

Michigan Blueberry I.P.M. Update



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Contents

- Crop Stages
- Weather Notes
- Using Bees for Pollination in Blueberry
- Pest of the Week - Botrytis
- Disease Update
- Insect Update
- Upcoming Changes to Guthion
- Meetings and Announcements

The Blueberry IPM Update is a weekly publication produced by Michigan State University Extension. To receive a copy of this newsletter, send an email to masonk@msu.edu.

Also available online through blueberries.msu.edu and at: www.isaacslab.ent.msu.edu/blueberryscout/blueberryscout.htm

CROP STAGES

In Van Buren County, Jersey in Covert are showing mostly early pink bud. Blue-ray and Bluecrop are approaching late pink bud in Grand Junction.

In Ottawa County, Blue-ray are at early pink bud and Jersey are at bud break in Holland. Rubel are at bud break and Bluecrop is at early pink in West Olive.



Bluecrop at late pink bud in Grand Junction

DEGREE DAYS AND WEATHER NOTES

Weather Forecast: Temperatures will be generally warmer than last week with little chance of rain Wednesday through Monday. By 5-7 GDD₅₀ will increase by ~50, and GDD₄₂ will increase by ~110. Complete weather summaries and forecasts are available enviroweather.msu.edu

GDD (from March 1)	Van Buren County	
	Base 42	Base 50
4-16	189	133
4-23	382	189
4-30	474	237
	Ottawa County	
	Base 42	Base 50
4-16	213	91
4-23	295	137
4-30	368	170

Editor's Note: We hope you find the information in this newsletter useful in guiding what to look for as you scout your own farm. The scouting data shown in the Disease and Insect Updates below are taken from four Michigan blueberry farms. As conditions are different from farm to farm, we must stress that the information in this newsletter should not be used as a substitute for scouting your own fields; your spray decisions should be made based on what is seen on your own farm. Please use this newsletter to determine when and how to look for certain pests, identify potential pest problems, and to get information on the biology of pests and other aspects of integrated pest management. See the Insect and Disease Updates below for descriptions of some scouting methods that can be used on your farm. These scouting methods will also be demonstrated at the Blueberry IPM Scouting Workshops on June 13:

BLUEBERRY IPM SCOUTING WORKSHOP
10-12am at the Bodtke Farm, Grand Junction
3-5pm at Carini Farms, West Olive

Using Bees for Pollination of Blueberry

Zachary Huang and Rufus Isaacs
 Department of Entomology

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 \$40-70 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 costs because if you only need 10 hives, you might be expected to pay a higher price than the other 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. The invasion of Varroa mite has decimated the numbers of feral (unmanaged, wild) honeybee colonies that used to contribute to pollination in addition to rented colonies. The proportion of pollination caused by feral bees relative to managed colonies is unclear, but it is safe to say that we need higher densities today than when feral bees were present. Research in blueberries has shown variation in their needs for 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.

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.

MSU will be 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.

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 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. Two insecticides that can both be applied during bloom for control of moth larvae in blueberry and cranberry are the *Bacillus thuringiensis* (Bt) products, and the insect growth regulator tebufenozide (Confirm®). Good coverage is required for both, and a spreader/sticker should be used to improve effectiveness. Inform the beekeeper 2-3 days before application so that precautions can be taken to minimize bee exposure. Late evening application is better than morning application and in general liquid form is less harmful to bees compared to the power form. 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>

PEST OF THE WEEK

Botrytis blight and fruit rot

Botrytis cinerea (fungus)

[Annemiek Schilder, MSU Plant Pathology](#)

[Bill Cline, NCSU Plant Pathology](#)

Botrytis blight and fruit rot is a minor disease in most years but sometimes causes serious damage. Economic losses are mostly due to blossom blight and fruit rot.

Symptoms

On leaves, brown, irregular lesions develop that sometimes distort leaves. Blighted blossoms turn brown and soon become covered with abundant gray mold. Infected twigs are first brown to black and later become tan to gray.

Developing berries can also become infected, but fruit rot usually does not develop until after harvest. Infected berries become covered with a fluffy gray mold. Disease cycle

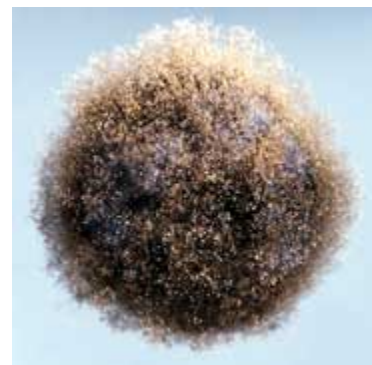
The fungus overwinters as mycelium or hard black mycelial masses (sclerotia) on infected plant material. In spring, numerous airborne spores develop on plant debris and sclerotia. The fungus infects tender green twigs, blossoms, leaves, and fruit. Older plant parts are rarely attacked. Moderate temperatures (59 to 68°F) and frequent rains favor disease development.

Management

Remove infected plant material; reduce humidity in the canopy; apply effective fungicides during bloom and fruit ripening; avoid excessive use of nitrogen fertilizer in the spring; cool berries rapidly after harvest.



Leaf lesion (left) and twig blight (right) caused by Botrytis.



Flower blight (left) and postharvest rot (below) caused by Botrytis.

DISEASE UPDATE

To scout for mummy berry in fields with susceptible varieties, visually examine an approximately 9 sq ft area of soil at the base of each of 5 bushes. Count the number of mummified berries and mushrooms. If mummies or mushrooms are found fungicide treatment should be considered. [Click here for more info on mummy berry.](#)

Scouting methods for other diseases will be included in the Disease Update when it is time to look for those diseases.

Infection periods for mummy berry will continue through this week. Growers should scout for mummy berry and consider fungicide treatment if mummies and/or mushrooms are found.

Van Buren County						
Farm	Date	Mummified berries per bush*	% germinated mummified berries	Mummy berry mushrooms per bush*	Phomopsis canker	Botrytis
Covert	4-17	0.25	0	0		
	4-23	0.1	0	0		
	4-30	0.4	12	0.05		
Grand Junction	4-17	27	26	21		
	4-23	21	26	9		
	4-30	29	17	12		
Ottawa County						
Farm	Date	Mummified berries per bush*	% germinated mummified berries	Mummy berry mushrooms per bush*	Phomopsis canker	Botrytis
Holland	4-17	13	19	5		
	4-23	10	29	4		
	4-30	11	14	3		
West Olive	4-17	6	18	2		
	4-23	5	24	1		
	4-30	3	33	2		

* The numbers in this table are the average number of mummies in 9 sq ft area of soil at the base of each of 5 bushes.

INSECT UPDATE

MONITORING FOR FRUITWORMS

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

After moths are caught and after petal fall (~5-15 or 5-30) bushes should be inspected for eggs and damage each week for a five minute sampling period. Working in a "hotspot," look at as many fruit clusters as possible on 10 to 20 bushes along the field border. Looking at the fruit clusters can help you find eggs in calyx cup, larvae entry holes and damage. When inspecting the fruit grasp the cluster and view with the sun over your shoulder. Carefully turn the clusters over and inspect the bottom of the fruit as well as the top for entry holes and/or frass. Record the number of cranberry fruitworm and cherry fruitworm eggs and the number berries with damage. [Click here for pictures and more info about fruitworms.](#)

Scouting methods for other insects will be included in the Insect Update when it is time to look for those pests.

As of 4-30-07 no cherry fruitworm or cranberry fruitworm have been caught. Traps for these moths should already be set and the traps should be checked weekly until harvest.

The "contaminant" moth, *Pseudexentra vaccinii* is still being caught in CFW traps. [See BB IPM Update from April 24th for more info about this moth.](#)

In the next week, we expect Cherry fruitworm moths to emerge in Van Buren County, but emergence of this pest will likely be ~1 week later in Ottawa County.

Van Buren County						
Farm	Date	CBFW moths per trap	CFW moths per trap	BBA % infested shoots	BBM adults per trap	JB per 20 bushes
Covert	4-16	Set	Set			
	4-23	0	0			
	4-30	0	0			
Grand Junction	4-16	Set	Set			
	4-23	0	0			
	4-30	0	0			

Ottawa County						
Farm	Date	CBFW moths per trap	CFW moths per trap	BBA % infested shoots	BBM adults per trap	JB per 20 bushes
Holland	4-16	Set	Set			
	4-23	0	0			
	4-30	0	0			
West Olive	4-16	Set	Set			
	4-23	0	0			
	4-30	0	0			

LEAFROLLERS

Obliquebanded Leafroller larvae have been detected at the Covert farm. Scout your bushes for these larvae and their damage and [Click here for more information on Obliquebanded leafroller.](#) Specific insecticide treatment for this pest is usually not required as insecticide sprays targeting fruitworms are effective at controlling early season leafrollers.

UPCOMING CHANGES TO GUTHION: WHAT DOES THIS MEAN FOR FRUITWORM CONTROL?

Dr. Rufus Isaacs, Dept. of Entomology, Michigan State University

Late last year, the EPA released their decision on the phaseout of azinphos-methyl, the active ingredient in Guthion. This insecticide is still used in blueberries and nine other food crops, but will be phased out by the end of 2012. The vocal input from blueberry growers, industry groups and universities during the last few years has convinced EPA that Guthion is needed and should be phased out slowly in this crop, giving growers six years to learn how to best maintain insect control without this insecticide. This article will describe EPA's phase-out plan for blueberry and will cover the other options growers have for control of fruitworms, the main pests that Guthion is used against.

Changes to Guthion label in blueberry

It is important to realize that there are no changes for the 2007 growing season. Also, Guthion will retain the 7 day re-entry and pre-harvest intervals currently on the label for the remainder of the phase-out period. After that, the following changes will be made:

- Gradual reduction in allowable season limits of Guthion 50WP
 - 2.5 lb per season in 2008 and 2009
 - 1.5 lb per season in 2010, 2011, 2012
- Maximum single application rate – 1.5 lb of Guthion 50WP
- Aerial sprays allowed, but only until Sept. 30, 2009

There will also be buffer zones to dwellings and bodies of water and long re-entry intervals (30-42 days) on U-pick fields. **After Sept. 30, 2012 all uses of Guthion will be prohibited on blueberry.**

Alternative insecticides

The EPA's gradual phase-out provides some time for growers to learn how to manage blueberry insects effectively without this product. Testing alternative insecticides for control of fruitworms and other pests would be a good start, to learn what works on your farm. Our research at MSU's Trevor Nichols Research Complex in Fennville has identified some effective alternatives that are already registered for use. These include Confirm, an insect growth regulator that has worked well for use during bloom. This is especially useful when growers find themselves in the common situation where petal fall has started, fruitworm moths are being trapped in monitoring traps, but bees are still in the field. Confirm has a high degree of safety to bees. This product also lasts much

longer and is less likely to wash off than the other bee-safe products such as *B.t.* With either product, good coverage during bloom is essential for getting fruitworm control.

After bees are removed from fields, growers also have many options for fruitworm control. Imidan, Sevin, Lannate and Asana all provide broad-spectrum control of fruitworms, with varying duration of residual control. Because of the short PHI of some of these products, growers have been saving their use until nearer harvest when Japanese beetle and blueberry maggot control are priorities. In the past two years, we have tested a fruitworm control program on six grower farms, using Confirm when fruitworm egg-laying was detected during bloom and switching to Asana after bloom. Depending on the level of fruitworm pressure and the length of activity, growers needed one or two post-bloom sprays for fruitworm control. From the 2005 and 2006 results, this program had similar effectiveness as the typical program of *B.t.* during bloom followed by Guthion after bloom.

Looking forward

Full implementation of EPA's plan will eventually leave blueberry growers without access to an insecticide that is used on a majority of Michigan's blueberry acreage. In the coming years, it would be wise to try some alternative options (starting on small parts of your farm) to see how well they work, and to gain confidence in ways to manage fruitworms and other insect pests using the other insecticides options available. Next week's newsletter will contain a detailed article about the various options for fruitworm management.

UPCOMING MEETINGS

May 17 - Blueberry IPM Scout Training, Hands-On Workshop

Meet at 1 pm at Trevor Nichols Research Complex in Fennville, then drive to blueberry farm

June 13 - Blueberry Scouting and IPM Demonstration Workshops

10-12am at Bodtke Farm, Van Buren County
3-5pm at Carini Farms, Ottawa County

MSU Blueberry Team

Horticulture - Eric Hanson
Plant Pathology - Annemiek Schilder
Entomology - Rufus Isaacs
Trevor Nichols Research Station - John Wise
Van Buren Co. - Mark Longstroth
Ottawa Co. - Carlos Garcia
Berrien Co. - Greg Vlaming
Southeast Michigan - Bob Tritten

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



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