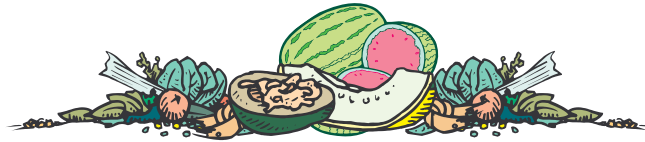


VEGETABLE CROPS HOTLINE

A newsletter for commercial vegetable growers prepared by the
Purdue University Cooperative Extension Service

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DOWNY MILDEW AND GUMMY STEM BLIGHT ON VINE CROPS - (Dan Egel) - *The following article was written as a Vegetable Crops Hotline - BULLETIN, July 30, 2004.*

Gummy stem blight of watermelon is severe enough that I recommend that growers with valuable fields of muskmelon and watermelons apply fungicides on a 7-day schedule. In addition, I have observed downy mildew of pumpkin near Vincennes. Muskmelons and watermelons should also be protected against this disease. Protectant fungicides that are effective against gummy stem blight are also effective against downy mildew. Some of the strobilurin fungicides (e.g., Amistar, Cabrio, Pristine, Quadris) may provide additional protection against downy mildew while still protecting against gummy stem blight.

Downy mildew is primarily a leaf disease. Often, the first symptoms one observes are yellow, angular or square looking spots on leaves (Figure 1). The



Figure 1. Upper surface of pumpkin leaf with downy mildew. (Photo by Dan Egel)

underside of the leaves may be covered with a black fuzzy looking growth - this is the fungus that causes the disease (Figure 2). Leaves may eventually, turn brown and crinkle. The leaves may turn upwards as they dry. Severe outbreaks may result in the rapid death of vines.



Figure 2. Downy mildew on underside of pumpkin leaf. (Photo by Dan Egel)

Growers should make a special effort to manage those fields severely affected with gummy stem blight. Soon after it is determined that no more fruit will be picked from the field, the crop should be tilled. Rotate to a crop other than watermelon, muskmelon or pumpkin as long as possible. Downy mildew does not over winter in Indiana, so crop rotation is not a factor with that disease. Hopefully, the weather next year will be better for us than in 2004.



BACTERIAL SPOT OF PUMPKINS - (Dan Egel) - Recently, I received leaves of pumpkin plants with the disease bacterial spot. Symptoms on leaves are not obvious. The spots are small (1/8-1/16 inch across), angular, necrotic lesions that coalesce to form larger, irregularly shaped necrotic areas that can be mistaken for a non-infectious disorder (Figure 1). Lesions may have a white to light brown coloring. Although these leaf lesions are unimportant, fruit lesions may appear which are unsightly. Fruit lesions start as small (1/16-1/4 inch across), round, tan scabs that occur in clusters, often on the "face" of the jack-o-lantern (Figure 2). The scab-like lesions begin as tiny water-soaked spots on developing fruit. As fruit mature, the spots enlarge and give rise to tan, raised "blisters".



Figure 1. Bacterial spot on pumpkin leaf. (Photo by Dan Egel)



Figure 2. Lesions on pumpkin fruit caused by bacterial spot. (Photo by Dan Egel)

Details regarding the bacterial spot disease cycle are still uncertain. The bacteria that cause the disease may be carried in infested seed. The bacteria may also survive locally on infested residue of diseased crops for a year or two.

Like most bacterial diseases, the disease probably spreads by splash dispersal during rain or irrigation events. Long distance spread (one mile or more) is unlikely.

Fruit infection probably occurs during early fruit development. Symptoms develop on infected fruit in 7 to 14 days.

No host resistance has been identified. Therefore, growers must rely on a combination of cultural and chemical methods to reduce the disease threat. Since it is possible that the bacteria can be carried in seed, growers are advised not to save their own seed. Affected fields should be planted to crops other than cucurbits for at least 2 years. If fields are transplanted, then transplant production facilities and transplant materials should be sanitized with commercial disinfectants.

Early season copper applications may also be used to reduce the amount of infection. Three sprays applied at 10 to 14 day intervals beginning when the fruit are about 4 inches in diameter may provide some degree of black rot control as well as protect vulnerable fruit from the bacterial spot pathogen.



BACTERIAL FRUIT BLOTCH - (Dan Egel) - This disease has been reported in southwestern Indiana. The primary symptom is a dark green irregular blotch that occurs on the top of the watermelon fruit (Figure 1). Older lesions



Figure 1. Bacterial fruit blotch on watermelon fruit. (Photo by Chris Gunter)

will have a necrotic area in the center of the lesion. Watermelons are the only host with economically important damage. Sometimes the rind will crack and white ooze will come out of the fruit (Figure 2).



Figure 2. White ooze caused by bacterial fruit blotch. (Photo by Chris Gunter)

Although bacterial fruit blotch will seldom invade the fruit farther than the rind, the fruit may start to rot from other organisms. The leaves have necrotic lesions, however the lesions are easy to miss. Damage results in rotted or defaced fruit.

The bacterium that causes bacterial fruit blotch may be seed borne. The causal bacterium may survive short periods in the greenhouse.

Bacterial fruit blotch will spread rapidly in warm moist conditions. Rains will quickly spread this disease.

All watermelon varieties are susceptible to fruit blotch. However, dark skinned varieties appear to be tolerant.

Growers, who discover they have bacterial fruit blotch, may want to apply a copper product to protect the healthy fruit. Fruit become infected when they are about two weeks old after pollination. Thus, if there is a significant amount of young fruit in a field, it may be worth applying copper. Although fruit blotch has not been known to over-winter in Indiana it is always a good idea to practice fall tillage and rotate from cucurbit production for 2 to 3 years.



TOMATO INJURY BY HORNWORMS AND STINK BUGS -

(Frankie Lam) - Hornworms and stink bugs are prominent insect pests on tomatoes in Indiana. The tobacco and tomato hornworms both attack tomato, tobacco, eggplant, pepper, potato, and related weeds. Whereas the green and brown stink bugs are general feeders and attack, alfalfa, soybean, corn, vegetable crops, cotton, and sometimes peaches and citrus.

Hornworms: Relatively low numbers of hornworms have been found on tomatoes in southern Indiana this year. Most of the fields that I have sampled have less than 0.1 caterpillars per plant. The economic threshold for hornworms is 0.5 larva per plant. Hornworms are one of the most destructive insect pests of tobacco and tomato plants. The caterpillars consume large amounts of foliage (Figure 1) and occasionally feed on tomato



Figure 1. A tobacco hornworm feeding on tomato. (Photo by Frankie Lam)

fruit (Figure 2). During mid-season and in home gardens, the best management tactic for hornworms is by handpicking. To avoid hornworm damage, you need to examine your tomatoes for the presence of hornworms, feeding damage, or worm frass. During a warm day the caterpillars usually hide under the leaves in the lower portion of the tomato plant or in the plant debris. However, their frass or poop can be seen easily on leaves or fruits. The best time to sample the caterpillars is in the morning or in the evening when temperature is cool. Ambush, Asana, Avaunt, Baythroid, Danitol, Entrust, Fury, Intrepid, Lannate, Pounce, Sevin, SpinTor, Warrior, and some *Bacillus thuringiensis* insecticides (Agree, Biobit, Dipel, Javelin, and XenTari) are labeled for the control of hornworms.



Figure 2. Tomato injury by hornworms. (Photo by Frankie Lam)

Stink Bugs: The green and brown stink bugs are widely distributed in North and Central America. These insects have stink glands and give out a stinky smell when disturbed. The stink bugs are very active and no sampling method and economic threshold for these pests have been developed on tomatoes. The nymphs (Figures 3 and 4) and adults (Figures 5 and 6, see page 4) of stink bugs have piercing and sucking



Figure 3. Adult green stink bug. (Photo by Frankie Lam)

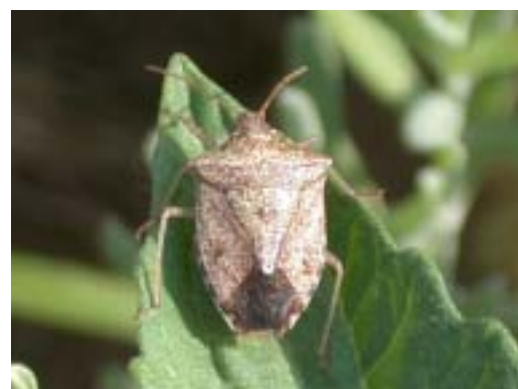


Figure 4. Adult brown stink bug. (Photo by Frankie Lam)

mouthparts and are primarily sapsuckers from leaves, buds, and fruits. The insects feed on the tomato fruit and cause a yellow "cloudy spot" appearance (Figure 7, see page 4). Baythroid, Capture, Danitol, Endosulfan, Fury, Thiodan, and Mustang Max are recommended for the control of stink bugs. Follow label directions carefully before using any pesticides.



Figure 5. Green stink bug nymph. (Photo by Frankie Lam)



Figure 6. Brown stink bug nymph. (Photo by Frankie Lam)



Figure 7. Yellow "cloudy spot" injury of tomato by stink bugs. (Photo by Frankie Lam)



USDA CENSUS OF AGRICULTURE PROVIDES INFORMATION ABOUT INDIANA VEGETABLE AND PUMPKIN TRENDS - (Liz Maynard) -

The 2002 Census of Agriculture from the USDA National Ag Statistics Service was published this year. The information reported therein will be used by state and federal policy makers, researchers, Extension personnel, farmers, and others to help guide future plans. What picture does the Census paint for Indiana vegetable production? This article provides an overview of farm numbers and acreage for all vegetables, and then takes a closer look at what the picture is for one particular crop: pumpkins.

Since 1987, vegetable acreage in Indiana has increased 14% to 37,682 acres, while the number of vegetable farms has decreased by 5%, to 1,139 (Table 1). Snap beans and pumpkins showed the largest increases in acreage over the period. There has been a steady decline in the number of farms with 15 to 49 acres and an increase in farms with more than 500 acres. Farms with fewer than 15 acres have increased in number by 6%, but the trend has been uneven. Nationally, vegetable acreage has increased by 5% and the number of vegetable farms has decreased by 10%. In 2002, Indiana vegetable farms represented about 1% of the total U.S. harvested vegetable acreage and about 2% of the total number of vegetable farms in the U.S.

Pumpkin acreage in Indiana has doubled since 1987 (Table 2), and the number of farms growing pumpkins has also about doubled, from 240 in 1987 to 495 in 2002.

The trend across the U.S. has been similar, with acreage more than doubling since 1987, for a total of 97,408 acres harvested for fresh market and processing in 2002.

Total pumpkin acreage includes both processing and fresh market pumpkins. Processing pumpkins accounted for 15% of the total U.S. pumpkin acreage in 2002. Indiana does not produce pumpkins for processing. If only pumpkins for the fresh market are considered, Indiana ranked 6th in acreage in 2002, in between Ohio and Illinois, accounting for about 5% of the total U.S. acreage (Table 3). The state with the highest acreage was Pennsylvania.

These statistics suggest that vegetable farms in Indiana are following the overall trend seen for farms in the U.S.; reduced numbers of mid-sized farms, and more large and small farms. The fact that acreage has increased suggests that there have been opportunities for growth in vegetable production.

The numbers also show that pumpkins represent a significant part of the Indiana vegetable industry, accounting for over 10% of the acreage, and that Indiana plays an important role in supplying the nation's pumpkins, with 5% of the total acreage. It is also clear that Indiana is right in the middle of a major pumpkin producing region, with 3 of the 4 bordering states also in the top 10 for acreage. From a production standpoint, the increased acreage and concentration of production can lead to increased problems with insect pests and diseases.

Table 1. Number of farms harvesting vegetables for sale (not including potatoes), and acreage of vegetables harvested for sale in Indiana, 2002, 1997, 1992, and 1987

	2002 No.	Acres	1997 No.	Acres	1992 No.	Acres	1987 No.	Acres
United States	54,391	3,433,269	60,631	3,669,951	61,969	3,533,114	60,189	3,264,343
Indiana: All Vegetable Farms	1,139	37,682	1,379	34,443	1,302	33,860	1,203	32,934
Less than 1 acre	134	61	210	(no data)	175	74	127	50
1 to 14 acres	695	3,057	791	3,639	756	3,370	658	3,272
15 to 49 acres	144	3,834	195	5,336	199	5,507	239	6,792
50 to 499 acres	157	23,886	177	21,524	169	22,918	177	20,280
More than 500 acres	9	9,864	6	3,800 (est.)	3	1991 (est.)	2	2,000 (est.)

Source: USDA, NASS, 2002 Census of Agriculture - State Data - United States Table 28 and Indiana Table 35 <www.nass.usda.gov/census/>; and 1997 Census of Agriculture - State Data - United States Table 29 and Indiana Table 42 <www.nass.usda.gov/census/census92/volume1/vol1pubs.htm>. Accessed 4 August 2004

Table 2. Acreage of pumpkins harvested for sale in Indiana and the U.S., 2002, 1997, 1992, and 1987.

	acres			
	2002	1997	1992	1987
United States	97,408	79,707	63,260	40,652
Indiana	4,242	2,929	2,197	2,116

Source: USDA, NASS, 2002 and 1997 Censuses of Agriculture State Data - Table 29.
www.nass.usda.gov/census/census02/volume1/us/index2.htm and
www.nass.usda.gov/census/census92/volume1/us-51/toc292.htm.
 Accessed 4 August 2004.

Table 3. Top ten fresh market pumpkin producing states in 2002.

Rank	State	Acreage Harvested	Percent of total US acreage (non-processing)
1	PA	7,376	9
2*	MI*	7,000*	8*
3	NY	6,699	8
4	CA	6,376	8
5	OH	5,497	7
6	IN	4,237	5
7	IL	4,115	5
8	WI	4,023	5
9	TN	3,742	4
10	NJ	3,094	4

*Estimated: total fresh and processing pumpkin acreage in MI is 7,414; 91 farms grow pumpkins for processing, but acreage of processing pumpkins was not reported.

Source: USDA, NASS, 2002 Census of Agriculture - State Data - Table 29.
www.nass.usda.gov/census/census02/volume1/us/index2.htm.
 Accessed 4 August 2004.



UPCOMING EVENTS - Mark your Calendar for the Following Events

September 14, 2004 - Pumpkin Variety Plot Tours in NE Indiana. Two locations, visit one in the afternoon and one in the evening. Watch for details in upcoming newsletters.

September 16 2004 - Commercial Fruit and Vegetable Plot Tour, Throckmorton Purdue Ag Center. See over twenty jack-o-lantern pumpkin varieties and talk with Purdue Vegetable Specialists about pumpkin production. See over 50 grape varieties, training system research, and herbicide injury symptoms. Come and see twenty new apple varieties and how they perform under Indiana conditions. Also see dwarf apple tree pruning and training.

Come out and see the latest varieties, find out what's hot and what's not and talk with Purdue specialists at these upcoming meetings.

SWEET CORN, TOMATO AND PEPPER VARIETIES TRIALS IN NORTHERN INDIANA - (*Liz Maynard*) - Harvest has begun in sweet corn variety trials at the Pinney-Purdue Ag Center in Wanatah and harvest will start in the next few weeks for fresh market tomato, bell pepper, and jalapeno pepper trials. You are invited to visit the trials and observe the new varieties in the field. Please call (219) 508-1429 or (219) 785-5673 before you come to make sure that someone will be available to show you the trials. A list of varieties in the plots is available on the web at: www.faculty.pnc.edu/emaynard/nwch/.



DIRECT MARKETING TOURS TOUT VALUE-ADDED AGRICULTURE - (*Steve Leer*) - Two Ohio farm markets that combine agricultural produce and agritourism will be the focus of Ohio State University Extension Direct Marketing Twilight Tours in August.

The events, sponsored by Ohio State Extension's Direct Marketing Team, the Ohio Direct Agriculture Marketing Association and Farm Markets of Ohio, are designed to educate growers and any interested parties about value-added opportunities in agriculture. The tours are free.

The first tour takes place Aug. 11 at Maize Valley Farm Market in Hartville, Ohio. Maize Valley Farm Market produces fruits, vegetables, baked goods, meats, cheeses and other value-added items. The farm market also offers an array of "agritainment" activities, such as an 11-acre corn maze, Farm Fantasy day camps, a pumpkin cannon, a haunted maze and hot air balloon lift-offs.

The second tour will take place Aug. 17 at Barn-n-Bunk Farm Market in Trenton, Ohio. The family-owned business provides a variety of foods and crafts, including fresh produce, Amish baked goods, cheese and jellies. The business also houses an ice cream and candy shop and turn-of-the-century barns, and conducts school tours, motor-coach tours and seasonal festivals.

Both tours will run from 6-8 p.m. and include refreshments, host farm overviews, farm market displays, tours and presentations by marketing experts from across Ohio.

For more information on the tours, log onto <www.directmarketing.osu.edu>, or contact John Ellerman at (740) 289-2071 or by e-mail at

ellerman.5@osu.edu. For more information on the host farm markets or to get directions, contact them directly: Maize Valley Farm Market at (330) 877-8344, and Barn-n-Bunk Farm Market at (513) 988-9211.



Southwest Purdue Agricultural Center Field Day

August 10, 2004 – 2 to 4 PM

2 to 2:15 – Welcome and introduction of SWPAC staff

2:15 to 3:30 – Tour of field experiments including:

- ◆ Muskmelon and watermelon variety trials
 - ◆ Tomato nutrition
 - ◆ Disease, insect and weed IPM of pumpkins
 - ◆ Weather-based disease forecasting for muskmelons – MELCAST
 - ◆ Heat stress and sun injury control on watermelon
 - ◆ Development of stick trap sampling methods for muskmelons
 - ◆ Comparison of sampling time for cucumber beetles on muskmelon
- 3:30 to 4 – Questions and Answers

Address: 4369 N. Purdue Road, Vincennes, IN 47591; We are located North of Vincennes, just off Highway 41, on the west side of the highway.

If you have questions, please call the Southwest Purdue Agricultural Program office at (812) 886-0198.

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