Michigan Blueberry I.P.M. Update

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The Blueberry IPM Update is a weekly publication produced by Michigan State University Extension. To receive a copy of this newsletter, send an email to masonk@msu.edu.
Also available online through blueberries.msu.edu and at:
www.isaacslab.ent.msu.edu/blueberryscout/blueberryscout.htm

Editor's Note:

We hope you find the information in this newsletter useful in guiding what to look for as you scout your own farm. The scouting data shown in the Disease and Insect Updates below are taken from four Michigan blueberry farms. As conditions are different from farm to farm, we must stress that the information in this newsletter should not be used as a substitute for scouting your own fields. Your spray decisions should be made based on what is seen on your own farm.

Please use this newsletter to determine when and how to look for certain pests, identify potential pest problems, and to get information on the biology of pests and other aspects of integrated pest management. See the Insect and Disease Updates below for descriptions of some scouting methods that can be used on your farm.

CROP STAGES

In Van Buren County, Jersey in Covert are at early fruit coloring. Blueray and Bluecrop are at fruit coloring with several berries turning blue in many clusters in Grand Junction.

In Ottawa County, Blueray are at fruit coloring in Holland. Rubel and Bluecrop are also at fruit coloring in West Olive.

Berries continue to size up well at all our scouting locations.

Bluecrop at fruit coloring at Grand Junction.

DEGREE DAYS AND WEATHER NOTES

Weather Forecast: Hot humid weather until Wednesday when a front will move through the area and bring storms and rain.Then cooler, less humid weather will last through the weekend. By 7-2 GDD_{50} will increase by ~135, and GDD_{42} will increase by ~190. Complete weather summaries and forecasts are at available enviroweather.msu.edu

GDD (from March 1)	Base 42	Base 50
	Van Buren County	
6-11	1526	846
6-18	1606	1028
6-25	1788	1153
	Ottawa County	
6-11	1243*	742*
6-18	1472*	915*
6-25	1657*	1044*

* enviroweather data for the West Olive station is missing some dates, so data from Hudsonville was substituted for missing values.

PEST OF THE WEEK

Japanese beetle

Rufus Isaacs, MSU Entomology

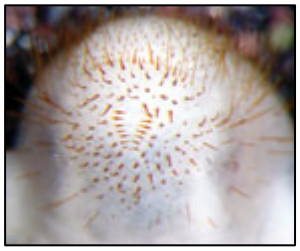
Japanese Beetle adult feeding on fruit

Adult beetles are about ½ inch (13 mm) long with a metallic green thorax and shiny, brown wing coverings. Rows of white tufts are distinctive on the undersides of the abdomen. Male and female beetles congregate on the tops of plants in sunlight, where they feed and mate. Adult beetle emergence begins in early June in North Carolina and early July in Michigan.

Adult beetles feed on ripe fruit and foliage.
Mating occurs as soon as females emerge from the ground. Then they seek grassy areas with moist soil to lay eggs. Eggs are 1 to 2 mm in diameter, spherical and white, and are laid 5 to 10 cm deep in the soil in batches throughout the female beetle's month-long life. C-shaped, cream-colored grubs with brown heads and three pairs of legs develop in the soil, becoming 3 cm long when fully grown. Japanese beetle grubs can be distinguished from similar grubs by two rows of seven hairs in a V shape on the inside of the posterior segment.

Beetles are best detected on blueberry bushes during calm, hot, cloudless afternoons. Traps for monitoring Japanese beetle are highly attractive but can increase the number of beetles flying into an area. In small plantings, beetles can be removed from bushes. Control of attractive weed hosts and removal of grassy areas in and around fields during July and August can reduce field suitability for Japanese beetle. Biological control agents suppress populations in areas where the beetle is established.

C-shaped grubs are found in soil under grassy areas



Japanese beetle grubs have hairs in a distinctive V pattern.

CONTROLLING JAPANESE BEETLES IN BLUEBERRIES

Rufus Isaacs and John Wise, MSU Entomology

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.

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 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 a highly 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.

Broad-spectrum insecticide options

The organophosphate Imidan (buffer to pH 6.0) provides excellent lethal 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. In early 2007, blueberries received a label for Danitol (10-16 oz per acre) which is another pyrethroid insecticide. This has a 3 day PHI and can be applied aerially and by ground. Trials of this insecticide have shown it to be highly active against Japanese beetle.

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 for use in blueberries after bloom provides a selective option for Japanese beetle management. Provado provides 2-3 days of lethal activity from the surface residues before it is absorbed into the foliage. Thereafter, beetles must eat treated foliage to get a dose of the insecticide. Once inside the foliage, Provado is rainfast and provides significant sub-lethal effects of repellency and knockdown activity, but with much less direct mortality from the residues. This neonicotinoid will also control aphids and leafhoppers. It has 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, Ecozin, Neemix etc.) have a 0 day PHI and pyrethrum (Pyganic) has a 12 h PHI. These compounds are labeled for 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.

DISEASE UPDATE

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

Latent mummy berry fruit infections

This week all scouted plots were at the fruit coloring stage. Scouting for diseases during this time of year is difficult because immature blueberries are not showing any symptoms of infection. On the other hand, infections by the mummy berry fungus (*Monilinia vaccinii-corymbosi*) are advancing within developing fruits as we speak (Figure 1), and are visible as a white discoloration of the ovaries within the green berry, which is only visible upon cutting open berries. Some infections are now starting to also become outwardly visible, as infected berries turn a tan-brown color and develop shallow ridges (Fig. 1A).

During this time of year there is very little a grower can do about mummy berry infection. In the weeks to come, infected berries will turn whitish purple, shrivel up and fall to the ground, while some will still remain in the clusters. It is the latter ones that may be a problem during harvest as they end up in the lugs. Scouting for the mummified berries will give growers useful insights into whether this year's treatments were successful and where the inoculum will be located next year for management purposes.

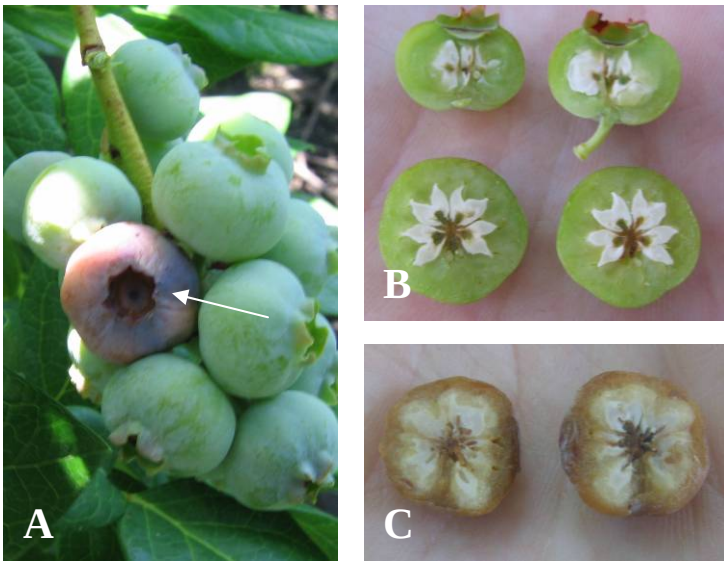


Figure 1. A) A tan-brown discoloration of fruit (arrow) may be symptomatic of mummy berry fruit infection. B) Cross sections of mummy berry-infected fruit. C) Advanced mummy berry fruit infection (West Olive, MI).

Twig blights caused by Phomopsis

Another important fungal disease to scout for during this time of year is Phomopsis. As the season has progressed the incidence of Phomopsis twig blight has increased in all the scouted plots. Phomopsis symptoms can be readily seen as reddish-brown lesions or areas on green twigs. Another typical symptom of Phomopsis can occur throughout the season as a sudden wilting of leaves and a blighting of flower and fruit clusters (Figure 2). At this point it is to late to prevent new infections, but if fields have a lot of Phomopsis twig blight, it may be useful to prevent cane infections through wounds created during mechanical harvesting with fungicides such as Topsin M + Captan, Cabrio or Pristine (do consider the pre-harvest interval). In addition, growers can time irrigation to overlap with natural dew formation.

Figure 2. A) Phomopsis twig blight symptoms (arrow). B) Blighted fruit cluster caused by Phomopsis (arrow) (Covert, MI).

Farm	Date	Mummy berry shoot strikes per bush	Blighted blossoms per bush *	Phomopsis twig blight per bush	Blueberry shoestring virus **
Van Buren County					
Covert	6-11	2.1	0.6	5.5	0
	6-18	-	-	5.6	0
	6-25	-	-	5.7	0
Grand Junction	6-11	6.0	0	4.6	0
	6-18	-	-	7.5	0
	6-25	-	-	8.2	0
Ottawa County					
Holland	6-11	2.8	1.0	5.8	4
	6-18	-	-	8.4	5
	6-25	-	-	8.9	5
West Olive	6-11	4.4	2.8	7.8	0
	6-18	-	-	10.2	0
	6-25	-	-	10.9	0

* Blighted blossoms may be symptomatic of mummy berry, Phomopsis, Botrytis or anthracnose.
** Number of bushes showing shoestring virus symptoms (50 bushes were scouted).

INSECT UPDATE

Top: Fruitworm entry hole. Note the characteristic darkening of the fruit. **Bottom:** Cluster damage from Cranberry fruitworm.

FRUITWORMS

Cranberry fruitworm moth flight continues to decline in both Van Buren and Ottawa Counties. All growers have sprayed twice for fruitworms. No cherry fruitworm moths were caught. No fresh Cranberry fruitworm or cherry fruitworm eggs were observed. Single berries with feeding damage were found at all farms and the amount of this damage has increased, but live larvae were only observed at the Holland farm. Clusters with webbing and frass (cranberry fruitworm feeding damage) were found at the Covert, Grand Junction and Holland farms (see photo to the right). In the next week, we expect to see cranberry fruitworm flight decrease and an increase in fruit with signs of fruitworm feeding damage. If either fruitworm has been trapped, or if you are seeing damage from these pests on your farm, you will likely need to apply insecticides for fruitworm control. See the past newsletter page for the 4 June 2007 article on post-bloom fruitworm management for some insecticide options.

BLUEBERRY APHID

Aphids were detected on all farms except in Covert. The percentage of infested shoots has generally remained steady, and colony size has decreased (1-5 aphids) after recent insecticide sprays. You should be scouting your bushes for the presence of this pest. If aphids are found on or near varieties that are susceptible to shoestring virus, the use of insecticides for control may be needed.

BLUEBERRY MAGGOT

No flies were captured. Emergence has been reported at other sites in Allegan County. It is likely that rains during this week will trigger the emergence of this pest.

JAPANESE BEETLE

This pest has emerged. Low numbers were observed in Covert and Grand Junction, and it has been reported at Ottawa County farms not involved in this project.

MONITORING FOR FRUITWORMS

After moths are caught and after petal fall (~5-15 or 5-30) bushes should be inspected for eggs and damage each week for a five minute sampling period. Working in a "hotspot," look at as many fruit clusters as possible on 10 to 20 bushes along the field border. Looking at the fruit clusters can help you find eggs in calyx cup, larval entry holes and damage. When inspecting the fruit grasp the cluster and view with the sun over your shoulder. Carefully turn the clusters over and inspect the bottom of the fruit as well as the top for entry holes and/or frass. Record the number of cranberry fruitworm and cherry fruitworm eggs and the number of berries with damage. **Click here for more info and photos of cranberry and cherry fruitworm.**

SCOUTING FOR JAPANESE BEETLE

Begin scouting for Japanese beetle in mid to late June. Visually scan the canopy of 10 bushes on the field border and 10 bushes in the interior of the field. Count the number of beetles observed. As beetles are very mobile, check for the presence of feeding damage on leaves and fruit to let you know if beetles have been active in the field recently. See the Pest of the Week Section above for a picture of feeding damage on fruit and for more information on Japanese beetle control see the article above.

Farm	Date	CBFW moths per trap	CFW moths per trap	Blueberry aphid % infested shoots	Blueberry maggot per trap	Japanese beetle per 20 bushes
Van Buren County						
Covert	6-11	19	0	0	0	
	6-18	0	0	0	0	
	6-25	18	0	0	0	1
Grand Junction	6-11	56	0	25%	0	
	6-18	7	0	20%	0	
	6-25	16	0	30%	0	2
Ottawa County						
Holland	6-11	60	0	30%	0	
	6-18	34	1	30%	0	
	6-25	9	0	25%	0	0
West Olive	6-11	8	0	15%	0	
	6-18	0	0	25%	0	
	6-25	0	0	15%	0	0

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For more information, see our website at
blueberries.msu.edu

MICHIGAN STATE UNIVERSITY EXTENSION

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