Michigan Blueberry I.P.M. Update

May 6, 2008 Volume 2, No. 3

Blueberry IPM Twilight Meeting
When: May 14, 2008 *6-8PM*
Where: Cornerstone Ag, Van Buren County
What: Timely updates for control of insect, disease, and weed control. This is a free meeting, with a light dinner served at 6PM. Spray credits available for attending.

Contents

CROP STAGES

Keith Mason
Department of Entomology, MSU

In Van Buren County, Jersey in Covert is at mid pink bud, and Blueray and Bluecrop in Grand Junction are at mid to late pink bud. In Ottawa County, Blueray in Holland, and Rubel and Bluecrop in West Olive are at mid pink bud.

 

Bluecrop at mid to late pink bud in Grand Junction (left) and Jersey at mid pink bud in Covert (right).

WEATHER NOTES

Mark Longstroth
SW Michigan District Fruit Educator, MSU Extension

Complete weather summaries and forecasts are available at enviroweather.msu.edu

A freeze on April 30, with lows in the 20 to 29 F range, caused wide spread damage but the severity of damage varied from extensive to very little. Every freeze is different. A great deal depending on the crop's stage of development, the characteristics of the fruit site and the duration of cold temperatures. This freeze was radiation freeze similar to freezes in 2002, 2004 and 2006. Southern Berrien County did not get as cold as other parts of the region and suffered less damage. Blueberries suffered little damage from last week's freeze. Few growers used sprinklers to protect their plantings.

Good pollinating weather with high temperatures near 70 and lows near 50 followed the freeze. Rain fell in the region Friday, May 2. Rainfall amounts varied greatly, from an inch to less than a tenth of an inch. These rains represented infection events for some diseases where more than a tenth of an inch fell. Soil moisture varies quite a bit depending on soil type. Light sandy soils are dry, and heavier soils are still very wet. We expect cooler temperatures this week. The forecast is for dry conditions with highs in the 60s and lows near 40. Rain showers should begin Friday with a wet weekend.

DEGREE DAYS		
GDD (from March 1)	**Base 42**	**Base 50**
	Van Buren County	
4-28-08	358	189
5-5-08	445	240
Projected for 5-12-08	518	274
	Ottawa County	
4-28-08	290	142
5-5-08	358	177
Projected for 5-12-08	435	213

PEST OF THE WEEK – BOTRYTIS

Annemiek Schilder
Department of Plant Pathology, Michigan State University

During wet springs, blossom blight often appears in Michigan blueberry fields. While there are multiple possible causes, *Botrytis cinerea* is a common cause of blossom blight. This ubiquitous fungus may also cause leaf and twig blight during extended wet periods and cause a post-harvest fruit rot.

Symptoms
Blossoms turn brown and die. They may become covered with abundant gray powdery spore masses (Fig. 1A). Infections move through the blossoms rapidly and often destroy the entire floral structure. Infections can also continue into the fruiting wood. Leaf and twig lesions are mid to pale brown and spreading (Fig. 2), with gray sporulation on the surface under humid conditions. Twigs blight from the tip towards the base. Botrytis fruit rot typically manifests itself as a post-harvest problem. Infected berries rot and become covered with a fluffy gray mold (Fig. 1B), which may be confused with Alternaria fruit rot.

Disease cycle
Botrytis cinerea overwinters as mycelium or hard black mycelial masses (sclerotia) in/on infected twigs and prunings. In spring, these tissues produce vast amounts of spores during wet periods. Spores spread primarily by wind but also by splashing water. Moderate temperaturers (59 to 68ºF) and frequent rains favor disease development.

Management
Annually prune to remove infected twigs and to open canopy for good air circulation and fungicide spray penetration. Adjust timing and frequency of overhead irrigation to reduce plant wetness duration. Avoid late-season fertilization and practice good weed control. Apply fungicides from pre-bloom through the end of bloom if conditions are especially conducive to infection (cool and wet). The most effective fungicides are: Switch, Captevate, Elevate, Pristine, Rovral, Iprodione, Topsin M + Captan (or Ziram). Only apply Topsin M if a section 18 label has been granted.

Figure 1. Blossom blight (left) and postharvest rot (right) caused by *Botrytis cinerea*.

Figure 2. Leaf lesion (left) and twig blight (right) caused by *Botrytis cinerea*.

INSECT UPDATE

Keith Mason and Rufus Isaacs
Department of Entomology, Michigan State University

Due to the generally cool weather last week, insect activity has remained low at all four farms. No leafroller, climbing cutworm or spanworm feeding was observed. Growers and scouts should still be on the lookout for feeding by these pests. The flower feeding beetle *Hoplia trifasciata* was caught in monitoring traps for other pests at all four farms, and beetles were seen flying at all farms, but no feeding damage was seen.

A single cherry fruitworm moth was caught at the Grand Junction farm this week , but no cranberry fruitworm have been caught to date. Growers and scouts should set traps for these moths soon to record the beginning of moth flight. These traps should be checked each week until harvest.

We are still catching the "contaminant" moth, *Pseudexentra vaccinii* in cherry fruitworm traps, however it appears the abundance of this moth is declining. As cherry fruitworm should be caught this week it is important to be able to distinguish between the two moths. The contaminant moth is ~½ inch long which is much larger than cherry fruitworm which is ~¼ inch long. Cherry fruitworm also have a pattern of iridescent bands across its back, while the contaminant moth has black or dark gray markings across light gray wings. See the photos below to help with identification.

Cherry fruit worm (left) and the contaminant found in cherry fruitworm traps, *Pseudexentra vaccinii* (right).

Farm	Date	CBFW moths per trap	CFW moths per trap	BBA % infested shoots	BBM adults per trap	JB per 20 bushes
Van Buren County						
Covert	4-21	0	0			
	4-28	0	0			
	5-5	0	0			
Grand Junction	4-21	0	0			
	4-28	0	0			
	5-5	0	1			
Ottawa County						
Holland	4-21	0	0			
	4-28	0	0			
	5-5	0	0			
West Olive	4-21	0	0			
	4-28	0	0			
	5-5	0	0			

DISEASE UPDATE

Tim Miles and Annemiek Schilder
Department of Plant Pathology, Michigan State University

Figure 1. Mature apothecia observed in West Olive, MI.

Mummy berry

Mummy berry mushrooms (apothecia) were observed at various stages of maturity. The plots had varying numbers of apothecia, with average counts this week as high as 11.2 per bush (Grand Junction) and as low as 0.4 per bush (Covert). The number of apothecia last year was positively correlated with the number of shoot strikes and infected berries. It is now the time of year to begin scouting for mummy berry shoot strikes due to the availability of discharged ascospores and susceptible green leaf tissue. No shoot strikes have yet been observed in any of the scouted plots. Shoot strike symptoms consist of wilting of developing leaves and shoots with a browning of the midribs and lateral leaf veins, often described as an "oak leaf" pattern of necrosis. Under humid conditions, gray spore masses will develop on these infected shoots. These spores (conidia) then get carried to the flowers by bees, wind, and rain, which then leads to infection and mummification of the fruit later in the growing season.

Figure 2. Water droplets on succulent developing leaf tissue provide suitable conditions for infection by mummy berry ascospores (West Olive, MI).

While shoot strikes were not seen, rainfall received in southwest Michigan last week and temperatures provided optimum conditions for ascospore release (around 57°F) and infection. In addition, freezing conditions may have predisposed shoots to infection by ascospores last week. Overhead irrigation for frost protection may also have contributed to leaf wetness for infection. Shoot strike symptoms typically appear about 12-14 days after the actual infection, depending on the temperature, so be on the lookout for shoot strikes in the next two weeks. Shoot strikes that are producing spores during bloom are epidemiologically most important since flowers have to be present for the fungus to complete its life cycle. If shoot strikes are observed and open blossoms are present, protect the blossoms from infection with a fungicide application (e.g., Indar or Pristine).

Farm	Date	Average number of mummies on the ground per bush*	% Germinated mummies	Average number of apothecia on the ground per bush*	Average number of mummy berry shoot strikes*
Van Buren County					
Covert	4-18	2.2	8.3%	0.4	0.0
	4-25	2.2	9.0%	0.4	0.0
	5-2	2.4	8.3%	0.4	0.0
Grand Junction	4-18	26.4	24.0%	9.1	0.0
	4-25	25.7	28.0%	10.9	0.0
	5-2	24.6	30.5%	11.2	0.0
Ottawa County					
Holland	4-18	3.0	14.9%	0.5	0.0
	4-25	3.2	16.0%	0.8	0.0
	5-2	3.2	21.9%	1.0	0.0
West Olive	4-18	7.3	15.9%	2.4	0.0
	4-25	7.3	23.0%	2.7	0.0
	5-2	7.1	28.2%	3.1	0.0

*Average number was calculated for ten bushes.

USING BEES FOR POLLINATION OF BLUEBERRY

Zachary Huang and Rufus Isaacs
Department of Entomology, Michigan State University

Pollination is an essential component of profitable blueberry production. Well-pollinated fields of highbush blueberry have larger berries, higher yields, and more even ripening than fields with low pollination. Pollination is achieved by bees moving pollen from one flower to another, and so growers should ensure that fields are stocked with healthy hives throughout the bloom period. Even though highbush blueberry cultivars have relatively high levels of self-fruitfulness (can set fruit from pollen of the same cultivar), cross pollination (from another cultivar) can increase yields by up to 20%.

Wait until bloom has started to bring in bees. In general, flowers of blueberries are less attractive to honeybees than other flowers due to the shape and the relatively low 'reward', so you want to have your crop starting to bloom before bringing bees in, so that bees tend to forage more on your crop. If brought in too early, bees will learn to forage elsewhere and when your crops bloom, they are not attractive enough to get the bees "back" to where you want them. Move bees into blueberry fields after 5% bloom but before 25% percent of full bloom.

Rental prices. Most growers will already have their pollination contracts set, but expect to pay anywhere from $45-75 per colony for spring fruit pollination. Rental prices are generally going up because of the colony collapse disorder, but this is still an essential investment. There is a range of rental prices because if you only need 10 hives, you might be expected to pay a higher price than another grower who is renting 500 hives. Colonies might be also of different strengths. Try to deal with the same beekeeper year after year in your area so you know what to expect and can build a good working relationship. If the beekeeper is new in the pollination business, make sure he/she knows your requirements and consider signing an agreement for pollination purposes. This can include the strength of the colonies and how quickly the colonies will be taken out of the field after bloom.

Stocking densities. Research in blueberries has shown variation in their needs for honey bee pollination, and this is reflected in Table 1. A good rule of thumb is that you'll need 4 to 8 bees per bush in the warmest part of the day during bloom to achieve good pollination. Do not cut corners with respect of putting enough bees in your crops. Investing some money to have enough colonies there at the right time will provide returns in the form of improved yields.

A strong honeybee colony should have 6-10 full frames of brood in all stage of development. This can also be assessed by watching the colony entrance – there should be dozens of bees entering and exiting the colony when conditions are suitable for honey bee flight (over 55 ^{o}F and less than 15 miles per hour winds. Work with your bee keeper to make sure your fields are being stocked with strong colonies, as the size of the hives is not a good indicator of their strength.

Table 1. Recommended stocking density of honeybees for highbush blueberry pollination.

Variety	Honeybee hives/acre
Rubel, Rancocas	0.5
Weymouth, Bluetta, Blueray	1.0
Bluecrop	1.5
Elliot, Coville, Berkeley, Stanley	2.0
Jersey, Earliblue	2.5

Hive placement

If possible, place the colonies in a sheltered location with the entrances facing east. This will encourage earlier activity as the hive warms in the morning sun. Hives should be spread out around the field to maximize floral visitation, with a maximum of 300 yards between colonies.

Bumblebees

The native *Bombus impatiens* bumblebees are highly efficient bees for pollinating blueberry, with activity at lower temperatures than honeybees and higher rates of pollen transfer per visit to flowers. These are available commercially and can be shipped directly to the farm, but orders need to be placed weeks before bloom to allow time to grow these insects.

MSU is conducting evaluations of these bees at commercial blueberry farms this spring to determine their effectiveness. This alternative to the honeybee has performed very well in trials in lowbush blueberry in Maine and in rabbiteye blueberries in the southeast.

Native Pollinators

Many other helpful native bees are active in your blueberry field, and with 20,000 recorded species of bees worldwide, some local native bees are probably active in Michigan's small fruit crops providing free pollination. Bumblebees and other native species can be seen looking for flowers already in and around fruit crops, and their activity generally remains high when weather conditions turn too cold or wet for honey bees. These native bees may be insufficient to provide adequate pollination for good yields, however, and cannot be relied on to stand alone as your sole pollination source. By providing the right nesting habitats, and food for the bees after your crop has flowered, you can enhance the local populations of native bees around your crop. This is a long-term process and you'll need several years of experimenting before these bees can become a reliable part of your pollination planning. Ongoing research at MSU is investigating strategies for conservation of native pollinators in Michigan blueberries, and there is a new bulletin available (number E2985 available from MSU Extension) titled 'Conserving Native Bees on Farmland'.

Pest Management During Pollination

Do not apply broad-spectrum insecticides when flower buds are open or you may kill a significant number of pollinators. Bee hives should be removed immediately after pollination if post-bloom pesticide applications are planned. By monitoring for pest problems carefully before and during bloom, growers can help minimize the need for pest control. If an insecticide application is necessary during bloom, the compounds that are least toxic to bees should be used, with careful observation of the pollinator-restrictions on the label. Three insecticides that can both be applied during bloom for control of moth larvae in blueberry and cranberry are the *Bacillus thuringensis* (Bt) products, and the insect growth regulators tebufenozide (Confirm®) and methoxyfenozide (Intrepid®). Good coverage is required for these to work effectively, and a spreader/sticker should be used to improve effectiveness. Inform the beekeeper before application so that precautions can be taken to minimize bee exposure. Late evening application is better than morning application and in general liquid formulations are less harmful to bees compared to the powder formulations. More information and a list of chemicals with their toxicity to bees is available from a recently-updated extension bulletin from Oregon State University at http://extension.oregonstate.edu/catalog/pdf/pnw/pnw591.pdf

EFFECT OF WATER pH ON THE STABILITY OF PESTICIDES

Annemiek Schilder
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Most pesticides are sold in concentrated form and have to be dissolved or suspended in water before they can be applied to crops. This water can come from various sources, such as wells, ponds, rivers, or municipal water supplies. Water naturally varies in the amount of dissolved minerals, organic matter and pH, depending on its source. The pH is a measure of the acidity or alkalinity of water, which refers to the number of hydrogen (H^+) and hydroxyl (OH^-) ions in a solution. The scale for measuring pH runs from 0 to 14. The lower the pH, the more acidic is the solution, while a higher pH indicates that the solution is more alkaline. Water at pH 7 is neutral meaning that there are an equal number of hydrogen and hydroxyl ions in the solution. Many areas in Michigan have alkaline water with high mineral/iron content. In addition, the pH of water from natural sources can vary throughout the season.

The pH of water can negatively affect the stability of some pesticides. Under alkaline conditions, alkaline hydrolysis occurs which degrades the pesticide to non-toxic (inactive) forms. In general, insecticides (particularly organophosphates and carbamates) are more susceptible to alkaline hydrolysis than are fungicides, herbicides, or growth regulators. The end result is less active ingredient applied and poor pesticide performance. The degradation of a pesticide can be measured in terms of its half life. For example, if a product has a half life of 1 hour, the amount of active ingredient is reduced to 50% in 1 hour, to 25% in the next hour, to 12.5% in the next hour, etc. Eventually, the pesticide becomes virtually ineffective. The effect of pH on pesticides varies from product to product and is also moderated by buffering solutions contained in the pesticide formulation. Tank-mixing multiple pesticides can modify the pH of the tank-mix.

The table below shows the half life of a number of pesticide products as well as the optimum pH (where known). As you can see from the table, most pesticides are most stable when the spray solution at a pH of about 5. As many water sources are more alkaline than this it may be necessary to adjust the pH of the spray solution. Do not attempt to acidify solutions containing copper-based fungicides, since copper becomes more soluble at a lower pH and may become phytotoxic to crops. In addition, phosphorous acid and other acid-based fungicides should not be acidified since they already have a low pH and lowering it could cause phytotoxicity. On the other hand, acidifying carbonate salt fungicides, such as Armicarb, may render them ineffective.

Product	**Active ingredient**	**Optimum pH**	**Half Life / Time until 50% Hydrolysis****
Insecticides/Miticides			
Admire	Imidacloprid	7.5	Greater than 31 days at pH 5 - 9
Agri-Mek	Avermectin		Stable at pH 5 - 9
Ambush	Permethrin	7	Stable at pH 6 - 8
Apollo	clofentezine		pH 7 = 34 hrs; pH 9.2 = 4.8 hrs
Assail	acetamiprid	5 - 6	Unstable at pH below 4 and above 7
Avaunt	indoxacarb		Stable for 3 days at pH 5 – 10
Carzol	formetanate hydrochloride	5	Not stable in alkaline water; use within 4 hrs of mixing.
Cygon/Lagon	dimethoate	5	pH 4 = 20 hrs; pH 6 = 12 hrs; pH 9 = 48 min
Cymbush	cypermethrin		pH 9 = 39 hours
Diazinon	phosphorothioate	7	pH 5 = 2 wks; pH 7 = 10 wks; pH 8 = 3 wks; pH 9 = 29 days
Dipel/Foray	*b. thuringiensis*	6	Unstable at pH above 8
Dylox	trichlorfon		pH 6 = 3.7 days; pH 7 = 6.5 hrs; pH 8 = 63 min
Endosulfan	endosulfan		70% loss after 7 days at pH 7.3 – 8
Furadan	carbofuran		pH 6 = 8 days; pH 9 = 78 hrs
Guthion	azinphos-methyl		pH 5 = 17 days; pH 7 = 10 days; pH 9 = 12 hrs
Imidan	phosmet	5	pH 5 = 7 days; pH 7 < 12 hrs; pH 8 = 4 hrs
Kelthane	dicofol	5.5	pH 5 = 20 days; pH 7 = 5 days; pH 9 = 1hr
Lannate	methomyl		Stable at pH below 7
Lorsban	chlorpyrifos		pH 5 = 63 days; pH 7 = 35 days; pH 8 = 1.5 days
Malathion	dimethyl dithiophosphate	5	pH 6 = 8 days; pH 7 = 3 days; pH 8 = 19 hrs; pH 9 = 5 hrs
Matador	lambda-cyhalothrin	6.5	Stable at pH 5 - 9
Mavrik	tau-fluvalinate		pH 6 = 30 days; pH 9 = 1 - 2 days
Mitac	amitraz	5	pH 5 = 35 hrs; pH 7 = 15 hrs; pH 9 = 1.5 hrs
Omite	propargite		Effectiveness reduced at pH above 7

Orthene	acephate		pH 5 = 55 days; pH 7 = 17 days; pH 9 = 3 days
Pounce	permethrin	6	pH 5.7 to 7.7 is optimal
Pyramite	pyridaben		Stable at pH 4 – 9
Sevin XLR	carbaryl	7	pH 6 = 100 days; pH 7 = 24 days; pH 8 = 2.5 days; pH 9 = 1 day
SpinTor	spinosad	6	Stable at pH 5 – 7; pH 9 = 200 days
Thiodan	endosulfan	6.5	70% loss after 7 days at pH 7.3 to 8
Zolone	phosalone	6	Stable at pH 5 – 7; pH 9 = 9 days
Fungicides			
Aliette	fosetyl-al	6	Stable at pH 4.0 to 8.0
Benlate	benomyl		pH 5 = 80 hrs; pH 6 = 7 hrs; pH 7 = 1 hr; pH 9 = 45 min
Bravo	chlorothalonil	7	Stable over a wide range of pH values
Captan	captan	5	pH 5 = 32 hrs; pH 7 = 8 hrs; pH 8 = 10 min
Dithane	mancozeb	6	pH 5 = 20 days; pH 7 = 17 hrs; pH 9 = 34 hrs
Nova	myclobutanil		Not affected by pH
Ridomil	mefenoxam		pH 5 – 9 = more than 4 weeks
Rovral	iprodione		Chemical breakdown could take place at high pH
Orbit	propiconazole		Stable at pH 5 – 9
Herbicides			
Banvel	dicamba		Stable at pH 5 - 6
Fusilade	fluazifop-p		pH 4.5 = 455 days; pH 7 = 147 days; pH 9 = 17 days
Ignite	glufosinate-ammonium	5.5	
Gramoxone	paraquat		Not stable at pH above 7
Poast	sethoxydim	7	Stable at pH 4.0 to 10
Princep	simazine		pH 4.5 = 20 days; pH 5 = 96 days; pH 9 = 24 days
Prowl	pendimethalin		Stable over a wide range of pH values
Roundup	glyphosate	5 - 6	
Touchdown	glyphosate	5 - 6	
Treflan	triflularin		Very stable over a wide range of pH values
Weedar	2,4-d		Stable at pH 4.5 to 7

**The half-life is the period of time it takes for one half of the amount of pesticide in the water to degrade. Other factors than the pH can affect the rate of hydrolysis, incl. temperature, solubility, concentration, type of agitation, humidity, and other pesticides and adjuvants in the mixture.

Check the pH of the water used for spraying pesticides frequently throughout the season. If you know that your water has a pH of 7.5 or greater, consider lowering the pH, especially if you are applying a pesticide that is sensitive to high pH. The fastest way to determine the pH level of water is to test it with a pH meter or test paper. Paper test strips are the least expensive; however, they can be unreliable and can vary by as much as 2 pH points. A pH meter will provide the most reliable and consistent readings. Meters are available commercially for $50 to $400.

Adjust the water pH by using a commercially available acidifying/buffering agent before adding the pesticide. Buffering agents, such as Buffercide, Buffer-X, Unifilm B, and LI 700 Acidiphactant, will stabilize a spray solution at a predetermined pH and keep it at that level. Read and closely follow the directions on the label of the buffering agent and make sure that the solution is stirred well before taking a pH measurement. While a pH of 5 may be optimal, a pH of 6 is usually satisfactory for many pesticides, especially if they will be sprayed out immediately after mixing. Some buffering agents such as pHase5 or PHT Indicate 5 will have a color indicator when the correct pH is achieved. Growers can add this product into the water until it reaches the color that indicates a given pH. For example, 5 = pink or red; 6 = orange; etc. Granulated food grade citric acid may be the most convenient and inexpensive acidifying material and is available in 50-pound bags from suppliers that handle food grade chemicals. Two ounces per 100 gallon has been shown to reduce the pH of tap water from 8.3 to 5.4.

When tank mixing multiple pesticides and/or foliar fertilizers, check the pH after the products have been thoroughly mixed and adjust the pH as needed. Not all pesticides react the same to the pH of the spray water solution and some products should not be used with buffering agents. Always read pesticide labels for any precautions with respect to pH and potential product incompatibility issues. Apply pesticides soon after mixing and avoid leaving pesticide tank mixes in the spray tank overnight.

INTREPID® 2F BLUEBERRY USE DIRECTIONS UPDATE

Rufus Isaacs, Department of Entomology, Michigan State University

An updated set of use directions has been released by Dow AgroSciences for Intrepid 2F for control of Lepidoptera larvae infesting highbush blueberry. The recent label approved for Intrepid in blueberry originally contained a 16oz/acre rate for fruitworms, which is a high rate. The new label update provides greater flexibility and guides blueberry growers to use a rate range of 12-16 oz/acre for fruitworm control, 10-16 oz/acre for leafrollers and spanworms, 8-16 oz for cutworms, and 4-8 oz for gypsy moth. The 12 oz rate of Intrepid is expected to perform very well against fruitworms, and we will be running trials this spring to verify this.

Intrepid 2F is an insect growth regulator insecticide, so it must be eaten to be effective on the insect. For this reason, the label guides application to be done to achieve excellent crop coverage. For this reason the label recommends application using 30 gallons of water by ground application and 10 gallons of water by aerial application.

The updated label also provides information on the other application restrictions, such as the 7 day PHI.

TOPSIN M® SECTION 18 REQUEST FOR BLUEBERRIES STILL PENDING

Annemiek Schilder
Department of Plant Pathology, Michigan State Universit

The Section 18 (emergency exemption) request for Topsin M is still pending with the Environmental Protection Agency (EPA). Do <u>not</u> use this fungicide unless we obtain approval for use this season. In making its decision, the EPA considers all other fungicides that are available for disease control in blueberries and the risk of major losses to diseases in the absence of Topsin M. In addition, it considers the toxicological profile and the overall "risk cup" for the product in question. We expect a final decision this week and will inform the growers immediately.

EARLY SEASON MOTH LARVAE

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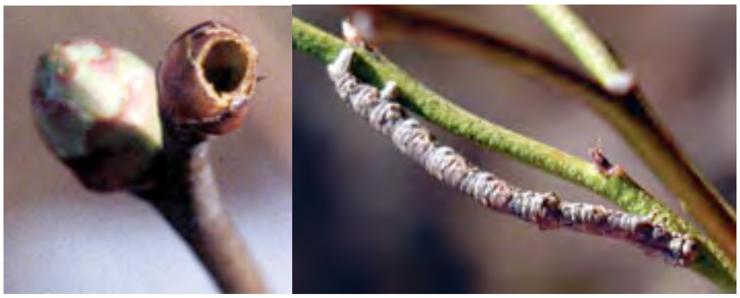
Before bloom, growers may notice caterpillars crawling on stems. There are a few main groups of these moth larvae, and scouting for these and knowing what to look for can help avoid economic damage.

Left, cutworm damage, right, cutworm larva on soil. Mississippi State Univ Archives

During early growth when night time temperatures become milder, and flower buds and leaf buds are beginning to swell and grow, you may see two insect pests, cutworms and spanworms, which may feed on young tissues. Both pests are moth larvae that are occasionally found in blueberry, and if left unchecked either can cause economic losses. So as you are scouting your fields keep an eye out for the symptoms described below.

Cutworms damage plants by feeding on young tissues. They spend the day time in leaf litter or in upper soil layers under bushes, and they tend to be more of a problem in weedy fields. Larvae are active at night and crawl up onto bushes after the first warm spring days. For this reason, inspect bushes for injured buds during delayed-dormant to budbreak. Buds may be partly or entirely consumed, and multiple buds may be damaged during one night of feeding. Cutworm larvae are typically 1 inch long (25 mm) and dark colored. When disturbed, they curl into a circular or C-shaped.

Several species of spanworm (inchworm) larvae feed on blueberry, where they chew holes through the sides or tops of buds. These insects have thin bodies with large fleshy legs only at the front and rear ends of the body. Their coloration makes them well camouflaged in blueberry bushes.



Left, typical spanworm damage, right, spanworm larva mimicking a twig.

Spanworms can look like twigs. Other common names for this type of larva are inchworms or loopers due to the characteristic looping way they walk. They may also remain completely still when disturbed, mimicking a branch to avoid predators. Detect spanworms by shaking branches over a beating tray. Inspect buds for feeding during bud swell.

Leafroller larvae may also be seen early in the spring. The two main species seen before bloom are obliquebanded leafroller and redbanded leafroller. These are rarely in sufficient abundance to cause economic injury but it is important to know how to identify these insects to enable accurate scouting. Obliquebanded leafroller overwinter as mature larvae and so they are relatively large (up to 1 inch long) early in the spring. The larvae have a green body with a dark brown head capsule and a dark thoracic shield (see photo). They typically feed on new growth and will feed in flower clusters. The larvae can web leaves and flowers together, hiding inside these areas for protection. There is a second generation of this insect later in the season, timed so larvae are active in July and August. These larvae may feed on the outside of developing berries causing cosmetic injury to the fruit. The redbanded leafroller overwinters as a pupa, and the newly-emerged adults are some of the earliest insects to begin flying in the spring. They lay eggs on the bush and larvae begin hatching during early growth. These larvae may also be seen in the bush canopy feeding on young growth and flowers.

During a four year project in which commercial blueberry fields were scouted weekly for insect infestation, moth larvae were rarely found to be at levels exceeding a threshold of 2% of young shoots infested with larvae. Regular scouting was used to demonstrate that these insects were not present at levels requiring control. Management programs for fruitworms and other insect pests typically suppress populations of these insects.

Redbanded leafroller larva

Obliquebanded leafroller larva (note the thoracic shield)

Foliage feeding by leafroller larvae

MEETINGS AND ANNOUNCEMENTS

2008 Blueberry IPM Twilight Meeting Schedule:
All meetings held from 6-8PM
May 14: Cornerstone Ag, Van Buren County
May 28: Carini Farms, Ottawa County
June 11: Cornerstone Ag, Van Buren County
June 24: Carini Farms, Ottawa County

These meetings are hosted by MSU to update growers on insect, disease, and weed control as the season progresses. They are completely free, with a light dinner served at 6PM. For more information, contact Paul Jenkins (517-432-7751, jenki132@msu.edu).

IN NEXT WEEK'S ISSUE…

Blueberry aphid
Fruit set
Fruitworm monitoring

MSU BLUEBERRY TEAM

Eric Hanson, Horticulture
Annemiek Schilder, Plant Pathology
Rufus Isaacs, Entomology
John Wise, Trevor Nichols Research Complex
Matt Grieshop, Organic Pest Management
Paul Jenkins, Small Fruit Education Coordinator
Mark Longstroth, Van Buren County Extension
Carlos Garcia, Ottawa County Extension
Bob Tritten, SE Michigan Extension

For more information, see our website at blueberries.msu.edu

This newsletter is produced by the MSU Blueberry Team with support from Project GREEEN, North Central IPM Center, MSU Extension and the EPA's Region 5 Strategic Ag. Initiative Program