

# Michigan Blueberry I.P.M. Update



April 29, 2008

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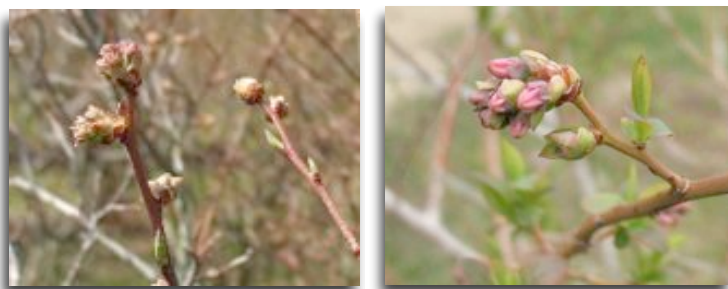
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## CROP STAGES

**Keith Mason**

**Department of Entomology, MSU**

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



Rubel at early pink bud in West Olive (top) and Bluecrop at mid pink bud in Grand Junction (bottom).

## WEATHER

**Mark Longstroth**

**SW Michigan District Fruit Educator, MSU Extension**

I expect a cold morning tomorrow. Use Enviroweather ([enviroweather.msu.edu](http://enviroweather.msu.edu)) to monitor low temperatures and dew points. Eleven days of warm temperatures with highs in the 70s and lows near 50 moved plant growth

quickly. Most plants are greened up and many new leaves have emerged. Soils began to dry out quickly with the warm, dry, windy weather. Significant rain fell in the Berrien County and the southwest portion of the region Saturday, May 19. A little more rain fell Thursday, April 24 and Saturday, April 26. Rainfall amounts were generally light, less than a tenth of an inch, and these rains represented marginal infection events for some diseases. With the warm weather, our GDD accumulation has moved close to average. The passage of cold fronts Sunday and Monday brought cooler temperatures. Morning temperatures Monday fell to freezing and below causing light damage to fruit. Tuesday morning was warmer, but Wednesday morning is forecast to fall to 25 F. Freeze injury would occur at temperatures below 29 to the mid 20s depending on the crop, so we anticipate damage in the frost prone areas. We expect cool temperatures week. The forecast is for dry conditions with highs in the 50 and 60s and lows near 40. Rain showers should begin Friday with a wet weekend.

## DEGREE DAYS AND WEATHER NOTES

Complete weather summaries and forecasts available at [enviroweather.msu.edu](http://enviroweather.msu.edu)

GDD (from March 1)	Base 42	Base 50
Van Buren County		
4-21-08	235	112
4-28-08	358	189
Projected for 5-5-08	417	215
Ottawa County		
4-21-08	190	84
4-28-08	290	142
Projected for 5-5-08	343	162

## PEST OF THE WEEK – HOPLIA FLOWER BEETLE

Rufus Isaacs

Department of Entomology, Michigan State University

### ***What are those beetles, chewing on my flower buds?***

The warm weather over the past few weeks has brought out one of the earliest scarab beetles we find in Michigan blueberry fields. Hot spots have been reported in Holland and West Olive, but they have been seen in a few other regions. This species is a *Hoplia* flower beetle (*Hoplia trifasciata*) and the adults feed on young buds and can also feed on flowers. In 2007, the beetles were active during bloom, but our recent sunny hot days have warmed the soil and brought them out early. They prefer flower buds and leave ragged feeding on the buds and on the flowers from their feeding. We have also trapped these beetles in the white traps used for monitoring fruitworms.

These beetles have marks on each elytra (wing covering) and are a little hairy. This distinguishes them from rosechafer or Japanese beetle. *Hoplia* beetles may be tan or grey and they are usually here for just a short time especially in hot weather. It is not known how much economic damage they do, but the number of flowers or buds affected is usually a very small percentage of the total number. We also do not know whether damaged buds or flowers can still set fruit.

As a rough threshold, if more than 2% of flower buds are eaten completely off, you should consider control. This is based on 2% of a typical yield being worth more than the cost of an application. In fields of concern, sample a representative 10 bushes spread throughout the field and sample ten flower buds on each bush to give 100 buds sampled. If more than 2 of these buds are eaten, consider an application of one of the insecticides that work well against Japanese beetle. Be aware that there are no insecticides registered for use in blueberry with this beetle on the label. Also be aware that we are approaching bloom and any application of insecticide with long residual activity runs the risk of causing harm to bees. A week from bloom, avoid broad spectrum insecticides. Spray insecticides only if this pest is causing economic levels of damage



*Hoplia* flower beetle on blueberry flowers in 2007, viewed from the rear.

## DISEASE UPDATE

Timothy Miles and Annemiek Schilder

Department of Plant Pathology, Michigan State University

### Attack of the mummy berries!

This week likely marked the beginning of the infection risk for this seasons shoots strikes as mature mushrooms (apothecia) are actively discharging ascospores and expanding leaves are present in all scouted blueberry fields (Figure 1). In all locations, expanding leaves have grown past the 1/2 inch (~12 mm) mark, providing supple young tissue for shoot strike infections (Figure 2A). The risk will be especially high this week and next with rain in the forecast, and temperatures predicted to range from the mid-50s to mid-60s (~12-18° C).

The number of (apothecia) and the percentage of germinated mummies has increased this week, with more found in the wetter Grand Junction site. Warmer temperatures last week caused the majority of past apothecia to mature this week, with cup diameters ranging from 1/8 to 1/4 of an inch (~3-6 mm) in most scouted plots (Figure 1). The mushrooms start shooting spores when the cup is about 1/8 of an inch (~3 mm) in diameter. The spores get shot out when the mushrooms are disturbed or the air pressure changes, appearing like a little wisp of smoke. Over a million spores can be released per day by a single mushroom. These spores get picked up by the wind and carried to susceptible green tissue. Prolonged cool, wet weather is conducive to infection. The optimum temperature for infection is 57°F (~14°C) and only 4 hours of leaf wetness is required.

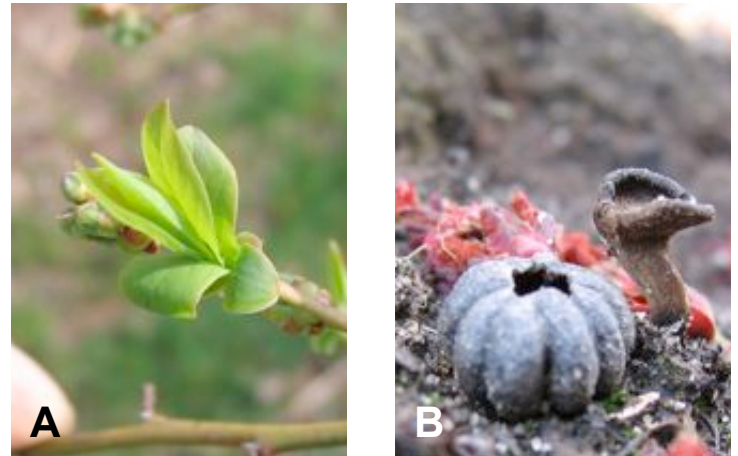
Finally, because of the prolonged high temperatures many of our plots had a number of "dried up" apothecia that were no longer actively discharging ascospores (Figure 2B). This means these apothecia are no longer a source of inoculum, however, with forecasted wet weather on the horizon, a second flush of apothecia will most likely take their place.

### Scouting for mummy berries and apothecia

To scout for mummy berries (pseudosclerotia) and mushrooms (apothecia) in fields with susceptible varieties, visually examine an approximately 9 sq ft area of soil at the base of each of five bushes spread out in a row, preferably a mummy berry "hot spot" near a treeline or woods. Count the number of mummified berries and mushrooms (Figure 1).



**Figure 1.** Mature "mushrooms" or "trumpets" (apothecia) were observed at Grand Junction on 4-25-08.



**Figure 2.** A) Late green tip was observed in Grand Junction, MI with expanding green leaves larger than half of an inch, providing fresh succulent tissue for shoot strike infections. B) After a period of warmth, some mature mushrooms (apothecia) have "dried up" and are no longer actively dispersing ascospores.

<b>Van Buren County</b>		Average mummies on the ground per bush*	% Germinated mummies	Average apothecia on the ground per bush*	Average number of mummy berry shoot strikes**
Farm	Date				
<b>Covert</b>	4-11	1.9	0.0%	0.0	0.0
	4-18	2.2	8.3%	0.4	0.0
	4-25	2.2	9.0%	0.4	0.0
<b>Grand Junction</b>	4-11	15.4	6.0%	1.5	0.0
	4-18	26.4	24.0%	9.1	0.0
	4-25	25.7	28.0%	10.9	0.0
<b>Ottawa County</b>					
<b>Holland</b>	4-11	2.7	5.0%	0.3	0.0
	4-18	3.0	14.9%	0.5	0.0
	4-25	3.2	16.0%	0.8	0.0
<b>West Olive</b>	4-11	6.0	2.0%	0.1	0.0
	4-18	7.3	15.9%	2.4	0.0
	4-25	7.3	23.0%	2.7	0.0

\*Average number was calculated from ten bushes. \*\*Bushes not advanced enough to rate for shoot strikes.

## INSECT UPDATE

Keith Mason and Rufus Isaacs

Department of Entomology, Michigan State University

Insect activity has remained low at all four farms. The flower feeding beetle *Hoplia trifasciatus* was caught in monitoring traps for other pests at all three farms, but no feeding damage was seen. Growers and scouts should still be on the lookout for feeding by leafroller, climbing cutworm or spanworm. Feeding by these pests may occur particularly as the weather warms near the end of the week.

As of 4-28-08 no cherry fruitworm or cranberry fruitworm have been caught. Given the current predictions for continuing cool weather, we do not expect the flight for either of these pests to begin in the next week. Growers and scouts should set traps for these moths in the next week 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. The contaminant moth is ~1/2 inch long which is much larger than cherry fruitworm which is ~1/4 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).

Van Buren County						
Farm	Date	CBFW moths per trap	CFW moths per trap	BBA % infested shoots	BBM adults per trap	JB per 20 bushes
<b>Covert</b>	4-14	0	0			
	4-21	0	0			
	4-28	0	0			
<b>Grand Junction</b>	4-14	0	0			
	4-21	0	0			
	4-28	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
<b>Holland</b>	4-14	0	0			
	4-21	0	0			
	4-28	0	0			
<b>West Olive</b>	4-14	0	0			
	4-21	0	0			
	4-28	0	0			



## FROST PROTECTION

Mark Longstroth

SW Michigan District Fruit Educator, MSU Extension

Many Michigan growers use sprinkler systems to protect blueberry flowers from spring freezes. Sprinklers are very effective under certain circumstances but can actually increase injury if used at the wrong time. Sprinklers used for irrigation do not protect below 23-24°F. If the system fails due to cold or wind the blueberries will get much colder than in areas where you are not sprinkling. When you use sprinklers to prevent freezing injury, you are using the energy that water releases when it freezes, and changes from a liquid to a solid, to keep the temperature in the ice right at the freezing point 32°F. As long as you keep the ice WET, the ice temperature will stay at 32°F. If the ice dries out and water starts to evaporate from the ice the ice will get colder than the air temperature as it evaporates.

### Protection with sprinklers

If you understand that you need to keep the ice wet, and when your system will fail to keep the ice wet, you will understand how to use your sprinklers to prevent freeze injury. The freeze protection from sprinkler systems is limited by the irrigation rate. Most sprinkler systems in Michigan blueberries are designed to provide about 0.12 to 0.15 inches of water per hour. This volume protects plants to about 22° F with no wind or 24° to 25° F with a light wind. More water is needed to protect at lower temperatures and higher wind speeds, see Table 1.

Most irrigation systems cannot easily be changed to deliver more water and protect to lower temperatures. Increasing the operating pressure is not advisable because the volume is not increased substantially (You need to increase the pressure 4 times to double the output). Higher pressure can break lines and reduces the uniformity of application. Larger nozzles can be installed in some systems, but only if the capacity of the system, mainlines, well and pump can handle the added volume. For example, 9/64-inch nozzles that deliver 0.12 inches water per hour require 60 gallons per minute per acre of blueberries. Switching to 5/32-inch nozzles would deliver 0.15 inches per hour but requires 68 gallons per minute per acre. Irrigation systems are not designed to apply enough volume to protect from temperatures in the low.



**Table 1.** Irrigation rate (inches/hour) needed to protect fruit buds under different wind and temperature conditions. (U of Florida Ext. Circ. 287)

Temp (°F)	Wind speed (mph)		
	0-1	2-4	5-8
27	.10	.10	.10
26	.10	.10	.14
24	.10	.16	.30
22	.12	.24	.50
20	.16	.30	.60
18	.20	.40	.70
15	.26	.50	.90

### Critical temperatures

Growers should only use sprinklers to protect blueberry from freezing, at around bloom time. The temperature range where sprinkler can protect the crop is relatively narrow from 24 to 32 F. This narrow temperature range is also the range that will hurt blueberry open flowers. When blueberries begin to grow in the Spring the buds can handle very cold temperatures. Swollen buds can tolerate 15-20° F. The lower end

of the range is where almost all the flowers are killed and the upper end is where damage begins to occur. At "early pink bud" (individual flowers are visible in bud), injury occurs between 18° and 25° F. These are temperatures colder than you can protect to with an irrigation system. In "late pink bud", when the flowers have separated in the cluster but the flower petals are still closed, 25-28° F is lethal. This is in the range where we can protect but if there is a wind or the temperature gets a little colder than predicted we could cause more damage than if we had not turned on the system. Once we turn on the system we need to keep it on until the temperatures are above freezing or you will cause a lot of damage as the temperature of the ice goes down colder than outside the irrigated area.



It is because of this narrow margin of error that I recommend that growers only try to protect at bloom when the temperature range that will cause damage is well inside the range that we can protect to with an irrigation system. Fully open flowers are killed between 28° and 31° F. Right after bloom when the petals fall, is the most sensitive, 31° F will damage green fruit. If the temperature gets colder or if it is windy, we have a safety margin and our system can still protect the blueberries. If we were operating the system at the edge of its effectiveness it is more likely to fail. Dr. Mike Mainland of North Carolina State says that he would not turn on a frost protect system in blueberries unless there were open flowers in the field.

### When to turn on the System

Once you have looked at the field and see open flowers and checked the weather and see that the temperature is supposed to get down to 26° F. You need to decide if you are going to turn on the system that night. I would not turn on the system if the temperature were forecast to fall below 24 F. If windy conditions (more than 10 MPH) were forecast I would not turn on the system at all. When you turn the system on and start to irrigate the air temperature will fall in the field. This is because the water is evaporating and cooling the air. The dryer the air, the greater the temperature falls. How dry the air is will dictate when you turn the system on. This can be calculated from the dew point, which is measured with a wet bulb thermometer or a sling psychrometer.

Table 2. Starting temperature for overhead sprinkler freeze protection based on the dew point of the air.	
Dew point	Start irrigation at
26 F	34 F
25 to 24	35
23 to 22	36
21 to 20	37
19 to 17	38
16 to 15	39

Once you start the system it is necessary to keep it running until the ice starts to melt on its own. If your system fails and the ice dries out and begins to evaporate it will change from a blueberry heating system to an effective refrigeration system that can significantly reduce your crop. As long as water drips from the ice the system is working. If the ice is clear, this indicates the system is working properly and the water is freezing uniformly.

### When can I stop irrigating?

Stop irrigating when the ice is melting and temperature is rising. Ice breaking free from branches indicates water is forming under the ice and it is likely safe to quit. Normally this is when temperatures are above freezing and rising. Beware of sudden dips in the temperature soon after sunrise.

## **GUTHION PHASOUT UPDATE**

**Rufus Isaacs**

**Department of Entomology, Michigan State University**

The EPA's plan for phasing Guthion out of blueberry production starts taking effect this season. Guthion is still registered, but here are the main label restrictions that blueberry growers need to be aware of:

- The seasonal limit is reduced from 3 to 2.5 pounds/acre.
- Maximum single application remains at 1.5 pounds/acre.
- Aerial application still allowed.
- 7 day REI and 7 day PHI, except in U-pick fields (30 or more days, depending on the rate used).
- Buffer zone to bodies of water is 60 ft for ground application and 150 ft for aerial application.
- Buffer zone to occupied dwellings or recreational areas is 60 ft.

One important practical implication of the list above, is that for using two sprays of Guthion after bloom for fruitworm control, if the first spray is at 1.5 pound rate, the next can only be 1 pound. Another option is to apply 1.25 pounds twice if you have high fruitworm pressure and need to apply at high rates. Of course, a 1 pound rate applied twice would work too. These changes are the first of the restrictions affecting Guthion in blueberry that will continue to limit the use through 2012. By Sept. 30 of that year, EPA's plan has Guthion restricted completely from blueberries. The next significant changes are in 2010, when the seasonal limit will drop to 1.5 lb, and no aerial application will be allowed.

Given the Guthion phase-out situation, testing alternative options for fruitworm control on some of your fields would be a prudent plan this year. Look in next week's edition of the IPM Update for an article on monitoring and management of fruitworms that will provide information on the various options available.

MSU and the Michigan blueberry industry have formed a Guthion Phaseout Task Force to develop and evaluate alternatives and prepare the industry for this change. Details of the group's activities can be seen at [www.isaacslab.ent.msu.edu/AZM.htm](http://www.isaacslab.ent.msu.edu/AZM.htm). This website contains minutes of the last meeting, and the priorities for research, education, and regulatory issues developed at that meeting.

## **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](mailto:jenki132@msu.edu)).

## **IN NEXT WEEK'S ISSUE...**

Botrytis

Bees and pollination

## **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](http://blueberries.msu.edu)



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