Michigan Blueberry Facts

MICHIGAN STATE UNIVERSITY

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Contents

Next Blueberry IPM Twilight Meeting

When: TONIGHT!!! Tuesday, June 24, *6-8PM*
Where: Carini Farms, 15309 Port Sheldon Road, West Olive, MI. Ottawa County (west of US 31).
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. Hope to see you there!

CROP STAGES

Keith Mason
Department of Entomology, Michigan State University

In Van Buren County, Jersey in Covert is at late green fruit with some early fruit coloring. In Grand Junction, Blueray and Bluecrop are at fruit coloring. In Ottawa County, Blueray in Holland, and Rubel and Bluecrop in West Olive are at late green fruit and some berries are at the beginning of fruit coloring.

Bluecrop at late green fruit in West Olive (left) and at fruit coloring in Grand Junction (right).

WEATHER NOTES

Mark Longstroth
Michigan State University Extension

Complete weather data for your area can be found at enviroweather.msu.edu.

Last week's weather was cool and dry with highs generally near 70, and lows near 50. A few showers passed through the region on Saturday, leaving little rain and some light hail. Soils are becoming dry. We expect warmer temperatures later in the week with highs rising into the 80s and lows near 50. Our GDD totals are now about 3 or 4 days behind 2007.

DEGREE DAYS		
GDD (from March 1)	**Base 42**	**Base 50**
	Van Buren County	
6-17-08	1289	793
6-23-08	1417	874
Projected for 6-30-08	1618	1019
	Ottawa County	
6-17-08	1117	649
6-23-08	1242	726
Projected for 6-30-08	1442	889

INSECT UPDATE

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

Left: Single berry damage. Note the characteristic darkening of the fruit.

Right: Cluster damage from Cranberry fruitworm.

The number of cherry fruitworm and cranberry fruitworm moths in traps decreased over the last week, and it appears cherry fruitworm flight is almost over. The cooler night-time temperatures are also likely to have inhibited moth captures in traps. A single cherry fruitworm egg was found at the West Olive farm, and no new cranberry fruitworm eggs were seen in the commercially-managed fields. Single berry damage (indicative of cherry fruitworm feeding or early cranberry fruitworm feeding) was observed at all four farms and this type of damage has increased slightly over the past week. Cluster damage (characteristic of advanced cranberry fruitworm feeding) was observed in Grand Junction. Click here for more info and photos of cranberry and cherry fruitworm. We expect the number of moths in traps and the number of new eggs of both species to decrease, while berry damage and cluster damage will likely increase over the next week as larvae continue to develop. Growers and scouts should continue monitoring cherry and cranberry fruitworm traps, and berry clusters should be inspected for eggs and larvae, to determine the effectiveness of control programs.

The accumulated heat and the recent wet weather, coupled with the coloring of early blueberry varieties suggests blueberry maggot flies should become active soon. However, no blueberry maggot flies were caught at any of the farms scouted this week. Growers and scouts should continue checking these traps at least once per week through harvest. See photos at right for help with identification of the blueberry maggot fly using the wing pattern.

Left: Blueberry maggot fly. Note "m" shaped wing pattern.

Right: Cherry fruit fly. Note separate dark spot on wing tip.

Aphids were found at all four farms, and mid-sized colonies (5 to 20 individuals) were seen. A parasitized aphid was seen at the Covert farm. Growers and scouts should be scouting for aphids, particularly on farms with varieties that are susceptible to shoestring virus.
See the June 10th issue of the Michigan Blueberry IPM Update for scouting methods.

Leafroller feeding was not seen at any of the farms, and tussock moth larvae were not observed, but growers and scouts should still be on the lookout for these pests.

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	6-9	78	6	10%		
	6-16	100	1	20%	set	
	6-23	41	0	5%	0	
Grand Junction	6-9	43	5	25%		
	6-16	51	3	5%	set	
	6-23	9	0	40%	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	6-9	108	7	5%		
	6-16	168	3	0	set	
	6-23	63	0	5%	0	
West Olive	6-9	2	2	0%		
	6-16	8	3	5%	set	
	6-23	1	0	15%	0	

DISEASE UPDATE

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

Figure 1. Twig Blight symptoms seen on 6-19-08 (Covert, MI)

This week all scouted blueberry plots were at the green fruit stage. Mummy berry shoot strike symptoms have dropped dramatically in all fields (see below). Also, at one of the fields there was an increase in blueberry shoestring disease symptoms. Finally, twig blight symptoms have increased dramatically in all of our scouted plots (Figure 1). As discussed in last weeks issue, twig blights can be caused by various fungi, including *Phomopsis vaccinii*, *Colletotrichum acutatum* and *Botrytis cinerea*. If fields have high incidences of twig blight, it may be useful to prevent cane infections through wounds created during mechanical harvesting with fungicides such as Cabrio or Pristine.

Mummy Berry

Scouting over the past few weeks has shown a dramatic drop in the number of shoot strike infections. Old infected tissues have dried down and fallen off. Although, shoot strike infections have dramatically declined immature fruit tissue will still have latent infections until later in the season. At this point, the risk for mummy berry fruit infection is minimal since pollination has come to a close and few blossoms still remain in the field. Infected berries are difficult to distinguish from healthy berries at this point, infections can be seen by cutting open berries: infected berries show a white, star-like shape in the center in place of the seed (Figure 2).

Figure 2. White mycelium of *Monilinia vaccinii-corymbosi* in ovaries of outwardly symptomless green blueberries.

Farm	Date	Average number of mummy berry shoot strikes*	Average number of blighted twigs per bush**	Blueberry Shoestring Virus***
Van Buren County				
Covert	6-5	2.0	2.1	0
	6-12	1.0	2.3	0
	6-19	0.5	9.9	0
Grand Junction	6-5	50.3	0.7	0
	6-12	33.9	0.8	0
	6-19	9.2	3.3	0
Ottawa County				
Holland	6-5	18.1	0.1	1/50
	6-12	7.4	0.2	3/50
	6-19	3.0	1.8	4/50
West Olive	6-5	8.0	0.4	0
	6-12	6.2	0.5	0
	6-19	3.7	1.2	0

*Average number was calculated for ten bushes.
**Blighted twigs may be caused by various fungi, incl. *Phomopsis vaccinii*, *Colletotrichum acutatum* and *Botrytis cinerea*.
***Number of bushes showing blueberry shoestring virus symptoms (50 bushes were scouted)

PEST OF THE WEEK – ALTERNARIA FRUIT ROT *Alternaria tenuissima* (fungus)

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

Alternaria species are an abundant, ubiquitous component in the environment and are a natural part of the fungal micro-flora. At least 20% of all agricultural spoilage is caused by Alternaria species. In a laboratory setting, alternaria can be easily identified microscopically by their characteristic club-shaped spore (Figure 1a). *Alternaria tenuissima* is the causal agent of Alternaria leaf spot and fruit rot in highbush blueberries. Alternaria leaf spot is usually only found in North Carolina (Figure 1b), however, fruit rot has been reported in almost all blueberry growing regions around the world. Anthracnose and Alternaria fruit rot are the primary post-harvest diseases of blueberry fruit; however, other rots can occur in the field when fruit remains on the bush beyond normal ripening.

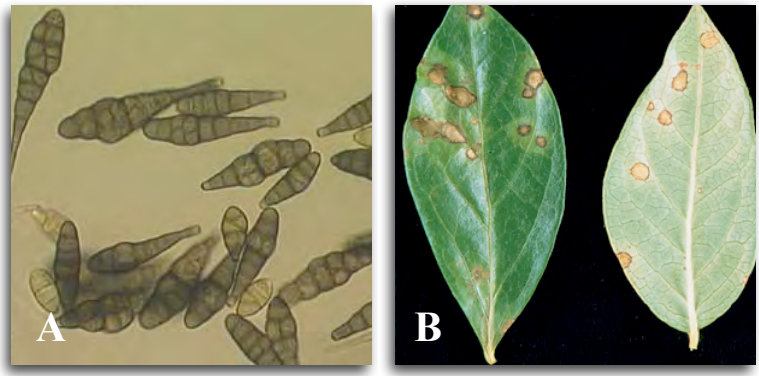

Figure 1. A) Characteristic club-shaped spore of Alternaria species (picture from the University of Arizona). B) Alternaria leaf spot symptoms (not typically seen in Michigan).

Symptoms

Although not seen in Michigan, alternaria leaf spot symptoms will appear in the spring after long periods of cool wet weather. The leaves typically have tan to gray, circular to irregular lesions that are about 1 to 5 millimeters in diameter. These lesions are also usually surrounded by a reddish brown border. In most cases only lower leaves are infected, but a severe infection can defoliate the plant.

In the field, alternaria will often appear on ripe fruit, as sunken areas near the calyx are covered by a dark green, velvety growth (Figure 2). Post-harvest, on stored fruit, a grayish-green mold may appear on the stem scar or calyx end and quickly spread over the entire berry. Infected fruit becomes soft and shriveled (Figure 3).

Figure 2. Alternaria fruit rot symptoms seen prior to harvest. Notice the dark-green or blackish spores on the sunken lesion.

Figure 3. Post-harvest incubation of fruit under high humidity results in a fuzzy grayish green mold to form on the fruit surface.

Disease cycle

Alternaria overwinters in infected canes, old twigs and in plant debris on the ground. Studies have also demonstrated that alternaria has a variety of alternate host that can serve as a source of inoculum for more fruit infections. In North Carolina, leaf infections occur in the spring during periods of cool, wet weather, and can serve as a vector for fruit infections in the summer. Fruit infections can occur prior to harvest with a low amount of incidence and appear to originate from the calyx cup as berries start to ripen. However, the majority of Alternaria appears in the post harvest environment, in experiments, 96% of alternaria rot infections occurred through the stem scar of the berry. This indicates that most alternaria infections are not initiated until after fruit is harvested, because the stem scar is only exposed when berries are detached. Postharvest infections produce fuzzy mycelial growth on the surface of the berries.

Management

Like other fruit rots such as anthracnose, alternaria fruit rot does not become apparent until after the first harvest, therefore, preventative measures are necessary to control the disease. A fungicide spray program

from pink bud to harvest will prevent infection of blossoms and fruit. The 2008 Fruit Management Guide (E-154 extension bulletin) lists several fungicides that are effective against alternaria including Aliette, Pristine, and Switch. Of note if a field has a disease history of Alternaria, studies have shown that Switch is an extremely effective control measure for controlling alternaria fruit rot.

Cultural control measures are also extremely effective and should be aimed at making the environment less conducive for pathogen growth and development, e.g., by pruning bushes to create an open canopy (this will also allow better spray penetration), good weed control, and timing of overhead irrigation to allow rapid drying of leaves and fruit. Timely harvests and rapid cooling and processing of fruit can reduce post-harvest losses. In the long term, pruning out of old or infected canes and twigs can be effective at eradicating or reducing overwintering inoculum. Another option is to plant resistant cultivars, such as Elliott. Among the newer cultivars, Draper and Aurora are also resistant to Alternaria fruit rot.

MSU BLUEBERRY TEAM PROFILE

We're starting a new section this week which profiles the MSU Blueberry Team, giving you an opportunity to learn more about us and the different projects we are working on.

Matt Grieshop, Assistant Professor, MSU Department of Entomology

I joined the MSU department of Entomology in October of 2007 as the new Organic Pest Management faculty member. My responsibilities include research, extension, and teaching in the areas of organic agriculture and pest management. Although I am housed in entomology I also have a strong interest in the management of weeds and pathogens and am involved in several projects exploring how plant, insect, and pathogen pests interact either with each other or with specific pest management tactics. My appointment is especially broad in that I am not restricted to a specific commodity group (i.e. fruit, field crops, vegetables, animal science, floriculture, etc.), rather my area of emphasis will be on pest management issues in organic agriculture. In this article I will briefly touch upon some of my previous experience, my initial research/extension efforts in Michigan, as well as future areas of interest.

My past academic and professional experience has spanned a number of professional roles. Immediately prior to my present position I served as a junior scientist in a large collaborative project examining behavioral management of the codling moth using mating disruption. Key aspects of this position involved evaluating new pheromone formulations and delivery apparatus as well as developing a better understanding of the mechanisms underlying codling moth mating disruption. While completing my PhD I researched the potential of augmentative releases of trichogrammatid egg parasitoids as management tactic for the Indianmeal moth in retail stores and warehouses. Much of this research focused on testing how spatial and physical factors affected the foraging success of Trichogramma spp. as well as how the use of egg parasitoids could be integrated into existing pest management strategies. As a research associate at Montana State University, I assisted in research on the wheat stem sawfly, as well as the development of new sampling techniques and technology for on-farm stored grain. During the completion of my MS at Montana State University (MSU) I worked on the monitoring, biological control, and extension of organic management tools for several invasive weed species. My earliest experiences with organic agriculture research and extension were as a laboratory technician, while pursuing my undergraduate degree at the University of California at Santa Cruz (UCSC). During this period, I participated in agroecological research focusing on the biological control of insect pests in fruit and fiber crops.

Since coming to MSU I have initiated and/or become involved in several new projects in small and tree fruit, and am presently developing projects in organic greenhouse and vegetable production. The first of these projects is a baseline study exploring the interaction between insect pollinators and mummy berry, a serious pathogen of Michigan blueberries. The initial approach of this project has been the use of digital video recorders as a means of determining what pollinator species are most likely to vector the pathogen. Projects in tree fruit include an examination of the impact of flash grazing organically grown hogs on weed, insect, and pathogen management in organic apples as well as a pilot study exploring the potential of mating disruption for the dogwood borer. My planned work in organic greenhouses will be the development and refinement of regenerative biological control tactics for insect pests. While my initial work in vegetable crops will be on the impact of no-till techniques on insect and pathogen management in organic pumpkins as well as efficacy trials for OMRI approved insecticides.

Broadly stated my future research and extension goals are to facilitate the development and adoption of crop and pest management techniques that reduce off farm inputs and reduce the negative environmental impacts of farming. In my opinion, the organic agricultural movement is at the forefront of developing new approaches to farming and the diversity of crops grown in Michigan and the upper Midwest present an incredible opportunity to develop alternative cropping systems. I am especially excited about the possibility of reintegrating animal agriculture into plant based agriculture because of the potential of developing new markets for producers while managing pests and nutrients in crops. This said I also maintain an interest in the refinement of more traditional pest management approaches.

As my program is just beginning, I am very interested in developing new collaborative partnerships with growers and researchers in the upper Midwest. I can be contacted via email at grieshop@msu.edu, by phone at 517 432 8034 or via post at 205 CIPS, Michigan State University, East Lansing MI 48824.

MEETINGS AND ANNOUNCEMENTS

2008 Blueberry IPM Twilight Meeting Schedule:

June 24, 6-8PM, 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).

For more information visit our website at blueberries.msu.edu

MSU BLUEBERRY TEAM

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Mark Longstroth, Van Buren County Extension
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IN NEXT WEEK'S ISSUE…

Japanese beetle

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