Michigan Blueberry Facts

MICHIGAN STATE UNIVERSITY

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Contents

CROP STAGES

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In Van Buren County, Jersey in Covert is at late green fruit with some early fruit coloring, and in Grand Junction, Blueray and Bluecrop, are at fruit coloring. In Ottawa County, Blueray in Holland, and Rubel and Bluecrop in West Olive are at early fruit coloring.

Bluecrop at fruit coloring in Grand Junction (left), and Blueray at early fruit coloring in Holland (right).

WEATHER NOTES

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

Cooler than normal temperatures are predicted through Friday. Showers and thunderstorms likely on Wednesday and Thursday morning as a result of a cold front moving through the area. Things should dry up through the weekend with temperatures returning to normal.

DEGREE DAYS		
GDD (from March 1)	**Base 42**	**Base 50**
	Van Buren County	
6-23-08	1417	874
6-30-08	1606	1007
Projected for 7-7-08	1780	1126
	Ottawa County	
6-23-08	1242	726
6-30-08	1423	852
Projected for 7-7-08	1609	982

INSECT UPDATE

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It appears the flight of cherry fruitworm is over, and cranberry fruitworm moth flight also decreased over the last week. No fruitworm eggs were found during scouting, but fruitworm damage is becoming more evident in some fields. Single berry damage (indicative of cherry fruitworm feeding or early cranberry fruitworm feeding) was observed at all four farms and this type of damage has increased slightly over the past week. Cluster damage (characteristic of advanced cranberry fruitworm feeding) was observed in Grand Junction and Covert. Click here for more info and photos of cranberry and cherry fruitworm. We expect cranberry fruitworm flight to continue to decrease, and we do not expect to find any freshly laid fruitworm eggs. However, berry damage and cluster damage will likely increase over the next week. Growers and scouts should continue monitoring cranberry fruitworm traps, and berry clusters should be inspected for eggs and damage. See the June 10th issue of the Michigan Blueberry IPM Update for scouting methods.

Left: Single berry damage. Note the characteristic darkening of the fruit.

Right: Cluster damage from Cranberry fruitworm.

A blueberry maggot fly was caught at the Holland farm. Growers and scouts should continue checking these traps at least once per week from now through harvest. See the June 24th issue of the Michigan Blueberry IPM Update for more information on Blueberry maggot fly.

All four farms were scouted for Japanese adults, but none were observed. Japanese beetles have been reported in Berrien County and around the MSU campus in East Lansing. Growers and scouts should be checking fields for these beetles from now through harvest. See below for scouting methods.

Aphids were found at all four farms, and mid-sized colonies (5 to 20 individuals) were seen. A parasitized aphid was seen at the Covert farm. Growers and scouts should be scouting for aphids, particularly on farms with varieties that are susceptible to shoestring virus.

Leafroller feeding was not seen at any of the farms, and tussock moth larvae were not observed, but growers and scouts should still be on the lookout for these pests. See the June 10th issue of the Michigan Blueberry IPM Update for scouting methods.

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. For more information on Japanese beetle control see the *Pest of the Week* article in this issue.

Van Buren County						
Farm	Date	CBFW moths per trap	CFW moths per trap	BBA % infested shoots	BBM adults per trap	JB per 20 bushes
Covert	6-16	100	1	20%	set	
	6-23	41	0	5%	0	
	6-30	6	0	20%	0	
Grand Junction	6-16	51	3	5%	set	
	6-23	9	0	40%	0	
	6-30	8	0	20%	0	
Ottawa County						
Farm	Date	CBFW moths per trap	CFW moths per trap	BBA % infested shoots	BBM adults per trap	JB per 20 bushes
Holland	6-16	168	3	0	set	
	6-23	63	0	5%	0	
	6-30	2	0		1	
West Olive	6-16	8	3	5%	set	
	6-23	1	0	15%	0	
	6-30	0	0	20%	0	

DISEASE UPDATE

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Figure 1. Blighted fruit cluster caused by twig blight seen on 6-27-08 in Grand Junction, MI.

This week all scouted plots were at the green fruit stage. Twig blight symptoms remained relatively constant in our scouted plots as compared with last week (Figure 1). Remember twig blights can be caused by various fungi, including *Phomopsis vaccinii*, *Colletotrichum acutatum* and *Botrytis cinerea*. During this time of year it is likely too late to control new twig infections however as most of them occur during bloom. However, if disease incidence is high (more then 20-30 blighted twigs per bush or more than 5 infected canes) it may be useful to prevent potential cane infections caused by mechanical harvesting by applying an effective fungicide (e.g., Pristine, or Cabrio) right after harvest. Also, infected mummy berry fruits were detected in all of our scouted plots for the first time this week by cutting open immature fruit.

Return of the Mummy!

Scouting for mummy berry disease 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 2), and are visible as a white discoloration of the ovaries within the green berry, which is only apparent 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.

Figure 2. Cross section of mummy berry-infected fruit seen on 6-27-08 in Grand Junction, MI.

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.

Van Buren County				
Farm	Date	Average number of mummy berry shoot strikes*	Average number of blighted twigs per bush**	Blueberry Shoestring Virus***
Covert	6-12	1.0	2.3	0
	6-19	0.5	9.9	0
	6-27	0.0	9.2	0
Grand Junction	6-12	33.9	0.8	0
	6-19	9.2	3.3	0
	6-27	0.9	2.9	0
Ottawa County				
Holland	6-12	7.4	0.2	3/50
	6-19	3.0	1.8	4/50
	6-27	0.0	2.8	3/50
West Olive	6-12	6.2	0.5	0
	6-19	3.7	1.2	0
	6-27	0.0	1.8	0

PEST OF THE WEEK – JAPANESE BEETLE

Rufus Isaacs
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Japanese beetle is an alien pest insect introduced into the United States in New Jersey around 1916. Since then it has spread west from the original introduction and is now throughout the Eastern US, Great Lakes region, and as far west as Iowa. Sporadic introductions into Western US states are eradicated through intense monitoring and management, and a quarantine program is in place to prevent beetle movement into uninfested states on plant material and through transportation. In blueberry fields, this insect can be present around harvest time, causing feeding injury on leaves and berries and also posing a risk of infestation during harvest.

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.

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.

C-shaped grubs are found in soil under grassy areas

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 so they are not recommended because these beetles are so easy to see. Attempts to mass-trap Japanese beetles using these traps have not been successful. In small plantings, beetles can be removed by hand from bushes. Control of attractive weed hosts such as wild grape, sassafrass, and raspberry, and removal of grassy areas in and around fields during July and August can reduce field suitability for Japanese beetle. Biological control agents such as nematodes, fungal diseases, and ground beetles suppress populations in areas where the beetle is established but they do not provide complete control.

CONTROLLING JAPANESE BEETLE IN BLUEBERRY

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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 our research conducted at MSU's Trevor Nichols Research Complex and at grower's farms.

Field management

Clean cultivation is a highly effective method for reducing the suitability of fields for Japanese beetles, because female beetles search out moist grassy areas to lay their eggs. For many farms, clean cultivation through the whole year 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 but it is not suitable for very wet sites and it can create dusty conditions during harvest. Even if the fields are managed this way, grassy field 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).

Many perennial weeds are highly attractive to this beetle, so growers should 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. Fall applications of an appropriate herbicide to these perennial weeds will pay off in providing lower weed pressure and also lower beetle numbers during harvest.

Chemical Control

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. This product is labeled at 1.3 pounds per acre and has a 3 day PHI for use in blueberry.

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 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 last year showed it to be highly active against Japanese beetle, providing 7-10 days protection when applied either by air or by ground (cannon) sprayer. One other pyrethroid insecticide, Mustang Max, was registered late in 2007, and we expect this to also be active on Japanese beetle adults.

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 close to harvest.

Selective insecticides. There are three neonicotinoid insecticides labeled for use in blueberry: Provado, Actara, and also Assail that was registered this spring. Additionally, some generic versions of Provado have been registered recently, though we have not tested these products. Neonicotinoid insecticides provide a selective option for Japanese beetle management, and they have some broad activity that can also control aphids and blueberry maggot. In our trials with Provado at 6 oz per acre, this insecticide provided 2-3 days of lethal activity from the surface residues before it was absorbed into the foliage. Thereafter, beetles must eat treated foliage to get a dose of the insecticide. A similar pattern is seen with Actara and Assail. Assail is registered at 4.5-5.3 oz/acre for control of Japanese beetle, blueberry maggot, and this rate is highly effective on aphids. In research station and grower farm trials, Actara at 4 oz/acre provided at least one week of protection against Japanese beetle feeding and long-term control of blueberry aphid. Note that this product is not lebelled for blueberry maggot control. Once inside the foliage, neonicotinoids are rainfast and provide significant sub-lethal effects of repellency and knockdown activity, but with much less direct mortality from the residues. These neonicotinoids all have short pre-harvest intervals: Provado (3 days), Assail (1 day), Actara (3 days).

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.

Admire and Platinum are two soil-applied insecticides that are both from the neonicotinoid class and are the soil formulated versions of Provado and Actara, respectively. These products provide an additional target for breaking the life-cycle of Japanese beetle. A soil application in late June places the insecticide in the soil to kill the young beetle larvae as they hatch from the eggs. This is a preventative approach, and will only reduce the abundance of beetles emerging in the following season.

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. 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, and we have also shown that implementing this approach at the whole-farm scale by targeting all the grassy drive lanes and suitable grassy egg-laying sites can help reduce the overall pressure from Japanese beetles.

While this is an expensive option due to the high price of soil-applied neonicotinoids, the current price pressure caused by generic insecticides in this market is making this a more affordable option. While unlikely to be a strategy used each year, soil applied insecticides can be used as part of an overall IPM program to reduce the populations of this pest and to minimize the risk of contamination by beetles at harvest time.

MEETINGS AND ANNOUNCEMENTS

Have a safe and enjoyable 4th of July weenend!

Our IPM meetings are finished for the season. Thanks to everyone who participated in our Twilight IPM Meetings this year, especially to **Carini Farms** and **Cornerstone Ag** for hosting these events! These meetings were a great success, with approximately 50 growers attending each week!

****After our next issue on July 8, this newsletter will be updated every two weeks for the remainder of the season.****

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IN NEXT WEEK'S ISSUE…

Fruit rots
Insect pests at harvest

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