

# VEGETABLE CROPS HOTLINE

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

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## IN THIS ISSUE

- DOWNY MILDEW
- CORN EARWORM/TOMATO FRUITWORM
- MITES
- PUMPKIN INSECTS
- TEMPERATURE AND CROP DEVELOPMENT
- ENHANCEMENTS TO WEB SOIL SURVEY HELP  
LANDOWNERS MAKE DECISIONS

**DOWNY MILDEW** - (*Dan Egel*) - (This article was published as a Hotline Bulletin on August 2.) Downy mildew has been observed on pumpkins in south central Indiana. The disease has the potential to affect all cucurbits including cucumber, cantaloupe squash, zucchini and watermelon. Growers in southern Indiana should consider treating for downy mildew as outlined below. Since downy mildew has been observed in southwestern Michigan on cucumber (*Vegetable Crops Hotline* Issue 572) growers in northern Indiana should also consider treating for this important disease of cucurbits.

The fungus that causes downy mildew of cucurbits does not overwinter in Indiana. Instead it must be blown into the state on winds or brought in on plant material such as transplants. Downy mildew is favored by cool temperatures (59° to 68° F) and as little as 6 hours of leaf wetness. An over night dew is plenty of moisture. The recent cool, foggy weather over much of Indiana has been perfect for downy mildew. The disease does not affect fruit directly, but it can quickly devastate cucurbit foliage, causing loss of yield and fruit quality.

The symptoms of downy mildew vary somewhat by cucurbit crop. In general, leaf lesions are a bright yellow initially. In time, the center of lesions may become necrotic (brown). Often the lesions are limited by veins and thus may appear angular. On watermelon, the lesions may appear more diffuse and less angular. The bottom side of all cucurbit lesions will appear 'fuzzy' due to the growth of the downy mildew fungus. However, the fungal growth may only be obvious under moist conditions such as when dew is present or after a rain. Downy mildew symptoms on pumpkin are shown here (see Figures 1 and 2).



Figure 1: Lesions of downy mildew of pumpkin are often bright yellow and angular. (*Photo by Dan Egel*)



Figure 2: The fungus that causes downy mildew of pumpkin causes a 'fuzzy' appearance on the underside of leaves under moist conditions. (*Photo by Dan Egel*)

The spores of the downy mildew fungus that appear on the bottom of leaves are readily spread by wind. Under some circumstances, the spores can be blown great distances. Should the spores land on a cucurbit leaf, the appropriate temperature and leaf wetness will allow disease to become established.

Cucurbit growers can follow the spread of downy mildew in the Eastern U.S. through the website [cdm.ipmpipe.org](http://cdm.ipmpipe.org). It is possible to set up an alert system via this website so that one can get emails should the

disease show up in your region. Articles on the presence of downy mildew will also be featured in the *Vegetable Crops Hotline* when appropriate. Finally, growers should scout their fields for symptoms of this disease. Plant samples suspected of having downy mildew may be submitted to the Plant Pest and Diagnostic Laboratory at Purdue University.

The decision regarding whether to apply a relatively expensive product for downy mildew may depend on the value of the crop and the time to harvest. Cucurbits within 2 weeks or so of harvest may not need special fungicides. Unfortunately, some watermelon growers have started harvest late this year and may need to take corrective action. Most pumpkin crops are just now starting to set fruit. In contrast, many cucumber and cantaloupe crops are close to harvest.

Although many products mentioned in the *Midwest Vegetable Production Guide for Commercial Growers 2013* (ID-56) are listed as having 'fair' efficacy for several diseases including downy mildew, the products that are listed as good are often labeled for downy mildew and possibly Phytophthora blight only. The products that are listed as 'good' in the ID-56 include:

- Several products with the active ingredient phosphorus acid include Agri-Phos®, Phostrol®, Pro-phyte®, Rampart®. These are often tank mixed with the other products listed below. Also listed as having fair activity against gummy stem blight.
- Curzate®-downy mildew only.
- Fontelis®-labeled for several diseases.
- Gavel®-has performed well in the past. Not labeled for pumpkins.
- Presidio®-one of our better products. Also listed for Phytophthora blight.
- Previcur Flex®-downy mildew only. This product has performed well in my trials in the past.
- Ranman®-also labeled for Phytophthora blight. Excellent product.
- Tanos®-listed for a few other diseases as well.
- Zampro®- a new product this year, has worked well in other parts of the U.S.

For homeowners, a product with the active ingredient chlorothalonil should help to slow the progress of the disease. Organic growers should apply a product with copper as an active ingredient after checking with your certifying agency.

All growers should remember that fungicides are applied to slow the progress of the disease. No product will cure the disease in the field.

Growers that have used the Purdue University MELCAST weather-based disease-forecasting program to schedule fungicide applications should instead apply fungicides on about a 7-day application schedule due to the presence of downy mildew.

More information about downy mildew on pumpkins can be found at: [www.extension.purdue.edu/ext-media/BP/BP-140-W.pdf](http://www.extension.purdue.edu/ext-media/BP/BP-140-W.pdf)

Please check the label before using any product.

Contact Dan Egel for questions or comments (812) 886-0198, [egel@purdue.edu](mailto:egel@purdue.edu).



#### CORN EARWORM/TOMATO FRUITWORM - (Rick Foster)

- Moth counts for corn earworms/tomato fruitworms remain very low throughout the state. When counts are this low and with field corn at silking or beyond, growers have the opportunity to save money and time by skipping insecticide sprays on their sweet corn and tomatoes. This situation is likely to change very soon. Growers should continue to monitor their pheromone traps or the website where we track our pheromone trap catches around the state [extension.entm.purdue.edu/cornearworm/index.php](http://extension.entm.purdue.edu/cornearworm/index.php). Typically, moth catches will go up dramatically sometime in the first 3 weeks of August. With the cooler than normal temperatures we have been having, I would not be surprised if the second generation did not arrive for another couple of weeks.

I have again received reports from growers that the pyrethroid insecticides have failed to provide adequate levels of control. Several years ago we documented the presence of moderate levels of resistance in earworms to the pyrethroids. Because many of our moths fly from the South, whether your population of earworms will be resistant will vary from year to year. Sometimes the pyrethroids might work fine, others they won't work at all. Because of the price differential between the pyrethroids and the replacement products (Coragen®, Radiant®, Belt®), growers may want to try the pyrethroids first and then switch to one of the more expensive products if necessary.

As always, if you have a control failure, you should rule out all the other possible reasons for lack of control before assuming resistance. Examples include: 1. Making sure you are applying the correct rate (high rate); 2. Making sure all your nozzles are working properly; 3. Using yellow water sensitive cards to insure that you are getting the insecticide where it needs to be; 4. Check the pH of your spray water to insure that it is neutral to slightly acidic.



**MITES** - (Rick Foster) - Even though the weather this summer, cool and wet, has not been what we would typically think of as mite weather, we have had a few reports of mite problems on various crops. High tunnel grown tomatoes are occasionally developing mite problems. Some growers are faced with the decision of whether to spray to control mites in a high tunnel that has nearly completed its production. In addition to the economics of the spray for that high tunnel, growers should consider whether there is a nearby tunnel or field that could be infested from the population in the tunnel. When spraying pests in high tunnels, be sure to consult the table on

page 40 in the *Midwest Vegetable Production Guide* (ID 56) to make sure you are using a product labeled for use in greenhouses or high tunnels.

Some growers have reported some mites on watermelons as well. Again, the weather has not been conducive to high mite populations but local problems can develop and growers should be scouting for mites. Look first on the older leaves along the center of the row. This is where populations will often develop first. Also, if your field is planted near a gravel road, look first for mites in the area where dust from the road lands on the plants. Mites prefer this type of habitat. See page 109 in the *Midwest Vegetable Production Guide* (ID 56) for a list of recommended products.



**PUMPKIN INSECTS** - (Rick Foster and Dan Egel) - Squash bugs are quite prevalent in some fields of pumpkins and squash. Both adult and juvenile squash bugs feed with their sucking mouthparts on stems, leaves, and fruit. The most important time to control them is when the plants are young or during flowering. If you find more than one egg mass per plant, you should use an insecticide to control squash bugs. The pyrethroid insecticides remain the products of choice for squash bugs. At the end of the season, destroy the vines with flail mowing or plowing to reduce overwintering habitat and decrease overwinter survival. Hopefully, you will have fewer problems next year.

In addition to the damage caused to the pumpkin plant, squash bugs have also been implicated in the spread of a disease known as cucurbit yellow vine. This disease, which is not common in Indiana, can affect most cucurbits. Affected plants may appear stunted and yellow. In later stages, the plant may wilt and decline. The vascular tissue just inside the outer skin of the lower stem should appear a honey brown. Affected plants are likely to be arranged in a random pattern in the field. If you believe you have yellow vine, contact Dan Egel or send a sample to the Plant Pest and Diagnostic clinic at Purdue University. The threshold for fields where yellow vine is a problem is to apply an insecticide if squash bugs are present in the field.

Sometimes during flowering we see large numbers of striped cucumber beetles and/or western corn rootworm adults feeding on the pollen in the flowers. Generally, this will not reduce yield, but if numbers are too high and beetles begin to feed on the flowers or cause considerable defoliation on the leaves, they should be controlled. Pyrethroids again will provide excellent control.

Aphids can be a problem on pumpkins by reducing plant growth or by honeydew dripping onto the fruit, but the biggest concern about aphids is that they can transmit viruses that are very detrimental to production. Because aphids transmit the pathogen that causes the virus disease very rapidly when they begin feeding, you

cannot kill an invading aphid fast enough to prevent transmission. However, I have seen cases where the use of an effective insecticide will reduce the secondary spread of the virus throughout the field. In other words, your insecticide may not kill the invading aphid before it infects the first plant it feeds on, but it might kill it before it moves to the second plant to feed. In addition, once the titer of virus has increased in that infected plant to the point that aphids can pick it up by feeding on the plant, having an insecticide present will kill the aphid before it carries that virus to another plant. So, you can't completely stop virus infection with insecticides, but I do think it is possible to reduce the overall amount of infection. Perhaps the best way to avoid virus problems is to plant sufficiently early so that fruit set occurs before aphids and the viruses they carry become a problem. In southern Indiana, the fruit of pumpkins planted in mid-June are not as likely to be affected by virus diseases as much as later planted pumpkins.

It's past the time to do anything about squash vine borer this year. If you had a problem, it would be a good idea to destroy the crop after harvest to reduce overwintering habitats, just like for squash bugs.



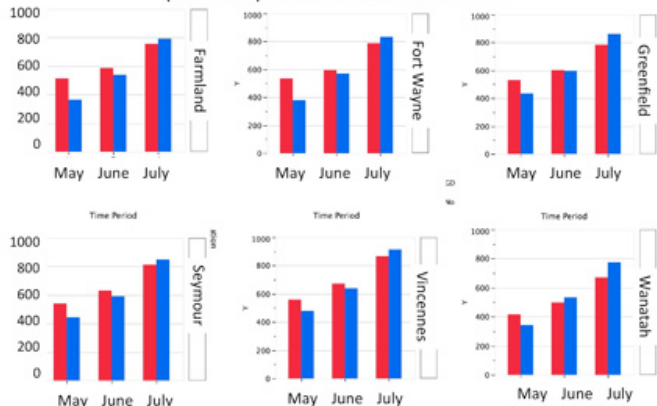
**TEMPERATURE AND CROP DEVELOPMENT** - (Liz Maynard) - July was cooler than normal around the state. Figure 3 shows the growing degree days (GDD, base 50°F) for approximately monthly periods around the state from May through July, compared to GDD for the 30-year normal. At all locations, May was warmer than normal, July was cooler, and June was a little warmer everywhere except NW Indiana (Wanatah). Not only have we accumulated fewer GDD in recent weeks, but also temperatures at some locations have dropped below 50°F on several nights.

Fewer growing degree days means slower crop development, generally speaking. Each new leaf will take a little longer to form and expand, and once fruit is set it will take longer to grow and mature.

In pumpkins and squash, we often see cool temperatures promoting development of female flowers. Sometimes in cool springs, female flowers will even open before any male flowers do. When cool temperatures come a little later in development, there may be more female flowers than usual along the branches. Figure 4 shows a vine of 'Big Max' giant pumpkin (*Cucurbita maxima*) with female flowers or buds at every third node. Note that the male flowers along this branch are still small buds and quite a bit behind the female flowers in development. If there aren't male flowers opening when the female flowers do, pollination could be a problem. If male flowers are present, the abundance of female flowers can mean more pumpkins (or squash) on each plant, and that typically means each pumpkin will be smaller than average. There may not be any really 'giant' pumpkins

from the plant in the figure. On a typical jack-o-lantern pumpkin, heavy fruit set usually means smaller size of pumpkins. For squash harvested at the immature stage, like zucchini or summer squash, and for smaller-fruited winter squash or pie pumpkins, the effect on fruit size would be small, if present at all.

Growing degree days (base 50F) in 2013 (red bars) and 30-year normals (blue bars) for six locations in Indiana.



Data from USDA NASS Crop and Weather Reports (Exact dates : Apr29-Jun2; Jun3-Jun30; Jul1-Aug4).

Figure 3: Growing degree days (base 50F) in 2013 (red bars) and 30-year normals (blue bars) for six locations in Indiana.



Figure 4: A vine of 'Big Max' giant pumpkin (*Cucurbita maxima*) with with female flowers or buds at every third node. (Photo by Liz Maynard)



## ENHANCEMENTS TO WEB SOIL SURVEY HELP LANDOWNERS MAKE DECISIONS - (Kris Vance) -

The latest version of the Web Soil Survey 3.0 (WSS), was recently launched by the USDA's Natural Resources Conservation Service (NRCS) and can be accessed at [websoilsurvey.nrcs.usda.gov](http://websoilsurvey.nrcs.usda.gov). The web-based application provides anyone with computer access a wealth of free soils information along with soil maps, properties and interpretations aimed at helping with land use decisions. Originally launched in August 2005, the web site continues to be improved and enhanced to meet the demands of its growing customer base of several million hits a year.

Notable changes to the Web Soil Survey include improved map appearance, increased Area of Interest acreage and upgraded options for changing map properties to include: soil boundary color; soil boundary thickness; soil label size and background image shading. To make things even better for the viewer, Web Soil Survey is now online 24 hours a day with no downtime.

"This is a valuable tool for everyone making decisions about projects on the land, including homeowners, developers and farmers. There have been many enhancements made in the latest version of the Web Soil Survey, and more enhancements are planned for future releases" says Gary Struben, Indiana NRCS State Soil Scientist.

Since its beginning the Web Soil Survey has attracted a wide array of online visitors from all over the world. During the first few months of its existence, the site averaged about 1,000 users per day, but now the site has seen that number increase dramatically to about 6,500 per day.

Soil surveys provide critical information in land use decisions, both on the farm and in the city. Whether a land developer is looking to build or purchase, or a farmer is considering alternative crops, soil survey data is a critical element in the decision making process that produces a successful outcome while protecting natural resources. Making soils information available on the web has been a major achievement for NRCS, who is committed to making the process better and easier for the customer.

NRCS is a science based USDA federal agency committed to the preservation of the nation's natural resources through the use of conservation. For more information about NRCS visit [www.in.nrcs.usda.gov](http://www.in.nrcs.usda.gov).

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