



Blueberry Newsletter

A newsletter from Michigan State University for the Michigan blueberry industry

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Volume 4, Issue 6

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MICHIGAN STATE UNIVERSITY

News you can use

Disease management. If blossoms are open and mummy berry shoot strikes are present, there is a risk of flower infection. Flowers are most susceptible on the day they open.

Insect management. First cranberry fruitworm moths have been trapped. Blueberry aphid colonies are starting on new foliage. Look for scale during field scouting.

Crop development. In Van Buren County, Jersey in Covert is nearing full bloom, and Bluecrop and Blueray are beginning petal fall in Grand Junction. In Ottawa County, Blueray in Holland, and Rubel and Bluecrop in West Olive are at full bloom.

MDA statewide virus survey. The Michigan Department of Agriculture is conducting a statewide virus survey in blueberry. This survey is separate from the virus diagnostic survey that the Small Fruit Pathology program at Michigan State University is conducting for all blueberry viruses. See page 2 for details.



Bluecrop at petal fall in Grand Junction



Blueray at full bloom in Holland

GROWING DEGREE DAYS

From March 1

	2010		Last Year	
	Base 42	Base 50	Base 42	Base 50
Grand Junction, MI				
5/3	619	333	427	208
5/10	692	370	545	276
Projected for 5/17	772	405	634	324
West Olive, MI				
5/3	528	259	314	135
5/10	588	285	422	194
Projected for 5/17	670	321	499	232

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



Do your part to protect the Michigan blueberry industry

Participate in the MDA statewide blueberry virus survey

This spring the Michigan Department of Agriculture (MDA) will conduct a statewide survey of Michigan blueberry fields to determine if blueberry scorch and shock viruses are present in commercial blueberry fields and to mitigate them where practical and feasible. Blueberry scorch and shock have the potential to cause significant losses to the Michigan blueberry industry if they are allowed to become established in the state. Both viruses were detected in Michigan in 2009, but due to swift action by affected growers, the viruses appear to have been eliminated. However, further monitoring is needed to be sure.

In an effort to protect this important industry, MDA requested and was awarded funding under the 2008 Farm Bill to conduct the statewide blueberry virus survey. The survey will be conducted over a 6-week period from May 17 to June 25, 2010, during which nearly 35,000 flower, shoot, and foliage samples will be collected from commercial blueberry fields and tested at MDA's plant pathology laboratory, at no cost to the growers. This survey is separate from the virus diagnostic survey that the Small Fruit Pathology program at Michigan State University is conducting for all blueberry viruses. The latter is meant to provide free diagnostic support for blueberry growers in the state. For more information on general blueberry virus diagnosis, contact Jerri Gillett (517-355-7539).

For the statewide blueberry virus survey, it is critical that as many fields as possible be sampled to assure that blueberry scorch and shock viruses have truly been eradicated from the state.

To participate in the survey, please contact the MDA as follows:

Growers in Berrien, Van Buren and Allegan counties - contact Crew Leader Becky Madsen at (517) 599-6716 or Regional Supervisor Mike Hansen at (269) 429-0669.

Growers in Ottawa and Muskegon counties - contact Regional Supervisor Jeff Zimmer at (616) 866-1486.

Growers in other parts of the state - contact Abigail Eaton at (517) 241-3933.

As the leading blueberry-producing state in the country, we can not afford to allow these damaging viruses to gain a foothold in Michigan. Do your part – participate in the statewide blueberry virus survey!

If you would like a copy of the recent MSU Pest Alert bulletins on Shock and Scorch, please email Annemiek Schilder at schilder@msu.edu



Mummy berry shoot strikes increase in number

This week all sites were between 50% bloom and petal fall. Mummy berry shoot strikes were observed at all of the scouted plots in Southwest Michigan and the incidence increased substantially this week. In the West Olive site the average number of shoot strikes per bush increased from 17 (May 2) to 39.5 (May 10). In the Grand Junction site, the average number of shoot strikes per bush increased from 1.5 (May 2) to 13.8 (May 10) and many of the shoot strikes looked very fresh, with portions of green tissue still present on the infected leaves (Figure 1). Most or all new shoot strikes that we will observe this week are the result of infections 1 to 2 weeks ago. Even though the rainy weather is conducive, the risk for new shoot strike infections has passed as few to no apothecia remain and the shoots have grown to a size where they become naturally resistant to infection. The focus should be on scouting for shoot strikes and protecting blossoms from infection by spores produced on any shoot strikes that are present.

Gray sporulation was particularly visible on the older shoot strikes at the West Olive site this week, probably due to the precipitation over the weekend.



Fig 1. Shoot strike symptoms observed near Grand Junction on 10 May 2010; Photo: T. Miles.

These spores (conidia) are transferred to the flowers by bees and other pollinating insects, and possibly by wind, and rain, which then lead to the infection and mummification of the fruit later in the growing season. The spores grow from the stigma through the style

pink discoloration on flowers (keeping in mind that some varieties naturally have pink flowers). Generally, all symptoms are present on bushes. Tomato or tobacco ringspot viruses can be identified by necrotic spotting and curling/twisting of leaves and general

Table 1. Disease scouting results.

Farm	Date	% Germinated mummies**	Avg number of apothecia on the ground*	Max apothecia cup diameter (mm)	Avg number of shoot strikes per bush*
VAN BUREN COUNTY					
Covert	5/3	0	0	n/a	0.8
	5/10	0	0	n/a	1.0
Grand Junction	5/3	<0.1	0.1	2	1.5
	5/10	0	0	n/a	13.8
OTTAWA COUNTY					
Holland	5/3	1.5	0.1	2	1.4
	5/10	0	0	n/a	2.3
West Olive	5/3	1.9	1.0	3	17.0
	5/10	0	0	n/a	39.5

*Average of 10 bushes; **Number of germinated mummies divided by the number of total mummies.

into the ovaries of the berries. The risk of fruit infection near the end of the week is fairly high because good pollinating weather is in the forecast towards the end of the week (low wind speeds, warm dry weather). If shoot strikes are observed and open blossoms are present in your field, consider protecting the blossoms from infection with a fungicide application (e.g., Indar or Pristine). It is important to protect blossoms at an early stage because flowers are the most susceptible right after they open, and susceptibility decreases over time.

For more information about mummy berry symptoms, biology, and management practices, check out the Mummy Berry Fact Sheet (<http://web2.msue.msu.edu/bulletins/Bulletin/PDF/E2846.pdf>).

Virus symptoms showing up

Symptoms of blueberry viruses are becoming apparent and will continue to increase. May and June are good times to scout for virus symptoms. Blueberry shoestring virus can be identified by the red streaks or blotches on the stems, red-discolored and malformed leaves, and

unthrifty growth and decline of bushes. Some bushes that were still alive last year may have died. Bloom is also the time when blueberry shock and blueberry scorch viruses manifest themselves by sudden blighting of flowers and young leaves on one or more canes per bush. The presence of blighted flowers on one or a few bushes surrounded by healthy bushes is characteristic of virus diseases. If all or most bushes are showing symptoms, it is more likely to be a fungal or bacterial disease or weather-related problem. If you have concerns about possible virus infections in your blueberries, contact Jerri Gillett (517-355-7539) at Michigan State University to arrange for a free diagnostic test.

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

Cold, rainy weather increases risk of blossom and twig blight in blueberry

Cold, rainy conditions with freezes during bloom are conducive to the development of blossom and twig blight in blueberries. Frost can cause microscopic wounds on plant tissues which allow invasion by fungi and bacteria. Extended duration of wetness of plant surfaces enhances fungal and bacterial growth and infection. In Michigan, at least five different pathogens can cause blossom blight: *Phomopsis vaccinii* (Phomopsis twig blight), *Botrytis cinerea* (Botrytis blossom blight), and *Colletotrichum acutatum* (anthracnose blossom/twig blight), *Monilinia vaccinii-corymbosi* (mummy berry flower strikes), and *Pseudomonas syringae* (bacterial twig blight). In addition, blueberry scorch virus and blueberry shock virus can cause blossom blight which can resemble Phomopsis twig blight. Just by looking at a blighted blossom or twigs it is difficult to identify the causal agent unless fungal growth is present, so it is a good idea to inspect the blighted tissues with a hand lens or magnifying glass.

Botrytis blossom blight, caused by *Botrytis cinerea*, is characterized by fluffy gray to tan spores that are present all over the surface of killed blossoms. In the case of mummy berry flower strikes, a dense layer of gray powdery spores will be restricted to the flower stem and/or cluster stem. In general, flower strikes are much less common than shoot strikes, so it is unlikely to see flower strikes without shoot strikes. Anthracnose blossom /twig blight does not have very diagnostic features to distinguish it from Phomopsis twig blight. Pseudomonas blight is characterized by dark brown to black necrosis on the twigs. Incubation in the laboratory is necessary to identify the causal agents. Samples can be sent for diagnosis to the MSU diagnostic lab (<http://www.pestid.msu.edu/>; phone 517-355-4536).

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. Also be alert to the presence of insects, webbing, and insect frass, e.g., caused by cranberry fruit worm infestation. To get a better handle on disease severity and changes over time, flag 5 random bushes and record the number of blighted blossoms per bush every week for the next 3 to 4 weeks.

At this time, it would be good to apply a protectant fungicide that provides broad-spectrum control of blossom and twig blight pathogens. A spray of Pristine works well against most causes of blossom blight. Other options are Indar + (Captan or Ziram or CaptEvate) if you have high mummy berry and Phomopsis pressure. CaptEvate and Switch have good activity against Botrytis and anthracnose, and moderate activity against mummy berry and Phomopsis. None of the common fungicides control Pseudomonas bacterial blight, since only copper products are able to control bacterial diseases. No antibiotics are labeled for use in blueberries. Serenade (*Bacillus subtilis*) and Regalia (giant knotweed extract) may also have efficacy against bacterial blight, but have not been evaluated for that purpose in Michigan.

Annemiek Schilder
 Department of Plant Pathology
 Michigan State University



Insect activity remains steady

Insect activity at the farms we scouted has been held steady by the cool temperatures that occurred over the last week. Low numbers of leafroller larvae were seen at the Grand Junction, Holland and West Olive farms, and some of these larvae were feeding in flower buds (Figure 2). Temperatures are expected to remain cool this week and insect activity should not increase much. Growers and scouts should continue to check fields for feeding damage by [leafroller](#), [tussock moth](#), and eastern tent caterpillars during the next week. These pests are generally more common in areas bordering woods.

Although aphids were not seen at any of the fields we scouted, we have had reports of aphid activity at other farms in southwest Michigan. Growers and scouts should be checking bushes for aphid colonies (Figure 3), and reports of scale outbreaks at some farms in the Holland and West Olive region mean that scale should also be included in scouting this week. See the article on scale in this edition.

To scout for aphids, examine the underside of leaves on two young shoots near the crown on each of 10 bushes and record the number of shoots where aphids are found. 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



Fig 2. Leafroller larva feeding on flower buds. Note the dead buds in the center and webbing around the cluster; *Photo: K. Mason.*

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 have blueberry varieties susceptible to shoestring on their farm.

Cherry fruitworm moths were caught at the Covert and West Olive farms, and a cranberry fruitworm moth was caught at the Covert farm. We expect the flight for these pests to slowly increase over the next week, but the slow progression of degree days means that egg-laying by either of these moths is **not** expected to begin in the next week at these farms.

Growers and scouts should have already set traps for cherry fruitworm and cranberry fruitworm. Traps should

be checked twice weekly until moths are caught consistently. This will identify fields with pressure from these pests, and will enable identification of the start (biofix) of the [cranberry fruitworm model on enviroweather.msu.edu](#). This model can be used for predicting optimal spray application dates for controlling cranberry fruitworm.

Captures of the contaminant moth in cherry fruitworm traps have declined to near zero over the last week, and we expect this downward trend to continue. See the [May 4 newsletter](#) for more information on these moths.

*Keith Mason & Rufus Isaacs
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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	5/3	1	set	0	--	--
	5/7	3	1	0	--	--
Grand Junction	5/3	1	set	0	--	--
	5/7	0	0	0	--	--
OTTAWA COUNTY						
Holland	5/3	0	set	0	--	--
	5/7	0	0	0	--	--
West Olive	5/3	0	set	0	--	--
	5/7	1	0	0	--	--



Fig 3. Aphid colony on the underside of a leaf; *Photo: K. Mason.*

Scale outbreaks found in blueberry fields

Late last week some observant scouts brought in samples of scale-infested blueberry shoots to our MSU Extension meeting in West Olive. On visiting some fields yesterday, it is clear that scale populations are very high in some hot-spots in the Holland and West Olive regions of the state, with some of last year's growth having high scale abundance. Growers and scouts should be on the lookout for scale throughout the state when they are walking their fields, to check and see whether they have similar infestations.

The scale we are finding are either dark black or tan colored (see the photo) and are mostly on last year's (green) shoots. On shoots growing diagonally or horizontally, they tend to be on the lower side of the shoot in the shade, making them a little harder to see. Some infestations have only a few scales per shoot, where others are well-covered with scale. One tell-tale sign we observed yesterday was a shiny film of honeydew that the scales emit (similar to aphids) and these drop onto the leaves beneath the scales. This can help you find scale infestations in a bush, but this honeydew will be washed off by rain and may take a few days to build up again. Scale colonies were found on one year old shoots in all parts of the bushes we sampled, but they were variable across the field. This pest cannot be seen without walking through fields and looking closely on the bushes.

This scale species found this season is thought to be Lecanium Scale (samples have been submitted to MSU Diagnostic Services for confirmation), a soft scale pest of many deciduous plants. This is a different species from the Putnam scale that can get onto fruit at harvest-time. Scales have an outer covering that they make, and the small soft scales live underneath this protection. Scale feeding creates honeydew that can act as a substrate for sooty mold, and their removal of sap by feeding can also

weaken shoots, killing them if populations are high enough. Vigorous and healthy blueberry bushes can tolerate some scale infestation, but if high populations of Lecanium scale are found, control programs should be considered.

Last year was a bumper year for Lecanium Scale in many parts of Michigan, and so it looks as if the 2009 crawlers settled down and have survived the winter in some blueberry



fields. The Lecanium scale has one generation per year, and is currently growing through molts from the overwintered scale (small black one in the photo), to a larger tan scale, and will then molt again before becoming a mature female. This stage will lay eggs under the scale, and the eggs then hatch and the crawlers disperse from the protective covering to find new places to feed on the bush.

Natural enemies usually regulate scale populations and prevent outbreaks of these pests, but growers with high populations this season should consider chemical control options. It is too late now for oil applications to suffocate the scale that can be used in the early spring

dormant timing. There is one insecticide with high activity on Lecanium scale, a Valent product called Esteem. This insecticide is registered for use in blueberry at 5 oz/acre for Lecanium scale control, and the details are described in a supplemental label (available at www.cdms.net). Esteem is an insect growth regulator that acts by disrupting the scale's normal molting. Application of Esteem should be planned soon, to disrupt their development before they reach the mature adult stage. Esteem is also active on eggs of fruitworms, so there may be an opportunity to combine scale and early fruitworm control. Esteem's effects may take some time to see, but with good coverage and timely application, it should prevent the scales reaching the stage where crawlers will be produced.

Most other insecticides that are active on scale are used at the crawler stage, later in the season, because the scale's waxy covering protects the scale inside. Crawlers are much more vulnerable to insecticides than the mature scales, and we will be monitoring the infested fields to identify when we see crawler emergence. This can be done in your own fields by placing some double-sided sticky tape near to scales on infested shoots, and checking with a hand lens until you see tiny dots (the young crawlers) on it.

We will update growers as this situation develops through the season. If you find infestations of scale, I would be interested in visiting the site so please contact me by email at isaacsr@msu.edu.

Rufus Isaacs
Department of Entomology
Michigan State University

2010 grower meetings

JUNE 10 6:00PM
Pre-harvest meeting - Van Buren County
Location: to be determined
Information: Mark Longstroth, 269-330-2790

JUNE 17 6:00PM
Pre-harvest meeting - Ottawa County
Location: Carini Farms
15039 Port Sheldon Rd., West Olive
Information: Carlos Garcia, 269-260-0671

JUNE 24 6:00PM
Weed Control Demo - Allegan County
Location: Getzoff Farm
7093 116th St., Fennville
Information: Paul Jenkins, 517-648-5099

Many thanks to Carini
Farms for hosting the
grower meeting last
Thursday!



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