M I C H I G A N

Blueberry Newsletter

A newsletter from Michigan State University for the Michigan blueberry industry

August 2, 2011 Volume 5, Issue 8

News you can use

Crop development. In Van Buren, Jersey in Covert is ready for first harvest and Bluecrop and Blueray in Grand Junction are between second and third harvest. In Ottawa County, Bluecrop in West Olive is at the beginning of second harvest.

Disease management. Keep monitoring for fruit rots and symptoms of leaf rust. If leaf rust is detected, apply a fungicide spray. Most fungicides with long PHI's cannot be applied until after the last harvest.

Insect management. Keep monitoring for blueberry maggot and spotted winged drosophila. Post harvest is best time for bud mite control.

Bluecrop in West Olive

Bluecrop in Grand Junction

GROWING DEGREE DAYS

From March 1

	2011		Last Year	
	Base 42	Base 50	Base 42	Base 50
Grand Junction, MI				
7/25	2529	1713	2840	1925
8/1	2761	1889	3059	2088
Projected for 8/8	2985	2057	3288	2261
West Olive, MI				
7/25	2270	1506	2596	1708
8/1	2490	1670	2806	1862
Projected for 8/8	2723	1847	3026	2026

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

MICHIGAN STATE UNIVERSITY | Extension

Hot weather returns to SW Michigan

Mark Longstroth
Michigan State University Extension
Van Buren County

July was generally hot with highs reaching 90 several days. Storms Wednesday and Thursday last week dropped varying amounts of rain. Weekly precipitation totals varied from one to three inches. The heaviest rains were in the trier of counties along I94 and close to Lake Michigan. Soils moisture levels are generally moist for most of the Southwest region but some areas are dry. Soil temperatures are as warm as the air temperatures. The hot summer has the region at or ahead of normal for heat accumulation. Check for the closest weather station at: enviroweather.msu.edu.

Blueberries harvest continues across the region. The harvest of Bluecrop is ending. Rubel and other varieties are being machine harvested. Generally the crop is light in Jersey. Now is time to take leaf samples for tissue analysis Growers who can irrigate should be replacing the 0.2 to 0.25 inches of water lost every day. You can stop irrigating after rains, but do not stop and wait for rain. Another Spotted Winged Drosophila was trapped in Allegan County on July 22. Growers should monitor for this pest. Cane collapse from phomopsis cane blight continues. Insects of concern include Japanese beetle and blueberry maggot. Japanese beetles populations vary widely. They are congregating in in preferred feeding areas. Anthracnose remains the most common fruit rot in ripening fruit. Many of these infections probably took place in the wet conditions soon after bloom.

Insect update

Keith Mason & Rufus Isaacs
Department of Entomology
Michigan State University

The abundance of blueberry aphids has continued to decrease at the farms we scout, and the size of individual aphid colonies has also been reduced over the past two weeks. We are still seeing an increase in parasitized aphids and aphid predators in those fields. Growers and scouts should continue checking bushes for aphids, particularly in fields that have varieties that are susceptible to blueberry shoestring virus.

No blueberry maggot flies were captured over the past two weeks at the farms we visited, but we are still receiving reports of captures of blueberry maggot flies at several other blueberry farms in southwest Michigan. It is likely that the insecticide applications made between harvests have kept the number of captures down at low levels. Blueberry maggot traps should be monitored until harvest, and be sure to replace traps that are covered in insects or debris. Also be sure that the bait chargers on these traps are full. See the article in the June 28, 2011 edition of The Michigan Blueberry IPM Newsletter for additional information on monitoring and control of blueberry maggot.

The number of Japanese beetles in the fields we scouted has decreased over the past two weeks as some fields are between harvests and growers have applied insecticides targeting Japanese beetles. Low numbers of beetles were seen at the Grand Junction and West Olive farms. Beetles have been more numerous on perennial weeds such as five-leaf ivy and wild grape that is growing in fields. Japanese beetle feeding damage can be readily seen on blueberry leaves, and some damage is visible on fruit (Fig. 1). In general, at the sites we monitor, we are seeing more damage on fruit from feeding by birds (Fig. 2) than damage from Japanese beetles (see pictures below). To monitor for Japanese beetle, examine 10 bushes on the field border and 10 bushes in the field interior and record the number of beetles on each bush. Keep in mind Japanese beetles are normally more common adjacent to grassy areas on sandy soils, and they prefer to be in sunny areas. Be sure to check any five-leaf ivy, wild grape or sassafras growing in fields as these plants are very attractive to Japanese beetles. Regular monitoring will aid growers and scouts in timing control measures to keep fields clean of Japanese beetles before harvest, and reduce the possibility of contamination during picking.

Table 1. Insect scouting results.

Farm	Date	CFW moths per trap	CBFW moths per trap	BBA infested shoots (%)	SWD adults per trap	BBM adults per trap	JB per 20 bushes
			VAN BUREN COUNTY				
Covert	7/25	-	-	0	0	0	0
	8/1	-	-	0	0	0	0
Grand Junction	7/25	-	-	5	0	0	7/25
	8/1	-	-	5	0	0	2
			OTTAWA COUNTY				
West Olive	7/25	-	-	0	0	0	0
	8/1	-	-	0	0	0	4

CFW=cherry fruitworm; CBFW=cranberry fruitworm; BBA=blueberry aphid; SWD=spotted wing drosophila; BBM=blueberry maggot; JB=Japanese beetle

Fig 1. Japanese beetle feeding damage; *Photo: K. Mason.*

Fig 2. Bird feeding damage; *Photo: K. Mason.*

No spotted wing drosophila (SWD) flies have been trapped at the farms we monitor for this newsletter, however a total of seven flies have been captured in southwest Michigan. One of these flies was caught in an Allegan county raspberry planting, and the remainder have been caught in or near minimally managed blueberry fields in Allegan county. For more information about this new invasive pest, please check out the MSU spotted wing Drosophila page at www.ipm.msu.edu/SWD.htm.

Low level SWD detections underscore the need for monitoring during harvest

Rufus Isaacs
Department of Entomology
Michigan State University

As of today, August 2, our monitoring program for spotted wing Drosophila has picked up seven confirmed SWD flies in Michigan. First detections were on August 7 in Allegan county in the woods adjacent to a crop field, and since then we have found three more flies in traps placed in woods adjacent to crop

fields, two in an old unmanaged blueberry field and one in a raspberry planting. This last-mentioned detection in a crop field was a female fly that was picked up in an apple cider vinegar-baited trap . The flies detected this season have been found only in Allegan county, but monitoring is continuing across the state. So far, we have not detected any SWD larvae in fruit, and the managers of the crop fields where SWD has been trapped are taking appropriate actions to protect their fruit from infestation.

This capture of a single female SWD fly in one commercial field underscores the need for monitoring to detect fly activity early. Instructions for how to monitor for this pest are available at the MSU SWD website – www.ipm.msu.edu/SWD.htm, and there are fact sheets there available in English and Spanish. Traps can be easily constructed and deployed, and they need to be placed into shaded areas in the fruit zone, with regular checking and replacement of the apple cider vinegar bait. Consulting and scouting services can assist with this if needed, and MSU Extension is ready to assist with checking flies that are suspect samples of SWD. The fact sheets posted at the website contain details of fly identification, and how to get samples to MSU Diagnostic Services if you are not sure. The site also contains a guide to SWD management in blueberry, and a second guide describing options for raspberry growers will be available this week.

It is important to highlight that the SWD detections so far this season have not been in large commercial farms. The sites where detections have been made were all sites where SWD flies were found during the fall of 2010. These are sites that have no, or a relatively minimal, program for insect control during the pre-harvest period. Time will tell whether this pattern continues through the end of the 2011 harvest. For updates on SWD captures and management, check back at our website – www.ipm.msu.edu/SWD.htm

Time for considering bud mite management in blueberry

Rufus Isaacs, Keith mason and John Wise
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With harvest ending in some west Michigan blueberry fields, and bushes forming flower buds for the 2011 season, it is time to consider bud mite management for fields that are infested with this pest. The first step is to sample fields that had poor bud development this season, to determine whether treatment for bud mites is required. This article describes identification, sampling approaches, and the available control options.

Blueberry bud mite (*Acalitus vaccinii*) has been identified as the cause of some problems with poor growth and low yield in Michigan blueberry fields. Sampling by crop scouts, MSU Extension, and the Berry Crops Entomology program has detected this pest across most of the major blueberry production regions in our state. However, only some fields have sufficient populations to cause economic levels of injury, and only some cultivars are susceptible. For example, in Grand Junction we have seen Rubel bushes with high infestation and damaged growth growing next to Bluecrop plants that showed no visible symptoms. Because of this, **bud mite management is warranted only in fields where 1) poor growth/damage have been seen, AND 2) high bud mite populations are verified by magnified analysis of bud samples.**

This mite is microscopic (Fig. 3), white or clear, and feeds inside buds in the winter (Fig. 4), causing damage to developing tissues and resulting in symptoms that include blistered red bud scales in spring, misshapen flowers, small leaves and fruit, or few berries per cluster (Fig. 5). Berries on infected shoots may also appear roughened and malformed.

The wide variability in symptoms among varieties adds to the difficulty in diagnosing this pest injury. It is important to take shoot samples in the late summer and fall as buds are being set or early spring to identify infestations. Bud mites move to fruit buds formed this year to find places to spend the winter, so fields should be sampled by taking 10 randomly-selected

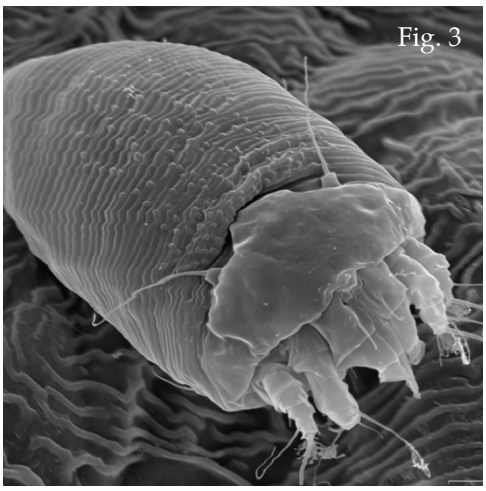


Fig. 3

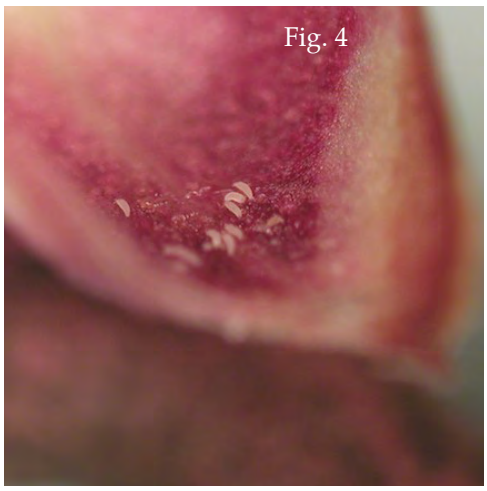


Fig. 4


Fig. 5

shoots and sampling the top five fruiting buds on each shoot for a total of 50 buds per field. These should be examined to verify that bud mites were the problem with the bushes, because some poor fruiting/growth symptoms are quite similar to the catch-all category of 'winter damage'. Sampling can be done with a hand lens if you know what to look for, or can be done under a microscope by trained personnel. Send samples to your scout, local extension office, crop consultant, or to the MSU diagnostic lab (*www.pestid.msu.edu*) for checking. While there has been no research to develop a specific economic threshold, if 10% of the sampled buds are infested with bud mite, and the field is a susceptible variety, chemical control should be considered.

This pest can be challenging to control with pesticides because of its small size and the difficulty of getting miticide residues into the tiny cracks and crevices it inhabits. The immediate post-harvest timing is recommended for targeting this pest because the mites are relatively exposed before the buds have formed completely for the winter. Effective control is extremely difficult once the mites are protected under bud scales, and so prompt action is needed if a planting requires control of bud mites.

Cultural and biological control

Pruning infested shoots from bushes is a cultural control that should be done to reduce infestation. In some southern states, bushes are 'topped' to cut off bud-mite infested shoots. Many growers leave prunings in the row middles and chop them in the row, but in fields infested with bud mite, the removed wood should be taken out of the field and burned or buried. Chopping this wood in the row middles may spread the mites back onto the bushes.

Biological control agents have been observed feeding on bud mite colonies. These include

predatory mites and predatory thrips. There are also some fungi that specialize in feeding on mites and these have been found inside bud scales sucking the juices out of these tiny mites. While we still know little about the ability of these beneficial insects to control bud mites, it is likely that they are helping to suppress pest mite populations in Michigan blueberry fields.

Chemical control options for bud mite

If fields are displaying reduced fruiting potential and exhibiting poor growth *and* bud samples indicate infestation by blueberry bud mite, control of this pest may be warranted to avoid further damage. Registered miticide options for blueberry bud mite are limited, but there are effective registered miticides available (Table 2). Endosulfan-containing products such as Thiodan 3 EC, Thionex etc. are the most effective miticides for this pest, and these should be applied immediately post-harvest, with reapplication 2-3 weeks later in heavily infested fields. This will control the mite populations and prevent colonies feeding on buds through the winter. Although the label recommends waiting 6-8 weeks between the sprays, this was developed for southern US conditions, and in Michigan we often do not have that long between the end of harvest and formation of next year's buds. That's why we recommend growers tighten up this period between sprays to get the second Thiodan spray on before complete bud formation. The label recommends that sprays be applied at high pressure (150 to 200 psi) and high gallonage to obtain effective coverage and penetration. Unless the interior spaces of the bud scales are wetted, it is unlikely that good control will be achieved. Use of a surfactant to improve the spreading and penetration of the spray is expected to increase control of bud mites.

Trials of new alternatives to Thiodan including Sulforix have been completed at MSU in recent years. We have also tested some highly-effective new miticides that are not yet registered in blueberry. From our recent trials we expect these to provide control equivalent to endosulfan once they are labeled.

We have found that Sulforix provides moderate control of bud mites when applied in the fall. Many growers are using this for a disease control spray at the end of the season and can expect some level of mite suppression if used at this timing. However, applications timed for leaf drop because of the focus on disease control are later than the ideal timing for bud mite control. By this timing most of the mites will be inside the bud scales and much harder for the spray material to reach, leading to low lwvels of control.

An additional option for population suppression of bud mites is the application in spring of a delayed-dormant application of oil. A high grade ultrafine oil applied at 0.5-1% by volume can help to reduce populations in the spring.

Our pesticide trials at the Trevor Nichols Research station have compared the various options for bud mite control in recent years. Table 1 shows the average level of control (compared to untreated bushes) found in these trials for the main registered options for bud mite control.

Table 2. Miticide rates, timings, and efficacy for blueberry bud mite.

Product	Rate / acre	Application Timing	Avg. % control
Thiodan 3 EC, Thionex, etc.	2 qt	Post-harvest	93%
Sulforix	1 gal	Pre- or post-harvest	60%
Summer oil	1% v/v	Delayed-dormant (spring)	27%

Free testing for viruses in blueberries available again

Annemiek Schilder
Department of Plant Pathology
Michigan State University

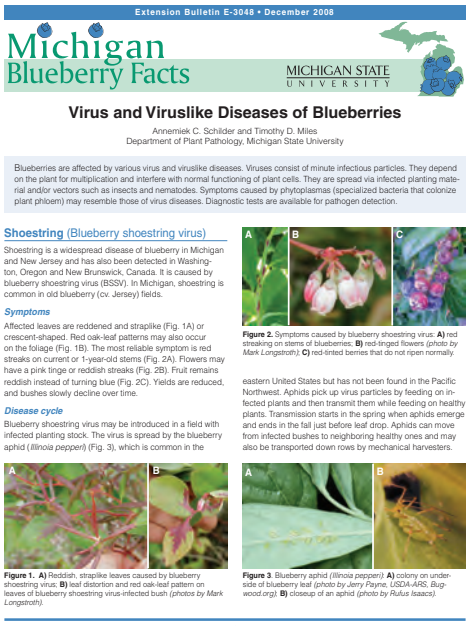
With the help of a MDA Specialty Crop block grant, we can offer once again free testing for viruses in blueberries. We invite growers who suspect a virus infection in their fields, e.g., declining and dying bushes, small and few berries, uneven ripening to send in samples in the next 4-6 weeks to: Dr. Annemiek Schilder, 105 CIPS Building, Michigan State University, East Lansing, MI 48824. Phone number: 517-355-0483. If you have questions, please contact Jerri Gillett, 517-355-7539.

The main thing is to keep the samples as fresh as possible by sending them overnight or hand-delivering them. The best way to take samples is to take living, symptomatic leaves and shoots and place them in a plastic bag. Refrigerate the sample as soon as possible –don't let the closed bag with the sample lie around as it can heat up very rapidly. If you add ice packs, be careful that the sample is not crushed. Whole plants can also be dug up and placed in a pot or plastic bag (keep roots moist) or whole canes can be cut and placed in a plastic milk jug with water.

Symptoms that may indicate a virus disease include: mosaic or mottling of leaves, crinkling or malformation of leaves and other plant organs, stunting, poor fruit set, generally poor growth, and plant decline or death. Some of these symptoms can also be caused by herbicides, such as Round-Up or 2,4-D, as well as nutrient deficiencies. Here are a few pointers that may help you decide whether symptoms that you are seeing may be due to a virus or another cause:

1) Are the symptoms present in a few scattered plants or in many plants over a large area? If present over a large area, it is more likely to be caused by an abiotic disorder like drought stress, herbicide injury or nutrient deficiency.
2) Did the symptoms show up suddenly or have they been worsening over the past couple of years? Symptoms of virus diseases usually become worse over time, and may eventually result in the death of the bush.
3) Does the disease seem to be spreading? If so, it may be a virus disease. Virus diseases vectored by nematodes usually spread in a more-or-less circular pattern in a field, whereas viruses vectored by aphids spread more readily down the row.
4) Did you apply Round-Up last fall? This herbicide may get transported into the roots and may not show symptoms until the following year.
5) Are symptoms showing up in a newly planted or young field? Consider your source of plants. Did you buy virus-tested planting stock? If not, you may have imported a virus disease with the planting material.
6) Also consider the hot conditions experience by young plants in nurseries. When the root system is not fully developed and/or plants are overfertilized, drought stress may occur despite frequent irrigation.

Pictures and descriptions of virus diseases and other disorders can be found in the Blueberry Pocket Scouting Guide, in the Virus Diseases Fact Sheet and on the following website: www.blueberries.msu.edu.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Michigan Blueberry Facts

MICHIGAN STATE UNIVERSITY

Virus and Viruslike Diseases of Blueberries

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Blueberries are affected by various virus and viruslike diseases. Viruses consist of minute infectious particles. They depend on the plant for multiplication and interfere with normal functioning of plant cells. They are spread via infected planting material and/or vectors such as insects and nematodes. Symptoms caused by phytoplasmas (specialized bacteria that colonize plant phloem) may resemble those of virus diseases. Diagnostic tests are available for pathogen detection.

Shoestring (Blueberry shoestring virus)

Shoestring is a widespread disease of blueberry in Michigan and New Jersey and has also been detected in Washington, Oregon and New Brunswick, Canada. It is caused by blueberry shoestring virus (BSSV). In Michigan, shoestring is common in old blueberry (cv. Jersey) fields.

Symptoms

Affected leaves are reddened and straplike (Fig. 1A) or crescent-shaped. Red oak-leaf patterns may also occur on the foliage (Fig. 1B). The most reliable symptom is red streaks on current or 1-year-old stems (Fig. 2A). Flowers may have a pink tinge or reddish streaks (Fig. 2B). Fruit remains reddish instead of turning blue (Fig. 2C). Yields are reduced, and bushes slowly decline over time.

Disease cycle

Blueberry shoestring virus may be introduced in a field with infected planting stock. The virus is spread by the blueberry aphid (*Illinoia pepperi*) (Fig. 3), which is common in the eastern United States but has not been found in the Pacific Northwest. Aphids pick up virus particles by feeding on infected plants and then transmit them while feeding on healthy plants. Transmission starts in the spring when aphids emerge and ends in the fall just before leaf drop. Aphids can move from infected bushes to neighboring healthy ones and may also be transported down rows by mechanical harvesters.

Figure 2. Symptoms caused by blueberry shoestring virus: **A)** red streaking on stems of blueberries; **B)** red-tinged flowers *(photo by Mark Longstroth)*; **C)** red-tinted berries that do not ripen normally.

Figure 1. **A)** Reddish, straplike leaves caused by blueberry shoestring virus; **B)** leaf distortion and red oak-leaf pattern on leaves of blueberry shoestring virus-infected bush *(photos by Mark Longstroth)*.

Figure 3. Blueberry aphid *(Illinoia pepperi)*. **A)** colony on underside of blueberry leaf *(photo by Jerry Payne, USDA-ARS, Bugwood.org)*; **B)** closeup of an aphid *(photo by Rufus Isaacs)*.

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These bulletins are available on the blueberries.msu.edu website or at the MSU bookstore.


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Michigan Blueberry Facts

MICHIGAN STATE UNIVERSITY

Blueberry Aphid and Blueberry Shoestring Virus

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[3]Michigan State University Extension, Michigan State University

Introduction

Aphids are a sporadic pest in blueberries, but they can sometimes reach high densities. Their abundance should be monitored each year to help prevent outbreaks. The primary species in blueberries in Michigan is the blueberry aphid, *Illinoia pepperi*. The importance of this aphid is magnified by its role as a vector of blueberry shoestring virus (BSSV). Losses due to reduced yield and bush decline are estimated at several million dollars annually in Michigan.

Aphid identification

Adult blueberry aphids are light green, with darker legs and antennae (Fig. 1A, B).

Figure 2. Narrow, strap-like blueberry leaves are a symptom of infection by blueberry shoestring virus.

Figure 1. Blueberry aphid (*Illinoia pepperi*): **A)** Colony on underside of blueberry leaf *(photo by Terry Payne, USDA-ARS, Bugwood.org)*; **B)** Close-up of aphid; **C)** Mummy of parasitized aphid with typical tan coloration *(photo by Matt O'Neal)*.

The siphunculi (two short tubes projecting from the rear of the aphid) have dark brown constricted tips. Young aphid nymphs may be green or yellow and clustered on the underside of the leaf (Fig. 1A, 3). Aphid identification requires a strong hand lens or microscope.

Aphid life cycle

Blueberry aphids spend the winter as tiny eggs at the bases of bud scales (Fig. 4). Egg hatch starts at around 700 growing degree-days (base 38°F [3.3°C]) in the spring once young foliage has begun to develop, usually during bloom. Young aphids move in search of a place to feed and may move between adjacent plants. Once they are mature, they reproduce asexually (females produce offspring without mating).

Figure 3. Blueberry aphid nymphs on blueberry leaf.

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2011 Grower Events

Great Lakes Fruit, Vegetable, and Farm Market Expo
December 6-8, 2011
DeVos Place Convention Center, Grand Rapids

SW Hort Days
Early February, 2012
Lake Michigan College, Benton Harbor

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