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**European corn borer and corn earworm**

*Beth Bishop*  
*Entomology*

The number of European corn borer moths caught in pheromone traps during the interval of July 15 through 22 was low for most areas in Michigan. Degree day totals (see table in the back of this issue) for nearly all of Michigan indicate that we are between adult flights. Most overwintered adults are dead, and summer adults can be expected to start flying and laying eggs at approximately 1450 to 1500 GDD50. Some areas in Southern Michigan may reach these GDD totals in a week or so. Once the summer adults begin to lay eggs, sweet corn at tassel and beyond, and peppers and snap beans in fruit are at risk for corn borer contamination.

So far this season, corn earworm moths have been caught in pheromone traps only in extreme southern Michigan (Monroe County). Corn earworm moths do not overwinter in Michigan, rather they migrate in each year from the south. Their arrival and abundance is, therefore, unpredictable. Corn earworms lay eggs on corn silk. Upon hatching, larvae migrate inside the ear and feed on kernels. Insecticides to control corn earworm must thoroughly cover the silk, since once inside the ear, the earworm is protected. Since larvae do not feed before entering the ear, Bt insecticides are not effective against corn earworm.

**Aster leafhoppers and the risk of aster yellows**

*Beth Bishop*  
*Entomology*

During the past several weeks, aster leafhoppers have been collected from celery and carrot fields throughout Michigan. These leafhoppers were brought back to the Vegetable Entomology lab at MSU and were tested by Dr. Liyang Zhou to determine the estimate of the proportions that were carrying aster yellows (infectivity rate).

<b>Location</b>	<b>Date collected</b>	<b>Estimated proportion infected</b>
MSU Muck Soils Research Farm, Clinton Co, MI	July 14, 2003	2.0%
Freemont, MI (carrots)	July 14, 2003	2.0%

Hudsonville, Wayland, Decateur, MI (celery)	July 8 and 9, 2003	3.5%
Hart, MI (carrots)	July 4, 2003	6.6%

The proportion of aster leafhoppers carrying aster yellows influences the risk of the disease, and thus, the treatment threshold. Treatment thresholds (number per 100 sweeps) for various crops at different infectivity rates are shown in the accompanying table. The infectivity rates obtained through testing are **estimates**, and not exact, but they provide general guidelines for making treatment decisions. Remember, it takes several weeks for aster yellows symptoms to develop once the plant is infected, so no treatment is necessary within 10 days of harvest for lettuce, two weeks of harvest for celery, and a month of harvest for carrots.

Crop		Infectivity rate		
		2%	3.5%	6.6%
Carrots	Resistant	50	29	15
	Intermediate	37	21	11
	Susceptible	25	14	8
Celery		17	10	5
Lettuce		12	7	4

## Carrot disease update

*Mary Hausbeck*  
*Plant Pathology*

Several diseases have increased in severity during the past week. In particular, the warm, wet weather has prompted a significant increase in foliar diseases in some carrot fields. Growers are advised to scout fields for *Alternaria* leaf spot and *Cercospora* leaf spot. I=m especially concerned about fields where *Cercospora* was detected in early July. It is important to remember that *Cercospora* is able to infect the young foliage, and therefore can potentially cause more damage than *Alternaria* blight. *Alternaria* blight infects the older foliage and often is a problem later in the growing season

Bravo has been a staple for the carrot industry and is highly effective against the foliar blights. Quadris and Cabrio are fungicides relatively new to carrot growers, and they are also effective against *Alternaria* and *Cercospora*. It is important that neither Quadris nor Cabrio be used exclusively, but be used in rotation with another fungicide such as Bravo.

## Downy mildew detected on onions

*Mary Hausbeck*  
*Plant Pathology*

Environmental conditions are favorable for downy mildew, and it has been found in the state. Epidemics of downy mildew can be explosive. The first signs include velvet-like growth on the leaves that appears purplish in the morning. Diseased leaves turn pale green, then yellow and eventually collapse and die. The main sources of spores are volunteer onion plants, onion cull piles, onion seed crops and onions in home gardens.

Foliar fungicides suppress downy mildew when timed appropriately. Recommended fungicides include

Ridomil Gold MZ or Ridomil Gold/Bravo with an application interval of 14 days. Do not apply Ridomil Gold/Bravo to Sweet Spanish onions if they have or will receive additional Bravo applications. See the label for plantback restrictions and other important information. While protectant fungicides such as Dithane, Manzate, Manex, Penncozeb and Bravo have activity against downy mildew, they are helpful only when applied before infection and must be reapplied every seven days.

Environmental conditions continue to be favorable for development of purple blotch. Botrytis leaf blight development is also expected under present weather conditions.

### Downy mildew results from a recent field trial

Treatment and rate per acre, applied at 1-week intervals (7 applications)	Foliar disease (%) <sup>1</sup>				Onion bulb yield per 25 ft of row					
	Purple blotch <sup>2</sup> 8/20	Downy mildew			(lb)	(%)				
		8/4	8/20 <sup>3</sup>			<2"	2-3"	>3"		
Untreated	8.8 <sup>4</sup>	6.8	56.3	de	28.9	10.4	84.5	abcde	5.1	c
Manex 4FL 3.2 pt	1.8	1.8	12.5	a	32.2	3.6	83.1	cde	13.4	a
Kocide 4.5LF FL 1.3 pt	8.0	4.3	50.0	cde	25.6	8.7	88.8	ab	2.5	c
ManKocide 61.1DF 3 lb	8.5	7.3	57.5	de	24.1	11.0	86.0	abcd	3.0	c
Bravo Weather Stik 6SC 1.5 pt + Rovral 50WDG 1 lb	5.5	6.8	48.8	cde	26.4	8.1	87.8	abcd	4.1	c
Bravo Weather Stik 6SC 1.5 pt alternate Ridomil Gold Bravo 76.5WP 2 lb	4.8	2.5	46.3	cde	28.5	5.3	88.6	abc	6.1	bc
Quadris 2.08SC 0.8 pt	4.5	5.8	38.8	cd	27.8	8.1	84.4	abcde	7.5	abc

<sup>1</sup> Based on visual estimation of percentage of foliage diseased.

<sup>2</sup> Most leaf tissue destroyed by downy mildew.

<sup>3</sup> All treatments were dead after Aug 20.

<sup>4</sup> Column means with a letter in common or with no letters are not significantly different (Student-Newman-Keuls;  $P=0.05$ ).

### Lessons learned with *Phytophthora* fruit rot

Mary Hausbeck

Plant Pathology

*Phytophthora capsici* is causing serious fruit rot problems in many Michigan fields this season. Several field studies were conducted and are detailed below. To summarize, fungicides can be helpful if they are applied early and frequently with excellent coverage of the fruit.

In 2001, a study was conducted at a cooperators farm on a sandy loam soil with a history of *P. capsici*. Plots were 2,640 ft. long with 9 rows per plot, 30 inches between rows and 3 inches between plants. Additional fungicide treatments were applied with a conventional boom sprayer, an air-assisted sprayer, or according to standard grower practices. The conventional sprayer had 8003 nozzles spaced 20 inches apart, operated at 50 psi and delivered 20 gal/A. The air-assisted sprayer had four Proptec nozzles spaced 64 in. apart, and delivered 10 gal/A. Sprays were applied on August 8, 13 and 15. Two large samples of fruit were taken on August 17 from each treatment strip and stored four days in bins at ambient conditions. After four days of storage, 200 fruit per bin were evaluated for *P. capsici* infection on August 21. All of

the treatments were better in protecting the fruit than the grower standard. The grower relied on Ridomil Gold/Bravo, which was not very effective in this field because resistance to this product had developed.

**Table 1. Evaluation of fungicides and sprayers to manage *P. capsici* blight on pickles (2001)**

Spray regime, treatment and rate/A	Numbers of fruit		% infected <i>Phytophthora</i>
	<i>Phytophthora</i> infected	Healthy	
<b>Air-assisted sprayer</b>			
Acrobat 50WP 6.4 oz + Kocide 2000 54WG 1.5 lb	4.5	184.0	2.2
Acrobat 50WP 6.4 oz + Kocide 2000 54WG 1.5 lb + Ridomil Gold Bravo 76.5WP 2.0 lb	3.5	191.5	1.8
<b>Conventional boom sprayer</b>			
Acrobat 50WP 6.4 oz + Kocide 2000 54WG 1.5 lb	15.0	173.0	7.5
Acrobat 50WP 6.4 oz + Kocide 2000 54WG 1.5 lb + Ridomil Gold Bravo 76.5WP 2.0 lb	19.0	173.0	9.5
<b>Grower standard</b>	59.5	133.0	29.8

In 2002, several studies were conducted at a cooperators farm on a sandy loam soil with a history of *P. capsici*. In the first trial, plots were 900 ft. long with 9 rows per plot, 30 inches between rows and 3 inches between plants. Fungicide treatments were applied with a conventional boom sprayer or an air assisted sprayer. The conventional sprayer had 8003 nozzles spaced 20 inches apart, operated at 60 psi and delivered 30 gal/A. The air-assisted sprayer had four Proptec nozzles spaced 60 in. apart and delivered 10 gal/A. Sprays were applied on August 20, 26 and 29. These application dates corresponded to fruit sizes of 1, 3 and 5 inches. Three large samples of fruit were taken on August 31 from each treatment strip and stored four days in bins at ambient conditions. During harvest, the number of infected fruit that came across the transfer belt of the harvester were recorded for a pass of 3 rows by 900 ft (6,750 ft<sup>2</sup>). After four days of storage, 200 fruit per bin were evaluated for *P. capsici* infection on September 3. The results of this trial clearly indicate the need for good fruit coverage when applying fungicide to control fruit rot. While the fungicides helped to limit disease compared to the untreated, the least amount of disease was observed when an air-assisted sprayer was used. This is probably due to the ability of the air-assisted sprayer to more effectively force the fungicide through the plant canopy to cover the fruit.

**Table 2. Evaluation of fungicides and sprayers to manage *P. capsici* blight on pickles (2002)**

Trial 1 Spray regime, treatment and rate/A	Numbers of fruit				% infected <i>Phytophthora</i>	
	<i>Phytophthora</i> infected at harvest*		<i>Phytophthora</i> infected after storage			
<b>Air assisted sprayer</b>						
Acrobat 50WP 6.4 oz + Kocide 2000 54WG 1.5 lb	16.3	a**	11.7	a	5.9	a
<b>Conventional boom sprayer</b>						
Acrobat 50WP 6.4 oz + Kocide 2000 54WG 1.5 lb	89.3	b	55.0	bc	27.5	bc
Gavel 80WG 2.0 lb + Kocide 2000 54WG 1.5 lb	70.0	ab	54.7	bc	27.4	bc
<b>Untreated</b>	178.0	c	74.7	c	37.4	c

\* Number of infected fruit that came across the harvest belt over a 3 row x 800 ft plot.

\*\* Column means with a letter in common are not significantly different (Student-Newman-Keuls;  $P=0.05$ ).

In a second trial, plots were 2,640 ft. long with 9 rows per plot, 30 inches between rows and 3 inch between plants. Each spray treatment was replicated three times in a randomized block design. Fungicide treatments were applied with a conventional boom sprayer equipped with Tee Jet 8002 XR nozzles spaced 20 inches apart, operating at 66 psi and delivering 20 gal/A. Sprays were applied on July 18, 22 and 24. These application dates corresponded to fruit sizes of 1, 3 and 5 inch. Three large samples of fruit were taken on July 30 from each treatment strip and stored four days in bins at ambient conditions. After four days of storage, 200 fruit per bin were evaluated for *P. capsici* infection on August 3. Overall, disease in this trial was severe because the weather was very favorable for *P. capsici*. Both Gavel and Acrobat were effective in reducing disease compared to the untreated. Kocide 2000 (copper hydroxide) was mixed with each of these fungicides because previous studies suggest that adding copper may improve disease control.

**Table 3. Evaluation of Acrobat and Gavel to manage *P. capsici* blight on pickles (2002)**

Trial 2 Spray regime, treatment and rate/A	Numbers of fruit				% infected <i>Phytophthora</i>	
	<i>Phytophthora</i> infected		Healthy*			
Acrobat 50WP 6.4 oz + Kocide 2000 54WG 1.5 lb	19.3	a**	141.3	a	9.7	a
Gavel 80WG 2.0 lb + Kocide 2000 54WG 1.5 lb	21.3	a	152.7	a	10.7	a
Grower standard	65.0	b	113.0	b	32.5	b

\* Number of fruit without *Phytophthora* or *Pythium* infection.

\*\* Column means with a letter in common are not significantly different (Student-Newman-Keuls;  $P=0.05$ ).

In a third trial, plots were 900 ft. long with 9 rows per plot, 30 inches between rows and 3 inches between plants. Each spray treatment was replicated three times in a randomized block design. Fungicide treatments were applied with a conventional boom sprayer equipped with Tee Jet 8003 XR nozzles spaced 20 in. apart, operating at 60 psi and delivering 30 gal/A. Sprays were applied on August 11, 15 and 20. These application dates corresponded to fruit sizes of 1, 3 and 5 inch. Three large samples of fruit were taken on August 22 from each treatment strip and stored four days in bins at ambient conditions. After four days of storage, 200 fruit per bin were evaluated for *P. capsici* infection on August 26. Disease in this trial was somewhat less severe, and the fungicides were able to limit *P. capsici* fruit rot fairly effectively.

**Table 4. Evaluation of Acrobat and Gavel to manage *P. capsici* blight on pickles (2002)**

Trial 3 Spray regime, treatment and rate/A	Numbers of fruit		% infected <i>Phytophthora</i>
	<i>Phytophthora</i> infected	Healthy*	
Acrobat 50WP 6.4 oz + Kocide 2000 54WG 1.5 lb	11.0**	168.3	5.5
Gavel 80WG 2.0 lb + Kocide 2000 54WG 1.5 lb	1.7	193.0	0.8
Untreated	39.0	150.3	19.5

\* Number of fruit without *Phytophthora* or *Pythium* infection.

\*\* There were no significant differences among treatments (Student-Newman-Keuls;  $P=0.05$ ).

For additional information on *Phytophthora*, please refer to previous *Vegetable CAT Alert* issues

## Regional reports

### 1 - SW Michigan Research and Extension Center

Ron Goldy

#### Weather

The area received 1 to 2 or more inches of rain over the past week. Much of the rain came early Monday morning (July 21) as thundershowers. Standing water is still present in many fields. Temperatures were generally near normal or slightly below normal. Highs ranged from 77 to 85 and lows from 53 to 60.

#### Commodity reports

**Cucumber** harvest continues. Some early, tunneled fields are finished and have been removed and some replanted. Some *Phytophthora* has been found on cucumber fruit.

**Summer squash/zucchini** harvest continues. Early, tunneled fields are also being removed. Virus symptoms are evident in some fields. Squash bug eggs, nymphs and adults can be found. No evidence of squash vine borers at this time. *Phytophthora* symptoms can be seen in some fields.

**Cantaloupe** grown under tunnels is being harvested. Cantaloupe and **watermelon** from non-tunneled fields have six-inch fruit.

Tunneled grape **tomatoes** are changing color and harvest should begin soon. Color change can also be seen in tunneled fresh market tomatoes. Early, non-tunneled tomato plants have 3-inch diameter fruit. Pruning and tying continues, but is mostly done. Bacterial diseases are beginning to show up, encouraged by recent rains.

**Peppers** have 4-inch long fruit. Most fields are staked and tied.

**Snap bean** harvest continues. Leafhopper damage is evident in some fields.

Early planted **sweet corn** is being harvested. European corn borer activity is still low with none being caught in traps this week. Only an occasional Stewart's wilt or smut-affected plant can be seen.

### 2 – Grand Rapids Area

Amy Irish-Brown

#### Weather

Temperatures have been normal to below normal – nights have been cool. We did receive some rain throughout the area Monday and Tuesday (July 21-22) with some areas reporting over an inch of rainfall.

#### Commodity reports

**Summer squash**, slicing **cucumbers**, **broccoli**, **radishes** and **lettuces**, and early red **potatoes** are being harvested. Some very early **cabbage** can be found in roadside markets – head size is small.

Growth of **cucurbit** plants has been greatly enhanced by the warmer weather we've had for the last three weeks –most melons have golf ball-sized fruits or larger and the rows are filled in nicely.

**Tomato** plants have fruits about 2 inches in diameter. Most tomato plants have three to four ties on them.

**Peppers** are in boom with some very small fruits starting to show.

**Sweet corn** is starting to tassel with some early plantings expecting harvest in the next ten days or so.

### 3 – Oceana County

*Norm Myers*

#### Weather

Rains from half to four inches fell on Sunday and Monday (July 20-21) mornings. In the northeast corner of the County rains totaled four inches and were accompanied by a little hail and some serious erosion. Cool temperatures are holding back some crops.

#### Commodity reports

New fern generally looks good in **asparagus**. The Tom-Cast Disease Severity Value accumulation has been slowed by some cool nights. On the other hand, protective fungicides may have been washed away in some fields by the recent heavy rain. Scouts report some rust and a little asparagus beetle activity.

In **carrots**, scouts in our area have reported light cercospora. Aster leafhopper numbers are reported to be in the medium to high range.

In **sweet corn**, early crops for roadside markets are just coming in to tassel. My European corn borer catch was way down this week, so I assume we are between generations on that pest.

Harvest of processing **zucchini** was scheduled to begin yesterday. Growers are concerned about standing water in the fields causing a big outbreak of Phytophthora.

### 7 – Southeast

*Hannah Stevens*

#### Weather

Dry conditions have been alleviated with several rainfalls over the past two weeks. The amounts have varied and some fields remain in need of more moisture where as isolated areas experienced brief but heavy rain of 2 inches with accompanying high winds and hail, particularly Monday evening of this week (July 21). Temperatures have been cool with high's in the 80's.

#### Commodity reports

**Sweet corn** harvest will be starting in about ten days, behind average due to cool spring temperatures.

Cover spray intervals for European corn borer control are being lengthened at some locations due to the scarcity of adult moths. There have been very few caught in traps in this area for the past two weeks.

Current degree days predict the insect to be at low levels for ten days to two weeks.

**Yellow summer squash** and **zucchini** harvest for the wholesale market is well underway and the crops look excellent. High numbers of Colorado potato beetle larvae, now beginning to pupate, needed control last week. Despite the heat at the end of June there was a good crop of summer cauliflower from the area.

**Snap bean** harvest is underway. Leafhoppers, aphids and mites have needed control this season.

**Melons** are beginning to net and the locations I have seen have a bumper crop.

In the Imlay City area harvest continues on **lettuce**, the **onion** crop is bulbing and **carrot** root development is excellent.

## Weather news

[Jeff Andresen](#)

*Agricultural Meteorology  
Geography*

A large upper air trough more typical of October than July was centered over the Great Lakes region Wednesday morning (July 23). This trough will slowly move eastward during the next 48 hours, only to be replaced by another (weaker) troughing feature by the middle of next week.

In the short term, look for scattered showers and a few thunderstorms Wednesday afternoon, quickly dissipating by the end of the evening. Thursday and Friday are expected to be mostly dry, with a slow warming trend. The next chance for significant precipitation will be overnight Friday/Saturday or on Saturday, as a cool front moves from northwest to southeast across the state. Given ample moisture ahead of the front and relatively slow movement, some heavy rainfall totals are possible. Drier conditions are expected Sunday continuing into early next week. Temperatures will slowly warm from highs in the 70's on Wednesday to the low or mid 80's by Friday. Similarly, lows will warm from the 50's Thursday morning to the 60's by Saturday. Overall, temperatures and daily growing degree day totals will continue to remain at below normal levels for much of the upcoming week.

In the medium-range time frame, the NOAA **6-10 day outlook** for July 28 through August 1 calls for the return of upper air troughing across eastern North America, with both temperatures and precipitation in Michigan forecast to remain at near or below normal formation levels.

For the **8-14 day time frame** (covering July 30 through August 5), the outlook suggests a moderation of the upper air feature, with near normal temperatures and precipitation expected.