June 9, 2009 Volume 3, Issue 9

Michigan Blueberry IPM Newsletter

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Van Buren County
Jersey in Covert are at early green fruit; in Grand Junction, Blueray are at early green fruit and Bluecrop is at green fruit.

Ottawa County
Blueray in Holland, and Rubel and Bluecrop in West Olive are at early green fruit.

BLUEBERRY NEWS YOU CAN USE...

Disease management: Monitor for twig blight symptoms and, if scouting reveals a moderately high incidence, consider applying a fungicide (especially if rain is in the forecast). Continue to monitor for blueberry shoestring virus symptoms and, if necessary, manage aphid populations to prevent spread of the virus.

Insect management: Fruitworm and aphid activity are increasing. Tussock moth larvae have been seen.

GROWING DEGREE DAYS

From March 1

	2009		Last Year	
	Base 42	Base 50	Base 42	Base 50
Grand Junction, MI				
6/1	964	542	818	450
6/8	1106	633	1039	615
Projected for 6/15	1225	698	1251	771
West Olive, MI				
6/1	804	425	689	350
6/8	933	504	888	492
Projected for 6/15	1065	581	1081	629

See MSU Enviroweather website for more information

Next Twilight IPM Meeting:

Bring your virus samples – see P. 7 for details

Thursday, June 11
6:00–8:00PM
Carini Farms
15039 Port Sheldon Rd.,
West Olive, MI.
More information: Carlos Garcia, 616-994-4580.

Weed Control Meeting & Demonstration:

Thursday, June 18
6:00–7:30PM
Getzoff Farm
7093 116th St.
Fennville, MI.
More information: Paul Jenkins, 517-432-7751.

WEED MANAGEMENT

Eric Hanson, Department of Horticulture, Michigan State University

EARLY SUMMER WEED MANAGEMENT OPTIONS

Many blueberry fields in Southwest Michigan received heavy rains in late April that affected weed control. If fields were treated with preemergent sprays prior to the rains, efficacy may be reduced by runoff and leaching. Growers who did not get their preemergent treatments on before the rains could not get back into the fields until after many weeds had emerged, so control was reduced.

Leaching potential of preemergent herbicides. Heavy rains can reduce efficacy by leaching herbicides down in the soil, or by carrying the chemical away from the treated area by runoff. Leaching losses are most likely in blueberry fields because soils are often sandy. Runoff losses usually are associated with the movement of soil particles, and is less likely in blueberry fields with little slope. Estimating the leaching potential is not straight forward because it depends on both the solubility as well as how tightly it is adsorption to soil particles. Based on solubility levels and general field observations we would consider Velpar and Sinbar as highly prone to leaching (Table 1). Callisto is also very soluble, but we have limited field observations to draw from for this newer product. Princep, Solicam, Chateau and Casoron are expected to be the lease prone to leaching.

Table 1. Solubility ad leaching potential of some herbicides for blueberry.

Product	Chemical	Solubility (ppm)	Leaching Potential
Princep	simazine	2	low
Karmax	diuron	47	medium
Sinbar	terbacil	710	high
Solicam	norflurazon	28	low
Velpar	hexazinone	30,000	high
Chateau	flumioxazin	2	low
Casoron	dichlobenil	21	low
Callisto	mesotrione	15,000	high

Although these herbicides are unlikely to move out of blueberries fields with surface runoff, they may move within fields and concentrate in lower areas as water recedes. This could result in herbicide injury to bushes in low areas of fields treated with soluble herbicides such as Velpar or Sinbar. Bushes in low areas may also be stressed by prolonged periods of saturated soils as well.

Early summer herbicide options. Most fields of early season varieties are within a month of harvest so pre-harvest interverals (PHI) limit which herbicides can be used. The PHI's for some blueberry herbicides are well defined on the labels, whereas others are vague (Table 2). We are now too close to harvest to apply preemergent herbicides. However, in fields where preemergent treatments were not applied, or where efficacy is poor due to rain, postemergent products such as Aim, Rely, and Roundup can still be applied, if used with caution. These chemicals will damage any green bark, new shoots, or leaves of blueberries, so minimize contact with bushes. Orient nozzles so they do not contact the base of bushes, or spot-spray by hand taking care to avoid the crown of plants. New canes are now emerging from buds on the crowns of bushes and these can be killed by Aim, Rely, or Roundup.

Table 2. Preharvest intervals or restrictions for some herbicides on blueberry.

Product	Chemical	Pre-harvest restrictions
Pre-emergent Herbicides		
Princep	simazine	Do not apply when fruit are present
Karmax	diuron	Apply before germination of annual weeds
Sinbar	terbacil	Apply before weeds emerge or in early seedling stage
Solicam	norflurazon	Do not apply within 60 days of harvest
Velpar	hexazinone	Apply before bud break
Chateau	flumioxazin	Apply before bud break
Casoron	dichlobenil	No clear restrictions stated
Callisto	mesotrione	Apply before first bloom
Post-emergent Herbicides		
Aim	carfentrazone	Apply up to harvest
Gramoxone	paraquat	Apply before new canes or shoots emerge
Rely	glufosinate	Apply up to 14 days pre-harvest
Roundup	glyphosate	Apply up to 14 days pre-harvest

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INSECT MANAGEMENT

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

Warm weather over the past week has increased insect activity at all four farms that we sampled. Aphid numbers continue to rise, cranberry fruitworm is at or near peak flight, but the flight of cherry fruitworm has generally decreased at the sites we sampled. Eggs of both fruitworm species were seen during scouting this week.

Aphids were found at all four sampled farms, and the percentage of infested shoots has increased. We are finding 5 to 65% of new shoots have aphids on them. The observed aphid colonies ranged in size from 1 to 20 individuals. As aphid numbers are likely to continue to increase across the region, growers and scouts should continue to check for blueberry aphids on new growth.

To scout for aphids examine two young shoots near the crown on each of 10 bushes and record the number of shoots where aphids are found and also record the number of shoots with parasitized aphids. Be sure to sample weekly from as wide an area in the field as possible to have a better chance of detecting whether aphids are present. Although natural enemies (parasitic wasps, lady beetles, lacewings, hover fly larvae) can keep this pest in check, aphids can transmit blueberry shoestring virus, so growers may want to consider using an insecticide to control aphids if they find aphids in fields that are susceptible to shoestring virus.

Cranberry fruitworm flight increased substantially over the past week. Moths were

Fig 1. Early stage Tussock moth larva. Note feeding damage on leaf.

caught at the four sampled farms and the number caught ranged from 4 to 68 per trap. Cherry fruitworm moths were caught at all of the farms that were sampled, but the number per trap (1 to 6 moths per trap) is declining; especially at the farms in Van Buren County. All four farms were scouted for the presence of fruitworm eggs. Cherry fruitworm and cranberry fruitworm eggs were seen at the Covert and Grand Junction farms. No fruitworm feeding damage was seen during scouting this week.

The forecast is for more warm nights in the next few days so we should see cranberry fruitworm flight and egglaying increase over the next week. Cherry fruitworm flight should continue to decrease over the next two weeks.

Follow the link to the model for fruitworm control to see cranberry fruitworm egglaying predictions based on the MSU Enviroweather weather stations in your area.

Leafroller feeding was observed at the Holland farm, but no spanworm activity was seen at any of the sampled sites. Growers and scouts should continue to look for leafroller and spanworm feeding on leaves and in fruit clusters, particularly if insecticides have not been used yet to control fruitworms. Insecticides that are applied for fruitworm management should also control leafrollers and spanworms. A tussock moth larva was seen at the West Olive farm (Fig. 1). If you had a problem with this pest last year, be sure to look for these small colorful larvae. Insecticides applied for fruitworm control at this time will also be active on larvae of the first generation of tussock moth.

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	6/1	8	49	10%	--	--
	6/8	3	68	5%	--	--
Grand Junction	6/1	3	39	25%	--	--
	6/8	3	65	65%	--	--
			Ottawa County			
Holland	6/1	6	6	5%	--	--
	6/8	6	51	20%	--	--
West Olive	6/1	3	0	15%	--	--
	6/8	2	4	55%	--	--

CFW=cherry fruitworm; CBFW=cranberry fruitworm; BBA=blueberry aphid; BBM=blueberry maggot; JB=Japanese beetle

DISEASE MANAGEMENT

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

This week all scouted plots were at the early green fruit stage. At all scouted plots mummy berry shoot strike symptoms decreased this week. Blueberry shoestring virus symptoms have increased and were seen near Covert, Grand Junction, and Holland. Twig blights have also increased this week and were seen in all of the scouted plots.

Fig 2. Late-stage mummy berry shoot strike symptoms observed near Grand Junction on June 4.

Mummy Berry

Mummy berry shoot strikes were lower then previous weeks, with the highest incidence being observed at the Grand Junction site averaging 43.6 shoot strikes per bush (Figure 2). Since, all scouted plots are past bloom the risk for fruit infection is minimal at these sites during this period. This week, continue to monitor shoot strikes if blossoms are still open and consider a fungicide application to protect the flower's stigma.

Blueberry Shoestring Virus

Shoestring virus symptoms were seen in the Covert, Holland and Grand Junction plots this week. Blueberry shoestring virus causes stunting and a slow decline of infected bushes, and is spread from plant to plant via infected cuttings and by the blueberry aphid Illinoia pepperi. In addition to strap-like red leaves, other common symptoms for shoestring include: elongated reddish streaks on green stems (Figure 3A), and a reddening of immature fruit (Figure 3B). This week, monitor shoestring virus symptoms and consider controlling aphid populations to reduce the spread of the virus.

Fig 3. Symptoms of blueberry shoestring virus: A) elongated reddish streaks on blueberry stems, and B) a reddening of immature fruit.

Twig Blights

Blighted twigs have also been observed at low levels over the past few weeks with the highest incidence being observed this week in Covert averaging 3.7 blighted twigs per bush (Figure 4). This week, the number of blighted twigs increased compared to last week, although incidence has remained relatively low. Blighted twigs may be caused by various fungi, including Phomopsis vaccinii, Colletotrichum acutatum and Botrytis cinerea. Most likely, Phomopsis is to blame for twig infections in many locations this year.

Fig 4. Twig blight symptoms observed on blueberries near Covert on June 4.

Scouting and Control of Twig Blights

To scout for blighted twigs, pick ten random bushes and look for a recent browning and death of young twigs and collapsing flower/fruit clusters. If scouting reveals a moderately high incidence (>10 blighted blossoms/twigs per bush) consider applying a fungicide, especially if rain is in the forecast. Twigs that are in bloom are most susceptible to infection. Several fungicides are rated good to excellent at controlling the various fungi that cause twig blight, including Indar, and Pristine. In addition, there are several cultural control strategies that can be employed: when plants are dormant, prune out infected canes and avoid wounding the canes. Furthermore, to reduce the spread of spores and infection, minimize overhead irrigation or time irrigation to coincide with natural dew formation to reduce the availability of moisture for infection.

Disease Scouting Results

Farm	Date	Avg number of mummy berry shoot strikes per bush*	Avg number of blighted twigs per bush**	Blueberry shoestring virus***
		Van Buren County		
Covert	5/28	2.3	2.1	0/50
	6/4	1.9	3.7	1/50
Grand Junction	5/28	56.5	0.8	1/50
	6/4	43.6	1.1	4/50
		Ottawa County		
Holland	5/28	2.9	0.4	4/50
	6/4	2.4	0.5	6/50
West Olive	5/28	19.6	0.4	0/50
	6/4	18.4	1.1	0/50

*Average number based on 10 bushes.
**Blighted twigs may be caused by various fungi, including Phomopsis vaccinii, Colletotrichum acutatum, and Botrytis cinerea.
***Number of bushes showing blueberry shoestring virus symptoms (50 bushes were scouted).

Michigan Virus Survey: Bring your samples this Thursday, June 11 @ 6PM

Annemiek Schilder & Jerri Gillett, Department of Plant Pathology, Michigan State University

The Small Fruit Pathology lab at MSU is conducting a survey of the current blueberry virus problems in Michigan. We are offering a free test, of blueberry plants that are exhibiting unusual symptoms that might be caused by a virus. **You are invited to bring samples from your blueberry planting that you would like considered for testing to the next IPM meeting on June 11 at 6PM.** Please do the following:

1. Make sure it is a fresh sample (sampled within 24 hours of the meeting) and keep refrigerated until leaving for the meeting. Place each sample in a zip-lock bag with a moist paper towel in order to keep fresh.
2. Be sure to collect symptomatic tissue. If tissue is necrotic, be sure to also include green tissue taken from near the necrotic tissue.
3. Put samples from each bush in a separate bag. You can bring as many samples as you wish.
4. Put your name and contact information, as well as the variety of blueberry, on EACH sample bag. Include any other information you think is pertinent (e.g. how long the problem has been seen, etc).

We are particularly interested in:

1. Blueberry leaf mottle virus: mottled and malformed leaves
2. Stunt: severely stunted, "bushy" bushes with shortened internodes
3. Scorch and shock: sudden and complete necrosis of flowers and leaves sometimes with twig dieback of 4-10 cm; necrotic, "scorched" blossoms are often retained over the summer. These two viruses have not been found in Michigan yet but they are in the U.S.
4. Anything unusual for a healthy blueberry such as a mottle, mosaic, distortion, discoloration, necrosis, die back etc.

This is a win-win situation! You are able to get some free testing, and we are able to assess any future research needs. Questions? Please feel free to contact:

Jerri Gillett, Research Assistant
Email: gillett@msu.edu
Phone: 517-355-7539

**If you can't come to the meeting on June 11 but would like to participate, please ship your samples OVERNIGHT so they arrive Thursday June 11 at the address below:

Jerri Gillett
MSU
105 CIPS
East Lansing, MI 48824

Blossom and twig blight in blueberry

Annemiek Schilder, Department of Plant Pathology, Michigan State University

Blighted flower clusters were seen at low levels in several blueberry fields. In most cases, the blighted clusters looked like they were caused by Phomopsis, which is characterized by a dark brown discoloration of the twig that bears the flower cluster (Figures 1, 2). Initially, the brown lesion is ¼-½ inch long, but can expand to several inches in length in a couple of weeks and can kill additional flower clusters on that same twig. Eventually the lesion will stop growing and the blighted blossoms will fall off. The causal fungus, Phomopsis vaccinii, overwinters in dead twigs and canes and in the spring infects the flower clusters, aided by long wetness periods and possibly by frost injury. In some cases, it also appears that the fungus infects flower buds in the summer or early fall and overwinters in live buds. In the spring, the fungus will become active again and kill the bud followed by invasion of the twig. These types of infections are characterized by a dead flower bud surrounded by a brown lesion, while nearby buds would have developed normally.

In Michigan, at least four different pathogens can cause blossom blight: Phomopsis vaccinii (Phomopsis twig blight), Monilinia vaccinii-corymbosi (mummy berry flower strikes), Botrytis cinerea (Botrytis blossom blight), and Colletotrichum acutatum (anthracnose). Just by looking at a blighted blossom it may be difficult to identify the causal agent unless fungal growth is present, so it is a good idea to inspect the cluster with a hand lens or magnifying glass. In the case of mummy berry flower strikes, a layer of gray powdery spores is present but restricted to the flower stem and/or cluster stem. At this time, the spores will have disappeared but a light-grey to bleached areas is still visible. In general, flower strikes are much less common than shoot strikes, so it is unlikely to have flower strikes without shoot strikes.

Botrytis blossom blight, caused by Botrytis cinerea, may occur during or after very wet and cool weather and is characterized by fluffy grayish brown spores that are present all over the blossoms. Often, leaves and twigs are also showing blight symptoms. Considering the relatively warm and dry weather conditions we've had so far, Botrytis is not a likely cause of the blossom blight currently observed in blueberry fields in Michigan. Anthracnose blossom blight looks a lot like Phomopsis twig blight and does not have very diagnostic features to distinguish it from Phomopsis. Incubation in the laboratory is necessary to identify the causal agent.

To scout for blossom blight, walk several rows in a blueberry field and scan the bushes for symptoms. When you find any, inspect the flower clusters for twig lesions and fungal sporulation and possible presence of insects or insect frass. To quantify disease severity and changes over time, pick 5 random bushes and record the number of blighted blossoms per bush every 1 or 2 weeks. Record numbers of blighted blossoms, type of sporulation, and average lesion length of twig lesions.

For control of further blossom blight or twig blight infections, a fungicide spray may be needed if rainy weather is in the forecast. A spray of Indar + Captan (or Ziram), Orbit + Captan (or Ziram), Cabrio (+ Captan or Ziram) or Pristine would work well against most causes of blossom blight at this time. Do consider the pre-harvest interval though: Indar and Orbit both have a 30-day PHI. Don't apply these products if your planned harvest is less than 30 days away.

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