Michigan Blueberry Facts

MICHIGAN STATE UNIVERSITY

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Contents

CROP STAGES

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Harvest of midseason varieties like Bluecrop, Rubel and Jersey are still going strong and yields are generally very good.

In Van Buren County, Blueray is ready for last harvest, and Bluecrop is between third and fourth harvest in Grand Junction; in Covert the second harvest of Jersey has ended. In Ottawa County, in West Olive, Bluecrop is ready for third harvest and Rubel is ready for second harvest, and Blueray is in the middle of the second picking in Holland.

Bluecrop ready for third harvest in West Olive (left), and Jersey after second harvest in Covert (right).

WEATHER NOTES

Mark Longstroth
Michigan State University Extension

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

Weather over the past two weeks has been seasonal with highs in the mid 80s and lows near 60s, with no significant rainfall. Soils are dry. A few scattered storms have moved through the region and left some much needed rain in a few areas. Rainfall amounts were between a third and a half-inch. The forecast for the upcoming weeks is for continued cooler and dryer than normal conditions, indicating that the lack of water will continue.

DEGREE DAYS		
GDD (from March 1)	**Base 42**	**Base 50**
	Van Buren County	
8-11-08	2831	1897
8-18-08	3012	2023
Projected for 8-25-08	3214	2167
	Ottawa County	
8-11-08	2604	1697
8-18-08	2782	1819
Projected for 8-25-08	3076	1967

INSECT UPDATE

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

No blueberry maggot flies were caught at any of the four farms. However, captures of this pest are still being reported from other farms. Growers and scouts should continue checking blueberry maggot traps at least once per week from now through the end of harvest. See the June 24th issue of the Michigan Blueberry IPM Update for more information on Blueberry maggot fly.

Blueberry maggot traps should also be checked for sharpnosed leafhopper, a vector of blueberry stunt disease. See the Blueberry Facts website for more information on sharpnosed leafhopper.

All four farms were scouted for Japanese adults, and low numbers of beetles were observed at the West Olive, Holland and Grand Junction farms. Very little evidence of Japanese beetle feeding on leaves or fruit was seen at any of the four farms (see photos to the right). Growers and scouts should be checking fields for these beetles from now through harvest. See the July 1st issue of the Michigan Blueberry IPM Update for more information including scouting methods for Japanese beetles.

Aphids were found at the Holland and West Olive farms, and small colonies (1 to 5 individuals) were seen. Parasitized aphids were seen in Covert, West Olive and Grand Junction. Continue scouting for aphids, particularly on farms with varieties that are susceptible to shoestring virus.

Oblique banded leafroller moths were caught at the Holland farm. Leafroller larvae were observed at the Holland farm, and growers and scouts should still be on the lookout for these pests.

Tussock moth larvae were not observed, but fields with a history of this pest should be monitored through harvest.

Van Buren County

Farm	Date	CBFW moths per trap	CFW moths per trap	BBA % infested shoots	BBM adults per trap	JB per 20 bushes	OBLR moths per trap
Covert	8-4	0	0	0%	0	0	0
	8-11	-	-	0%	0	1	0
	8-18	-	-	0%	0	0	0
Grand Junction	8-4	0	0	5%	0	0	0
	8-11	-	-	0%	0	2	0
	8-18	-	-	0%	0	2	0

Ottawa County

Farm	Date	CBFW moths per trap	CFW moths per trap	BBA % infested shoots	BBM adults per trap	JB per 20 bushes	OBLR moths per trap
Holland	8-4	0	0	20%	0	0	0
	8-11	-	-	20%	0	0	0
	8-18	-	-	5%	0	1	6
West Olive	8-4	0	0	0%	0	0	2
	8-11	-	-	0%	0	0	1
	8-18	-	-	5%	0	3	0

DISEASE UPDATE

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

All of the scouted plots have been fully harvested and scouting for diseases in the field has come to a close. In these past two weeks, we have seen an increase in the incidence of anthracnose among the scouted plots. Additionally, throughout the season, we have been collecting extensive anthracnose fruit rot data with regards to the onset of the infections.

Anthracnose infections throughout this season

Since anthracnose does not manifest itself until close to harvest, preventative control strategies are usually necessary. The latent nature of anthracnose infections also makes them difficult to study because it is hard to identify when the majority of infections begin. In order to better understand when these infections occur, green fruit has been collected in our scouted plots, the surface of the fruit sterilized and placed on selective fungal media. After a period of seven days, fungi that grow on the media were identified. Figure 1 represents the incidence of the anthracnose fungi (*Colletotrichum acutatum*) seen on collected fruit. From this graph we can estimate that the majority of infections most likely occurred two weeks prior because of the incubation period required by the pathogen.

Contaminated with mummy berry!

A number of growers this year have had mummy berries contaminated their processed fruit (Figure 2). There is usually a zero tolerance policy for mummy berries in processed fruit and obviously not encouraged in the fresh market fruit as well (No one wants to eat a mummy!). These berries are generally not difficult to identify and cull as they are small pumpkin-like pseudosclerotia that appear white around the time of harvest. Normally, senescence will occur before blueberry clusters ripen and infected berries will fall out of the cluster before harvest. Occasionally berries make it into the harvester and past the sorting line and inevitably to the fresh market. Several methods can reduce the incidence of mummy berry within a field, including annual monitoring, planting resistant varieties, cultural controls, chemical controls and biological controls.

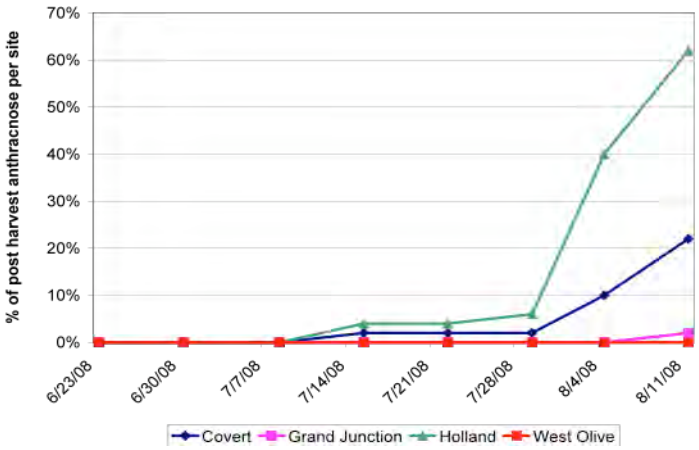

Figure 1. Anthracnose incidence at the four scouted plots throughout the 2008 growing season (percentage based on 50 random berries were per site).

Figure 2. A blueberry pint with a mummy berry present after the fruit has been processed. Notice the white pumpkin-like fruit in the center of the clamshell.

Van Buren County			
Farm	Date	Average of infected anthracnose clusters per bush*	Average of infected alternaria clusters per bush*
Covert	7-31	0.2	2.0
	8-8	0.1	0.7
	8-14	0.6	0.1
Grand Junction	7-31	0.1	0.3
	8-8	0.0	0.0
	8-14	0.0	0.0
Ottawa County			
Holland	7-31	0.4	0.0
	8-8	0.1	0.0
	8-14	0.5	0.1
West Olive	7-31	0.0	0.0
	8-8	0.0	0.1
	8-14	0.1	0.0

*Average number was calculated for ten bushes.

PEST OF THE WEEK – Blueberry bud mite

Rufus Isaacs and John Wise
Department of Entomology, Michigan State University

Post-harvest is the optimal time for blueberry bud mite control

Over the past five years, 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 grower groups, extension educators and the Small Fruit Entomology program 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 have been verified by magnified analysis of bud samples.

This mite is microscopic (Figure 1), and feeds inside buds in the winter, 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 (Figure 2). The wide variability in symptoms among varieties adds to the difficulty in diagnosing this pest injury. Berries on infected shoots may also appear roughened and malformed. While these symptoms may be indicators of infestation, it is best to take shoot samples in the late fall or early spring to identify infestations. Bud mites are moving to fruit buds formed this year to find places to spend the winter, so sampling should include the top 6 inches of shoots with fruit buds. These should be examined to verify that bud mites are the problem, because some of the symptoms are quite similar to the catch-all category of 'winter damage'. This 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 local extension office, to your crop consultant, or to the MSU diagnostic lab (www.pestid.msu.edu) for checking.

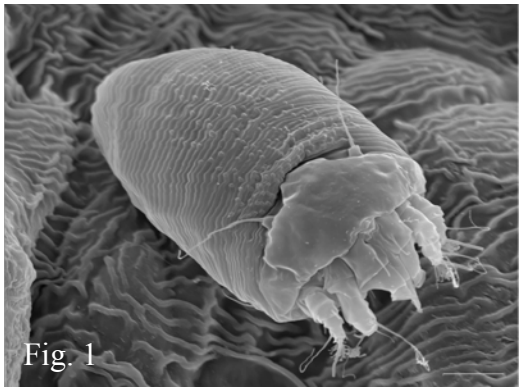
Fig. 1


Fig. 2

This pest can be difficult to control with pesticides because of its small size and the difficulty of getting miticide residues into the tiny cracks and crevices it inhabits. However, the immediate post-harvest timing (i.e. now) is recommended for targeting this pest because the relatively exposed situation 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.

Registered miticide options for blueberry bud mite are limited (Table 1), but include effective options. Thiodan 3 EC is the most effective miticide for this pest, and should be applied once immediately post-harvest, and again 2-3 weeks later. Although the label recommends waiting 6-8 weeks between the sprays, this label was developed for southern US conditions, and in Michigan we 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. It is recommended that sprays be applied at fairly 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 done at MSU and 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

and can expect some level of mite suppression if used at this timing, but applications at leaf drop are later than the ideal timing for bud mite 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 at 0.5-1% by volume can help to reduce populations in the spring.

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 mite back onto the bushes.

Table 1. Miticide rates and timings for blueberry bud mite

Compound	Product rate / acre	Application Timing
Summer oil	1% v/v	Delayed-dormant
Thiodan 3 EC	2 qt	Post-harvest
Sulforix	1 gal	Pre- or Post-harvest

GUTHION TRANSITION TASK FORCE UPDATE: On-farm fruitworm control studies

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

To address the challenges created by EPA's phaseout of Guthion from blueberries, the Blueberry Guthion Task Force was established during early 2008. Task force members include Michigan blueberry growers and representatives of Michigan State University (Michigan Agricultural Experiment Station and Michigan State University Extension), Michigan Department of Agriculture, Farm Bureau, EPA, USDA, The Northcentral IPM Center, MBG Marketing, Michigan Blueberry Advisory Council, Michigan Food and Farming Systems, Michigan State Horticultural Society, UAP, Wilbur Ellis, and Robertson's Crop Dusting. This diverse group of stakeholders has set research, education, and regulatory priorities for responding to the phaseout and these are available at the group's website at www.isaacslab.ent.msu.edu/AZM.htm. Many of the priorities identified by this group are being addressed by research underway at the Trevor Nichols Research Complex or on commercial blueberry farms in southwest Michigan. This article focuses on one part of that research, our on-farm evaluations of fruitworm insecticide programs.

Cranberry and cherry fruitworm (Figure 1) are the key insect pests that attack blueberries in Michigan during and after bloom, driving the application of insecticides to blueberry during late bloom and after petal-fall. These early-season insects can cause yield loss and contamination of the fruit. While bee safe insecticides such as Confirm or B.t. are typically used during bloom, control of these insects is currently dependent on Guthion applications after bloom in many Michigan farms. Recently, blueberries have received registration of Intrepid, Delegate, and Assail for fruitworm control in blueberry. To measure the performance of these alternatives to Guthion against cherry and cranberry fruitworm in a commercial setting, we compared the efficacy of three fruitworm control programs at four Michigan blueberry farms. At each farm, three similar 1 to 9 acre fields were chosen and the fields received one of the insecticide programs described in Table 1.

Table 1. Fruitworm control programs tested during 2008

	Insecticides (rate per acre)		
Program	**Bloom application**	**Post bloom 1**	**Post bloom 2**
1 – Guthion standard	Confirm 16 oz	Guthion 1.25 lb	Guthion 1.25 lb
2 – Pyrethroid	Confirm 16 oz	Asana 9.6 oz	Asana 9.6 oz
3 – Reduced-risk	Intrepid 12 oz	Delegate 6oz	Assail 5.3 oz

All insecticides were applied by the cooperating growers using ground application sprayers, and application timings were selected based on the degree day model for cranberry fruitworm being developed by MSU. Confirm and Intrepid were applied during bloom at 50-100 growing degree days (base 50°F) after the first cranberry fruitworm moth was caught in traps. In each program, the second application in each program was made at petal fall and the third application was 7 to 10 days after that.

To assess how well each program performed, 25 clusters were collected from each field every 7 days. The number of damaged berries (indicative of cherry fruitworm feeding or early cranberry fruitworm infestation) and clusters with multiple berry damage (sign of advanced cranberry fruitworm infestation) from each sample was recorded. The average number of damaged single berries is given in Figure 1 and the number of clusters with multiple berry damage appears in Figure 2. The collected clusters were then placed over moist sand and held in plastic bins for 6 to 8 weeks to allow any larvae surviving in the fruit to develop. This final part of the study is still running.

In this first year of testing fruitworm alternatives applied using the degree day model, we saw equivalent control of either single berry damage (Figure 1) or cluster damage (Figure 2) using the standard Confirm and Guthion program and with programs that employed a pyrethroid program or a reduced-risk insecticide program. Our preliminary results show no significant difference among programs in performance against fruitworms. Comparison of the levels of infestation from cherry (single berry) and cranberry (multiple berry) fruitworm suggests that these programs were less effective against cherry fruitworm which caused a higher level of infestation than cranberry fruitworm in all of the test plots. This is likely a result of the timing of sprays for fruitworms in these trials being focused on controlling cranberry fruitworm. We will need further studies in 2008 to explore the phenology and application timings for this pest.

This report has focused on our activities related to on-farm evaluation of fruitworm controls. Additional activities have been underway this summer related to the phase-out of Guthion and determining the implications of this change for the industry. In the research arena, we have been working to validate our degree day model for cranberry fruitworm to improve pesticide timing, and evaluating new insecticides for fruitworm control. Task Force met in February 2008 and project website was established.

Extension and education activities have been underway this summer, with completion of the Blueberry Guthion Transition Plan, sending the Michigan Blueberry IPM Update (this publication) weekly to ~170 email addresses, organizing grower IPM meetings with our MSU Extension partners, and updating the Pest Management Strategic Plan. We are planning a focused one-day workshop during winter 2008-09 that will focus on fruitworm management to provide more detailed information on the results of our research and practical use of the degree day model for fruitworm control.

Other activities include some general sampling of fruitworm infestation levels at commercial blueberry farms across SW Michigan, a survey of pesticide use by USDA-NASS during July, and we have also been able to secure funding for all this activity from Project GREEEN, EPA Region 5 Office in Chicago and EPA's PRIA2 program.

Finally, we thank the manufacturers of the tested products for supplying material for these trials and the four cooperating growers for access to their farm and assistance applying insecticides.

Figure 1. Cranberry fruitworm (left) and cherry fruitworm (right) infest blueberries during bloom and after petal-fall. The webbing and sawdust-like frass caused by cranberry fruitworm make this pest more of an pest, but ineffective management of cherry fruitworm can also cause economic injury and the potential for rejected fruit.

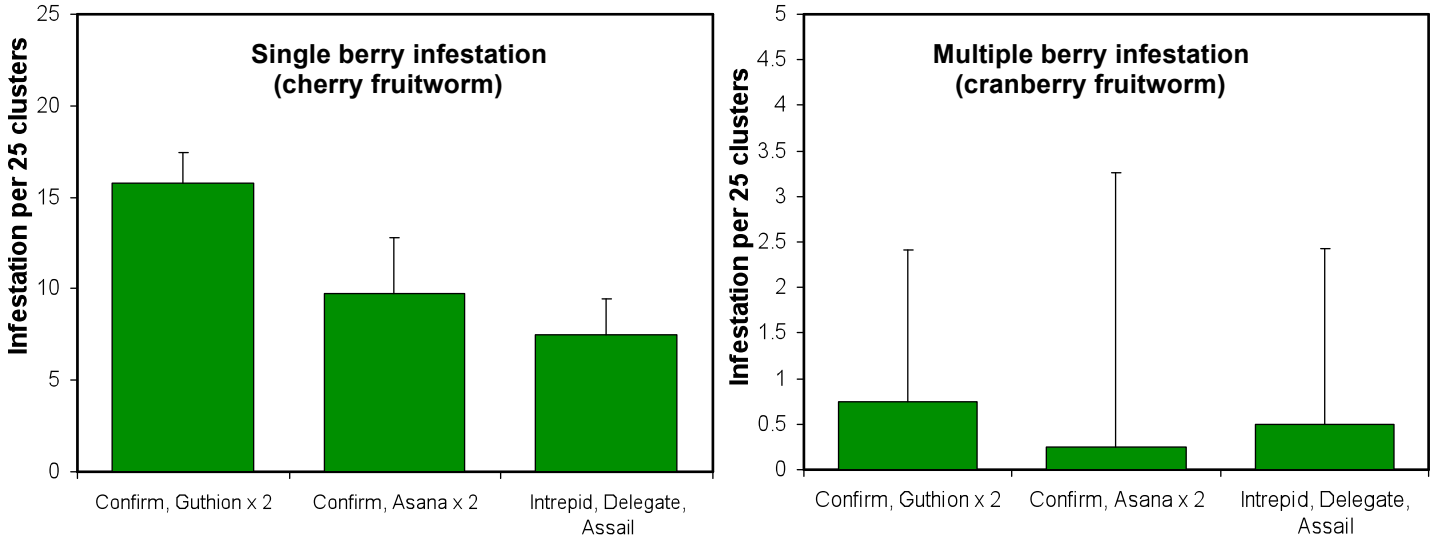

Figure 2. Relative control of cranberry and cherry fruitworm in commercial blueberry fields managed using three different insecticide programs, shown as average infestation ± standard error. Applications were timed using the MSU cranberry fruitworm degree day model. The graph on the left is single berry damage (indicative of cherry fruitworm), while the graph on the left is multiple berry damage (indicative of cranberry fruitworm). Note the different scales of the two graphs – cranberry fruitworm infestation was very low in all treatments, despite significant catches of moths in monitoring traps.

BLUEBERRY IPM UPDATE – END OF SEASON QUESTIONNAIRE

The Blueberry Team at Michigan State University received another year of funding to develop and deliver our IPM Update during 2008. You have been a subscriber to this free service, and we would like to get your feedback. Please help us by spending a few minutes to fill out and return this **anonymous** survey, so we can learn how to improve it and what we should change if we get funding to continue this in 2009.

1. Please describe your role in the blueberry industry (check all that apply):

□ grower □ processor □ scout/consultant □ university □ other (describe)_____.

2. How many acres of blueberry do you farm?_____acres.

3. Where are you based? State or Province_____ County_____.

4. Please rank how useful MSU's Blueberry IPM Update was for you during 2007.

□ very useful □ somewhat useful □ not useful □ didn't read it

5. If you did not read the Blueberry IPM Update, what was the reason?

□ not relevant □ no time □ no access to the internet □ other_____.

6. Did your pest management practices change in 2008 because of the Blueberry IPM Update? (check all that apply)

□ no change □ scouted more □ scouted less
□ better insect pest control □ sprayed more □ sprayed less
□ better disease control □ improved spray timing
□ other_____.

7. Did the information in the Blueberry IPM Update save you money? □ YES □ NO

If it saved you money, how much did you save (approximately)? US$_____.

8. We are interested in your response to the amount of information in the IPM Update. Is it.....

□ too much □ too little □ just right

9. What other sources do you use to get current pest management information? (check all that apply)

□ MBG scout □ chemical company scout □ private scout
□ MSU CAT Alert □ Rutgers Blueberry Bulletin □ neighbors
□ other_____.

10. What would you like to see more of?_____.

11. What would you like to see less of?_____.

12. Any other feedback you wish to provide?_____.

_____.

_____.

Please email completed surveys to jenki132@msu.edu, or mail your printed and filled out survey to Paul Jenkins at MSU, B18 NFST, East Lansing, MI 48824.

MEETINGS AND ANNOUNCEMENTS

This is the final Michigan Blueberry IPM Update for 2008… See you in April 2009!

Preliminary information on upcoming winter meetings:

2008 Great Lakes Expo (December 9-11, 2008; Grand Rapids, MI)
Two Blueberry sessions (Wednesday, December 10, morning and afternoon)

- The economics of establishing blueberry plantings, Mark Longstroth, MSU Extension
- Integrated pest management of fruitworms; Rufus Isaacs, MSU Entomology
- Health benefits of berry consumption; James Joseph, USDA ARS-Boston

More…

2009 Southwest Hort Days (February 3-5, 2009; Benton Harbor, MI)
Blueberry session is still being planned.

MSU BLUEBERRY TEAM

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Annemiek Schilder, Plant Pathology
Rufus Isaacs, Entomology
John Wise, Trevor Nichols Research Complex
Matt Grieshop, Organic Pest Management
Paul Jenkins, Small Fruit Education Coordinator
Mark Longstroth, Van Buren County Extension
Carlos Garcia, Ottawa County Extension
Bob Tritten, SE Michigan Extension

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