M I C H I G A N

Blueberry Newsletter

A newsletter from Michigan State University for the Michigan blueberry industry

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MICHIGAN STATE UNIVERSITY

News you can use

Disease management. Protect berries against fruit rots with broad-spectrum materials. Tank-mikxes with systemic fungicides are preferable due to rainy weather. Keep an eye out for leaf rust in fields with a history of the disease.

Insect management. Japanese beetles are starting to emerge in SW Michigan. Blueberry maggot flies were caught at some sites, are your traps up?

Crop development. In Van Buren County, Jersey in Covert is at late green fruit with some early signs of fruit coloring, and Bluecrop and Blueray in Grand Junction are at the fruit coloring stage. Harvest of early varieties has begun. In Ottawa County, Blueray in Holland, and Rubel and Bluecrop in West Olive are at late green fruit with some early signs of fruit coloring.

Blueberry weed control demonstration meeting this Thursday. *This is a free meeting; dinner provided by Scott's Pig Roast; donations welcome.*

Date: Thursday, June 24

Time: 6:00PM

Location: Getzoff Farm
7093 116th St., Fennville

Speakers: Bernie Zandstra & Eric Hanson

Early fruit coloring on Jersey in Covert

Late green fruit on Bluecrop in West Olive

GROWING DEGREE DAYS

From March 1

	2010		Last Year	
	Base 42	Base 50	Base 42	Base 50
Grand Junction, MI				
6/14	1513	924	1214	701
6/21	1726	1081	1409	840
Projected for 6/28	1959	1258	1654	1029
West Olive, MI				
6/14	1354	792	1050	573
6/21	1552	933	1241	708
Projected for 6/28	1791	1117	1480	891

See http://enviroweather.msu.edu for more information.

SW Michigan

Mark Longstroth
MSU Extension, Southwest

Blueberries are beginning to color. Frost injury to the caylx end of the fruit is common. Harvest of early varieties, such as Bluetta and Weymouth, begins today, Monday, June 21, 2010. This is at least a week ahead of normal. Fruit infested by fruit worms is shriveling and turning blue. Blueberry maggots flies have been caught. Water is standing in many fields. Under these wet conditions blueberry diseases are a primary concern. Systemic fungicides that are less susceptible to washoff are a better choice than protectant materials that wash off with our frequent rains. Green fruit should be protected from anthracnose fruit rot. As fruit ripens alternaria fruit rot becomes the focus of disease control. Blueberry canes are collapsing from phomopsis. We now see symptoms of the cane blight stage of the disease, rather than twig blight, which we saw earlier on young shoots, leaves and flower clusters.

Mummy berry

Last week infected mummy berry fruit were present in two of the four scouted plots. During this time of year when blueberry fruits are immature it is difficult to determine whether a fruit is infected by the mummy berry fungus (*Monilinia vaccinii-corymbosi*). Initially, an infected developing berry has no external symptoms. However, if infected green fruit are cut open, white, cottony mycelium can be seen in the ovaries of the berry. When looking for this cottony-white mycelium consider that blueberry seeds are also white in appearance, and it is only positive for mummy berry when you see white in the cavity beyond the seed (Fig 1). Infected berries show a star-shaped white area (Fig 2), which gets denser with age. In another field near Fennville, infections were more common in the largest (king) berries, which indicates that most infections took place at early bloom. A few berries were starting to ripen and showed clearer evidence of mummy berry infection, including browning and development of ridges (Fig 3). When these berries were cut open, they were light brown and the mycelial growth was filling most of the interior of the berry (Fig 4). It is likely that these early-infected berries will fall off the bush before harvest and will not present a problem at harvest.

Fig 1. Berries cut transversely near West Olive on 14 June. Healthy fruit (ABOVE) and mummy berry fruit (BELOW). Note the lack of white cottony mycelium in the healthy fruit and the white appearance is confined to the seed's locule; *Photo: T. Miles.*

Blueberry shoestring virus and mosaic

Last week several bushes were seen at the Grand Junction and West Olive sites that were symptomatic for blueberry shoestring virus (BSSV) (Fig. 5) and blueberry mosaic (Fig. 6). Blueberry shoestring virus can be detected by the presence of red streaks on green stems, strap-like, elongated leaves and/or the presence of a dark red oak leaf pattern on the leaves. Since BSSV is spread by the blueberry aphid (*Illinoia pepperi*), field monitoring and management of aphids is important to prevent further spread of the virus, especially to young fields that may have been planted near older fields. Blueberry mosaic disease, which is suspected to be caused by a virus, is characterized by leaves showing mild to brilliant mottle or mosaic patterns of yellow, pink, or

Fig 2. Star-shaped pattern of mummy berry infection of green berry. Note bottom locules not infected and seeds still visible; *Photo: A. Schilder.*

Fig 3. King blueberry turning bluish-brown and developing ridges, indicative of mummy berry infection; *Photo: A. Schilder.*

Fig 4. Advancing mummy berry infection showing light brown mycelium filling berry; *Photo: A. Schilder.*

Fig 5. Blueberry shoestring virus symptomatic leaf observed near Grand Junction on 14 June; *Photo: T. Miles.*

Fig 6. Blueberry mosaic symptomatic leaf observed near Grand Junction on 14 June; *Photo: T. Miles.*

Fig7. Clear mosaic symptoms on blueberry leaf; *Photo: A. Schilder.*

yellow-green on one or more branches of a bush (Fig. 7). Symptoms are not produced every year and presumably depend on sunlight intensity. Fruit on mosaic-affected canes ripens later and may be of poor quality. No vector has ever been identified for mosaic (it comes in on planting material) but it appears to spread slowly in a field. The other possibility is that, during cool seasons, more bushes are showing symptoms, which makes it appear like it is spreading. Symptoms of other diseases like necrotic ringspot and blueberry leaf mottle are also apparent in some fields. Affected bushes may show leaf spots, leaf distortion and overall bush stunting.

Powdery mildew and leaf rust

Powdery mildew symptoms are starting to show up in blueberries (primarily in Jersey) due to warm humid conditions. Symptoms are most common on leaves close to the ground and may be mistaken for virus symptoms due to the mottled appearance and puckering of leaves (Fig. 8). Powdery patches are rare on the upper leaf surface of blueberries, in contrast to other plants. However, dendritic patterns of small water-soaked spots on the lower leaf surface are indicative of powdery mildew of blueberries (Fig. 9). Powdery mildew tends to reduce photosynthesis of affected leaves, but only in rare cases is powdery mildew severe enough to lead to any damage to the plant. No controls are usually needed and most other fungicides used for disease control are effective against powdery mildew. Leaf rust has not been sighted yet. However, since weather conditions are suitable for infection, we may have an early appearance of leaf rust this year. Keep a close eye on those fields that have had problems in the past, especially those with hemlock trees in close proximity. Hemlock is the alternate host for this

Table 1. Disease scouting results *(Data is updated biweekly)*

Farm	Date	Avg number of shoot strikes per bush*	Avg number of blighted blossom/ shoots per bush	Mummy berry fruit infections present?
		VAN BUREN COUNTY		
Covert	5/30	1.1	6.3	no
	6/14	0	6.9	no
Grand Junction	5/30	7.9	0.8	no
	6/14	0.3	1.3	yes
		OTTAWA COUNTY		
Holland	5/30	1.7	1.1	no
	6/14	0	2.0	no
West Olive	5/30	64.0	2.2	no
	6/14	6.5	2.0	yes

**Average of 10 bushes.*

Fig 8. Early powdery mildew symptoms appear like yellow areas on blueberry leaves and may be confused with virus symptoms;

Fig 9. Radiating water soaked spots indicative of powdery mildew colonies on lower surface of blueberry leaf; *Photo: A. Schilder.*

disease and the spores from hemlock infect blueberries and vice versa. Leaf rust symptoms are reddish- brown spots on the leaves with yellow pustules on the lower leaf surface. Infected leaves turn yellow to red and drop prematurely.

Tim Miles & Annemiek Schilder
Department of Plant Pathology
Michigan State University

Insect scouting update

Cranberry fruitworm moths were caught at all farms we scouted, but the number of moths captured this week was lower than last week. Cranberry fruitworm eggs were seen only at the Holland farm, which is also a decline compared to last week. This suggests we are nearing the end of cranberry fruitworm egglaying. We expect to see the end of cranberry fruitworm egglaying in the next week to ten days at the farms we are monitoring. Multiple berry damage, which indicates advanced cranberry fruitworm feeding, was seen only at the Grand Junction farm (Fig 4).

Cherry fruitworm moths and eggs were not observed at any of the monitored farms. Single berry damage (cherry fruitworm or early cranberry fruitworm feeding) was observed at all farms (Fig. 4), and the amount of damage was slightly higher than last week. However damage levels still remain well below 1% of berries damaged. We expect fruitworm damage to be more noticeable in the next week as larvae in fruit cause early ripening of infested berries.

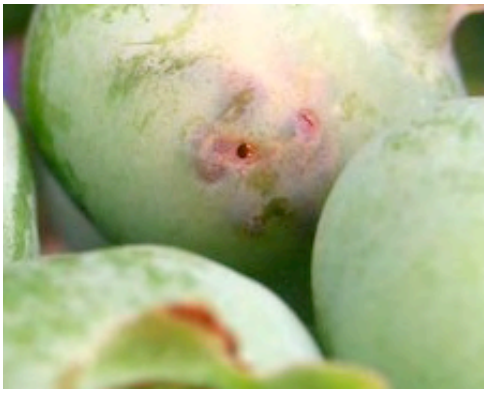

Fig 4. Look out for developing fruitworm damage, seen as early-ripening fruit and/or insect frass. Single berry damage typical of cherry fruitworm feeding or early cranberry fruitworm feeding (ABOVE). Multiple berry damage indicative of advanced cranberry fruitworm feeding (BELOW); *Photos: K. Mason.*

Fields should be checked for fruitworm feeding damage until harvest to determine the level of control in the field and to identify hotspots for future treatments. For more info on these pests, see the fruitworm pages on the blueberries.msu.edu website and check out the cranberry fruitworm model on enviroweather.msu.edu. This model can be used for predicting optimal spray application dates for controlling cranberry fruitworm.

Small aphid colonies (3 to 10 individuals per shoot) were seen at all the scouted farms except Covert, and we are still getting reports of aphid activity at many other farms in southwest Michigan. Parasitized aphids were seen at the West Olive and Grand Junction farms. Check bushes for aphid colonies, particularly on farms where there are varieties that are susceptible to shoestring virus.

We have received additional reports of lecanium scale infestations in Jersey fields at some Van Buren and Ottawa County farms. Scouts and growers should be on the lookout for scale especially in Jersey fields. See the blueberries.msu.edu website for more info on these pests.

No blueberry maggot flies were caught at any of our monitored farms. Growers and scouts should already have blueberry maggot traps deployed in fields. For more information about monitoring for this pest, see the blueberries.msu.edu website or the June 6, 2010 edition of the Michigan Blueberry Newsletter.

Japanese beetle is emerging in sandy sites in other crops in Allegan and Van Buren counties. All of our monitored fields were scouted for Japanese beetle, but none were observed. False Japanese beetles were seen at the West Olive and Covert farms. False Japanese beetles normally emerge 7 to 10 days before Japanese beetle.

Keith Mason & Rufus Isaacs
Department of Entomology
Michigan State University

Table 2. Insect scouting results.

Farm	Date	CFW moths per trap	CBFW moths per trap	BBA infested shoots (%)	BBM adults per trap	JB per 20 bushes
			VAN BUREN COUNTY			
Covert	6/14	0	58	15	set	--
	6/21	0	4	0	0	0
Grand Junction	6/14	0	6	15	set	--
	6/21	0	1	10	0	0
			OTTAWA COUNTY			
Holland	6/14	1	6	10	set	--
	6/21	0	4	5	0	0
West Olive	6/14	1	7	30	set	--
	6/21	0	3	0	0	0

Controlling Japanese beetles in blueberries

Japanese beetles can feed on the foliage and fruit of blueberries, causing damage to the plant and increasing the risk of fungal diseases. Their emergence during mid-summer can also create a risk of contamination of harvested berries. Japanese beetles are highly mobile insects and can fly into fields from surrounding areas. This article provides information on management options based on research conducted over the past few years at the Trevor Nichols Research Complex and at grower's farms.

Scouting. Weekly scouting for beetles should be done through July and August to identify field with, and without, beetle pressure. This can help ensure that management is targeted to the most important areas, and it will help with planning pest management activities around harvest activities. Regular field scouting can also detect the distribution of beetles in a field. If scouting indicates that the field only has beetles on the perimeter, as is often the case, a border application can be sufficient to gain control and allow harvest of beetle-free fruit. Grassy adjacent areas are often a source of beetles, so be on the lookout for this pest in fields near pastures, golf courses, urban areas, etc. Since the beetles are good flyers, this also applies to areas that might be across a road or hedgerow.

Field management. Clean cultivation is a highly effective method to reduce the suitability of fields for Japanese beetles, because the female beetles search out moist grassy areas to lay their eggs. Grassy perimeters may still be attractive and harbor beetle grubs, but there are approaches to making these areas less suitable for larval survival (see last section below). For many farms, clean cultivation may not be a suitable system due to potential problems with dust or mud, so growers have implemented a mixed system that has bare ground when beetles are flying in July and August, followed by a fall seeding of winter rye to provide soil structure during winter and spring. This is then mowed and tilled in the spring before beetle activity. Such a system is an effective approach to minimizing the suitability of fields for this pest.

Weeds can be a big draw for this beetle, so make sure fields do not have sassafrass, Virginia creeper, raspberry or blackberry, or any other attractive weeds growing in them. These plants are much more attractive than blueberry plants, and once beetles find them and start feeding, this will attract more beetles to the field.

In small plantings, beetles can be removed by hand and put into soapy water to help reduce the population.

Fig 5. Adult Japanese beetle; *Photo: P. Jenkins.*

Use of monitoring traps in crop fields is not recommended since these traps will draw beetles from the surrounding landscape into the field, creating hot-spots around the trap where the beetles feed, mate, and lay eggs.

Broad-spectrum insecticide options. The organophosphate Imidan (buffer to pH 6.0) provides excellent activity on adult beetles, providing 7-10 days of activity, with a 3 day PHI.

The pyrethroid Asana has been labeled for a few years in blueberry and this provides high mortality and some repellency of Japanese beetles. However, this insecticide also has a 14 day PHI making it of less use as harvest approaches. Blueberries also have label for Mustang Max (4 oz per acre) and Danitol (10-16 oz per acre) which are also pyrethroids. These have shorter pre-harvest intervals (Mustang = 1 day, Danitol = 3 days) and can be applied aerially and by ground. These products are also highly effective against Japanese beetles.

The carbamates Sevin and Lannate provide immediate kill of beetles present during the spray. They are also stomach poisons, so if beetles eat treated foliage they will also receive a higher dose. This can be a good property for control of Japanese beetles since they eat so much that a strong dose of insecticide is taken up. Lannate has a short residual activity of a few days, whereas Sevin provides a week or more of protection. Sevin has a 7 day PHI in blueberries which has reduced its usefulness near harvest.

Selective insecticides. The labeling of Provado, Actara, and Assail for use in blueberries after bloom provides selective options for Japanese beetle management. These provide 2-3 days of lethal activity from the surface residues before the residue is absorbed into the foliage. Thereafter, beetles must eat treated foliage to get a dose of the insecticide. Once inside the foliage, these neonicotinoid insecticides are rainfast and provide significant sub-lethal effects of repellency and knockdown activity, but with much less direct mortality from the residues. All three of these insecticides will also provide excellent control of aphids and leafhoppers, especially if the spray is applied to the whole bush. Assail has a 1 day PHI, while Provado and Actara have a 3 day PHI in blueberries.

Short PHI and organic insecticide options. For growers looking for beetle control immediately before harvest or in organically grown fruit crops, some selective insecticides with 0 day PHI's can provide a tool to repel beetles and help achieve beetle-free fruit during harvest. Compounds containing neem (Azadirect, Neemix etc.) have a 0 day PHI and pyrethrum (Pyganic) has a 12 h PHI. These compounds are labeled for

Continued next page.

organic use, and have a short but effective impact on adult Japanese beetles, with some mortality, some knockdown off the crop, and some repellent activity. Typically there is only 1-2 days of activity against beetles because the residues do not remain active for long. The non-organic form of Pyganic, called Evergreen, also has a 12 h PHI, and is much more effective against Japanese beetle than Pyganic due to the addition of a chemical that inhibits the beetle's ability to break down the insecticide.

Soil-applied insecticides. Japanese beetles typically lay their eggs in moist grassy areas and many fruit farms have a large amount of this suitable habitat. An additional approach to managing Japanese beetle populations is to target the grub stage of this pest in these areas to reduce the abundance of beetles in the following year. If the location of high grub densities near fruit fields is known, these areas could be treated with a soil insecticide to get maximum return on this treatment. Our experience in Michigan blueberry fields has been that application of Admire (16 oz/acre) to grassy field perimeters, applied in late June, reduced the abundance of beetles on nearby bushes in the following year. This effect only lasted for the first few weeks of their flight period, however. After that, beetles flying into the area from outside swamped out this effect, so there is only a short-lived benefit from targeting the grubs in fields that are surrounded by infested grassy areas. This approach is expected to work best in isolated farms with minimal immigration of beetles from surrounding areas.

Rufus Isaacs & John Wise
Department of Entomology
Michigan State University

2010 grower meetings

JUNE 24 6:00PM
Weed Control Demo - Allegan County
This is a free meeting; dinner provided by Scott's Pig Roast; donations welcome.
Location: Getzoff Farm
7093 116th St., Fennville
Information: Paul Jenkins, 517-648-5099

MICHIGAN STATE UNIVERSITY EXTENSION

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