within columns followed by the same letter are not significantly different (Tukey HSD test, P<0.05).

Table 2. Lynden, WA, 23 May 2002.

		Percent Mortality		
Treatments	**lbs(AI)/acre**	**1DAT**	**3DAT**	**6DAT**
Actara 25WG	0.086	0a	20ab	100a
Avaunt WG	0.045	0a	20ab	100a
Avaunt WG	0.11	0a	40ab	100a
Capture 2EC	0.10	40a	100a	100a
Intrepid 2F	0.12	20a	40ab	100a
Intrepid 2F	0.25	0a	0b	100a
MVP II	0.50	60a	60ab	100a
Proclaim 5SG	0.008	40a	60ab	100a
Proclaim 5SG	0.015	0a	0b	100a
Success 2SC	0.019	40a	80ab	100a
Success 2SC	0.049	40a	40ab	100a
Untreated check		0a	20ab	20b

Percentages within columns followed by the same letter are not significantly different (Tukey HSD test, P<0.05).

Table 3. Woodland, WA, 18 April 2002.

		Percent Mortality		
Treatments	**lbs(AI)/acre**	**1DAT**	**2DAT**	**5DAT**
Actara 25WG	0.086	73abc	80a	87a
Avaunt WG	0.09	73abcd	100a	100a
Avaunt WG	0.045	60abcd	87a	93a
Avaunt WG	0.065	67abc	73a	93a
Avaunt WG	0.11	53abcd	93a	93a
Capture 2EC	0.10	100a	100a	100a
Diazinon 50WP	0.50	80abc	87a	87a
Intrepid 2F	0.12	67abcd	93a	100a
Intrepid 2F	0.25	53abcd	60a	87a
MVP II	0.50	60abcd	73a	80a
Proclaim 5SG	0.008	73abc	93a	100a
Proclaim 5SG	0.010	80abc	100a	100a
Proclaim 5SG	0.015	87ab	93a	100a
Success 2SC	0.019	27cd	73a	87a
Success 2SC	0.03	33bcd	73a	93a
Success 2SC	0.049	47abcd	73a	93a
Untreated check		13d	13b	13b

Percentages within columns followed by the same letter are not significantly different (Turkey HSD test, P<0.05).
(***Source**: Washington State Univ. Vancouver Research & Educ. Unit Report; vancouverreu.wsu.edu/research/entomology/wintermoth.htm*)

Grapes

Assessing Weed Control In Vineyards

Alice Wise and Andrew Senesac, Cornell Cooperative Extension of Suffolk County

Weed control is one of the major challenges in vineyard management. There are no silver bullets but good judgment and good timing go a long way. Weeds of the Northeast, the bible on weed ID co-authored by CCE weed specialist Dr. Andy Senesac, is a very useful reference for diagnosing weed species and developing management strategies. Dr. Senesac also co-authored (with Cornellians Rick Dunst and Bob Pool) a set of fact sheets Managing Weeds in NY Vineyards. Call Andy or Alice for ordering information or for a set of fact sheets.

It is not viticulturally necessary to maintain a completely bare ground strip under the trellis all summer long. Just how much weed pressure vines can tolerate at various times of the season would be an interesting research project. Young

vines with shallow, developing root systems would be sensitive to anything more than light weed cover. Older vines with deeper root systems can likely tolerate more weed competition, assuming the vines are not otherwise stressed. However, allowing weeds to reach maturity only increases the number of propagules (seeds, tubers, rhizomes) that will be present to deal with in the future.

Weed control can be achieved without herbicides although increased labor inputs will be required. Hand hoeing is fine periodically but an impossibility for long-term weed control in a commercial vineyard. Mechanical weed control can be effective if done properly; however, timing is everything. Once weeds become well-rooted and lignified, cultivation is much more difficult. Use of a cultivating implement requires a skilled tractor driver to avoid vine trunk and root damage and trellis destruction (it has happened). Mechanical weeding long term is detrimental to soil organic matter and may increase soil erosion. Alternating cultivation with a timely postemergent herbicide such as glyphosate may be one way around that concern.

While growers endeavor to reduce pesticide use, it remains difficult to totally eliminate the use of herbicides in Long Island vineyards. Advances have been made in terms of applicators, namely the controlled droplet applicator. This shielded sprayer uses low gallonage and a spinner type nozzle. A higher percentage of the material hits its target and off-target drift is reduced. One difficulty with the CDA sprayer is that dry formulations and certain viscous liquid formulations cannot be used. Another application device uses infrared to turn on the sprayer only when a weed is sensed. These devices are expensive and probably not yet appropriate for LI cultural practices.

Herbicides are divided into two groups: those that prevent weed seed from germinating (emerging), known as preemergent materials, and those that are applied to existing weeds, known as postemergent materials. It is also necessary to plan for control of broadleaf weeds like horseweed, dandelion, groundsel, pineappleweed etc., as well as grasses such as bluegrass, quackgrass, crabgrass etc.

If planning on using preemergent materials for both broadleaf and grass control, it is usually necessary to combine two materials. If weeds are existing in the vineyard, a postemergent material may also be included. Be aware that only Prowl, Devrinol and Surflan are labeled for non-bearing vineyards. For established vineyards, preemergent grass herbicides include Devrinol, Surflan and Karmex (Solicam is no longer labeled for use on Long Island.) Broadleaf herbicides for established vineyards include Princep, Goal and Karmex. Some points about each one follow. This is not a substitute for reading the label—read the label thoroughly for complete information.

- **Devrinol**: Necessary to have 0.25 to 1.0 " of rain within a few days of application. Under warm summer conditions, significant loses can occur if water incorporation does not occur. In the cooler early spring, this is not so much of a concern.
- **Oryzalin 4AS/Surflan**: The standard for preemergent grass control, use 6 to 8 pts/sprayed acre in a tank mix with a broadleaf herbicide such as Princep or Goal.
- **Karmex**: considered to be tricky on Long Island because of the risk of damage on sandy soils. However on mature vines, the labeled rate for our soil types does provide good broadleaf weed control for most of the season.
- **Goal**: Must go on before bud swell, can cause burning of foliage close to ground due to volatility and 'splash up' of treated soil onto green tissues.
- **Princep**: Kills weeds by inhibiting photosynthesis after they emerge so it needs incorporation with rain though less time restricted than Devrinol.

A typical spring herbicide application might be Princep, Surflan and either Roundup or Gramoxone, the latter two being postemergent materials for established weeds. Postemergent herbicides will be covered in a future newsletter.

Calculation of area to be treated can be done by first noting the spray swath of the herbicide rig. For example, at the research vineyard, we use an 18" Enviromist. Since we drive this down both sides of the trellis, our spray swath is 36". For traditional application devices, measure the spray swath by filling the tank with water and turning on the unit while on pavement. Our row width is 8 ft. or 96". Our calculation for area to be sprayed is 36/96 = 0.375. Thus for every acre of vineyard, we will spray 0.375 acres with herbicide. This 0.375 acres is referred to as the "sprayed acre" on herbicide labels. Next week - postemergent herbicides. (***Source**: Long Island Fruit & Vegetable Update, No. 4, April 2, 2002*)

Grape Flea Beetle

Bruce Bordelon, Purdue University

The Grape flea beetle can be a serious pest of grapes because they feed on developing buds after final pruning. Lost buds can relate to a direct loss of yield. Grapes will be in early swell to budbreak across the state over the next two weeks and these are the stages most likely to be damaged from flea beetles. Scout vineyards for these insects or their damage and control if more than 5% of the buds have been damaged. Damage appears as holes eaten into the sides of buds. The insects are small (1/8 inch long) and shiny green, blue or black in appearance. They crawl quickly along the canes and tend to drop to the ground if disturbed. Incidence often occurs in outer rows adjacent to fencerows or woods, making spot spraying an option. Scout the planting carefully and apply insecticides only if needed. Damage from flea beetles usually decreases as buds break and shoots become 1/2 inch or longer. Sevin will provide excellent control of this insect. Refer to the label or ID-169 for complete recommendations. (***Source**: Facts for Fancy Fruit 04-01, March 26, 2004*)

Bug Information

Doug Pfeiffer, Virginia Tech

Periodical cicada in vineyards: This season we will be experiencing Brood 10 of the periodical cicada. Adults will be appearing in northern Virginia, West Virginia, Pennsylvania, and Ohio. This is the biggest of the several broods. Last year Brood 9 appeared in southern Virginia and West Virginia. These adults inflicted serious injury on young vines. In the first year or two of growth, the trunks are the appropriate size for females to select for oviposition. Mature vines are less of a problem, because the injury occur fairly distally and will be pruned off later. I have posted images of attacks to grape shoots in the periodical cicada page in the fruit web site www.ento.vt.edu/Fruitfiles/cicada.html.

The two main control methods are chemical and physical. A variety of insecticides will kill cicadas, but often not quickly enough to prevent oviposition. The most effective choices will be a pyrethroid (only one, Danitol, is registered on grape) or Lannate (methomyl). The first is toxic to predatory arthropods and may cause later flare-ups of red mites. The second is also toxic to humans, though with a fairly short residual.

Another method of control involves netting. It is most important that the trunk be protected. A link to a commercial source is included in the cicada page, though other types will probably suffice.

Oil for European red mite eggs? European red mite is the most common spider mite pest in Virginia vineyards. This species overwinters in the egg stage on cordons and trunks (unlike twospotted spider mite, which overwinters as adults in the ground cover). One treatment often applied for overwintered ERM eggs is Superior oil. This is effective on apple and peach, both of which have smooth bark. Effectiveness is hindered with the loose bark of grapevines. If growers opt for this approach, remember to use high volumes, in order to soak the bark and get as much penetration into crevices as possible.

Climbing cutworms: One of the early season insect pests that many growers contend with is the climbing cutworm complex. These caterpillars spend the daytime in the ground cover, usually hiding beneath clods of dirt or rocks. At night, they crawl up trunks of vines and feed on buds during the bud swell period. Once shoots have reached about two inches in length, they have grown past the main period of vulnerability. Sometimes the injury is confused with grape flea beetle, another pest at bud swell. The injury to buds by cutworms is generally more ragged in appearance, while GFB feeding is more sharply defined, sometimes a neat circle eaten in the side of the bud.

Cutworms can be difficult to control. Last year I had a spray trial for cutworms in a Seyval block that included Intrepid, SpinTor, a band of Tanglefoot around the trunk, and the untreated check. Intrepid and SpinTor gave a level of control not significantly different from each other, between a quarter and a third of the injury in the check. The Tanglefoot treatment was intermediate, not different from the check while not different from the insecticides, either. An expanded discussion of climbing cutworms, including photographs, can be found in the March-April 2003 Viticulture Notes (www.ext.vt.edu/news/periodicals/viticulture/03marchapril/03marchapril.html#I)

Douglas G. Pfeiffer, Department of Entomology, 205C Price Hall, Virginia Tech, Blacksburg VA 24061, (540) 231-4183 fax (540) 231-9131. Visit the Virginia Fruit Web Site http://www.ento.vt.edu/Fruitfiles/VAFS.html (***Source**: PA Wine Grape Info Newsletter, April 1,2004*)

April in the Vineyard

Mark Chien, PennState University

Budbreak is coming up fast so this is the time to get ready for a new season. The hope is, of course, that 2004 will be a bit more forgiving than 03. A harsh winter has set the tone, however, so growers need to be ready. My hope is that vineyards in colder climes counted buds and adjusted their pruning and bud counts accordingly. The Finger Lakes and Ontario were hit hard, and its a tremendous viticultural challenge to maintain production, reestablish the vine with healthy wood, and manage a gangly canopy. Spring will be very revealing.

The disease issues last year also means having a well considered spray program based on observations and results of last year's disease, insect, pest and problem situation in your vineyard. Where were the holes in your program? What are you going to do to plug them? A plan should be in hand prior to the beginning of the spray season then adjusted and adapted to the growing season as it develops. If you had a problem last year, its waiting to become an even bigger problem this year. Get on top of it and smother it early! Heed the recommendations in the NY/PA Pest Management Recommendations for Grapes: 2004, just out and available at your local county extension office. I'm sure that Dr. Wayne Wilcox will have his annual magnum opus out soon, the perfect compliment to the NY/PA. Also see Dr. Jim Travis' power point presentation on disease control for 2004 on the Wine Grape Network web site at http://winegrape.cas.psu.edu/. Scouting your vineyard will be important early and throughout the season. IPM will help you control your pest problems. http://www.nysipm.cornell.edu/.

Pruning needs to be finished before buds pop, especially cane pruning since its almost impossible to tie down canes after the buds have pushed without popping them off. Later pruning will delay budbreak and help you through early spring frost events. Brush needs to be chopped or removed. Many have asked if they had a disease problem should they physically remove the prunings from the vineyard. Depending on severity, it couldn't hurt, but its a ton of work. Using a real brush chopping mower will probably suffice, make two passes if necessary to pulverize the wood. If you have any dead cluster stems still hanging on the vines, it would be a good idea to remove them. They are a great source of inoculum for Phomopsis and Botrytis. Start thinking about ordering spray materials and other supplies.

Early season weed control can start now, with the use of preemergence herbicides. While I like to discourage growers from using herbicides, they may be necessary to help get a problem under control and then allow you slowly transition to other non-chemical methods of weed control. Fertilizers can also be applied on the ground now with spring rains to move them into the soil.

This is the time you really need to be fixing stuff. Actually, two months ago, but now is the 11th hour. Get out there and fix trellis, fencing, buildings, equipment, tools, everything that you will be using in the summer, make sure its in tip top shape. If you work on it now, you won't have to deal with it when it breaks at a critical moment in the growing season. Repair roads and spray fence lines.

Its a good time to be securing a home for your grapes. Talk to the wineries and get contracts delivered and signed. Talk to the wine makers about last year's results and talk together about how to make this year a better vintage. How was your bird control last fall? Its not too early to be thinking about strategies for 2004.

If you are planting grapes, you should be out there prepping the fields. By this time, its too late for weed control except cultivating. You can still put down amendments. But vines should be on their way and the design and layout work being considered. And, don't forget about replants. Those should be going in as well.

Its a miraculous time of year when to vines slowly break dormancy and the buds and new shoots begin to push. Enjoy the miracle, but be prepared for all the challenges of the new season. Oh, and its a good time to visit wineries and taste your wines, if they haven't been blended yet. And don't forget to leave some time to attend some grape meetings. There are still plenty of good ones happening around the region. (***Source:*** *PA Wine Grape Info Newsletter, April 1,2004*)

General Information

Farm to School Update: Calling Growers of Fruit, Vegetables and Cranberries!

Anne Carter, UMass

Letters have gone out to growers living near the school districts of Worcester, Middleboro, Belchertown, Hudson, and Maynard looking for suppliers of locally grown produce for school lunches. The produce may be fresh or from storage. If you are interested in supplying to these schools and did not receive a letter or you misplaced your letter, please call Kelly Erwin at 413-253-3844 or email her at kelerwin@localnet.com. Some schools would only need one or two farmers to meet their supply needs while other schools need several farmers. For example, the Worcester school lunch program serves 15,500 lunches a day while Hudson and Maynard serve 2,000 lunches a day.

We have applied for grants to expand the program in the Pioneer Valley. If the grant requests are approved, then the school districts of Holyoke and Chicopee should begin purchasing local food for this year's summer feeding program and will continue purchases into the fall. We are working on a third large school in the district as well. Many thanks to the Massachusetts Fruit Growers Association for providing a •nancial match to get apples into the schools as well.

On the National front, House Bill 2626 and Senate Bill 1755 - "Farm to Cafeteria Projects Act", part of the Child Nutrition Reauthorization, has come out of committee fully funded and is ready for a full vote in the House. Many thanks to Congressmen, Neal, Olver, Frank, and McGovern for supporting this act so far. If passed, schools will have the opportunity to receive $100,000 grants to work with farmers to purchase equipment and supplies that will allow schools to serve meals with locally grown products. Some of our Massachusetts schools have started with some products and more requests are coming in. However, I want to caution farmers to move slowly and thoughtfully into this new market. Moving too fast can cause frustration as each school's delivery and billing requirements are unique. Kelly Erwin has been working as a liaison between schools and growers and is facilitating this part of the program. As more grants come in, we will include more schools and farms. This program is working well in schools in California, New York, Florida and New Jersey. In some schools, growers started with one product, then expanded once all the kinks were worked out of the system. Because the school food purchaser is the same person for all commodities, we hope to help our apple and cranberry growers as well as our vegetable growers. Please call Kelly at (413)253-3844 kelerwin@localnet.com or myself at (413)545-5216 akcarter@pssci.umass.edu as we expand the project. (***Source**: UMass Vegetable Notes, March 30, 2004*)

Massachusetts Organics Recycling Summit: "Links in the Food Chain"

Thursday, April 22, 2004, 8:30am to 4:00pm, Holiday Inn, Boxborough, Massachusetts The site is located just east of the Boxborough exit on I-495 (one exit south of Rt. 2) Gather with 200 of your colleagues for a comprehensive overview of the food waste management infrastructure in Massachusetts. By attending, you will:

- Learn of business opportunities for on-farm composting to make stronger connections with haulers and generators of organic waste, including: commercial food processors, hospitals, hotels and motels, colleges and universities, restaurants, supermarkets and even the prison system.
- Be ready for the potential state disposal ban on organics.
- Meet equipment and product vendors.

Two farmers who operate on-farm composting operations will be among the presenters. Bob Martin of Martin's Farm Recycling in Green•eld, and Bill Paige of MassNatural in Westminster, will discuss their successful composting of food waste.

Officials from the Massachusetts Departments of Environmental Protection and Agricultural Resources will provide updates on solid waste and recycling policies, programs and regional trends. This is a terrific networking opportunity! To see agenda and get registration form, visit DEP on the Web at: http:// www.mass.gov/dep/recycle/compost.htm or contact Steve Long (617-292-5734, stephen.long@state.ma.us) or Sumner Martinson (617-292-5969, sumner.martinson@state. ma.us). (***Source**: UMass Vegetable Notes, March 30, 2004*)