VEGETABLE CROPS HOTLINE

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

Issue: 647 July 19, 2018



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Not All the Watermelon and Cantaloupe Leaf Symptoms are caused by Pests

(Wenjing Guan, guan40@purdue.edu, (812) 886-0198) & (Dan Egel, egel@purdue.edu, (812) 886-0198)

Watermelon harvest is in full swing in southern Indiana. At this time, we frequently see many types of leaf symptoms. Some of them are caused by foliar diseases, such as anthracnose, Alternaria leaf blight and gummy stem blight. These diseases require special attention, normally in the form of fungicide sprays, to slow spread of the disease. However, the appearance of a moderate amount of foliar disease in mid-season doesn't necessarily need an immediate fungicide application. Other leaf symptoms may not be caused by diseases or insects. Here are some examples of leaf symptoms that are not associated with a pathogen.



Figure 1. The symptom was only on one pollinizer variety. This is likely a unique plants' response to environmental factors.



Figure 2. The symptom also was on one pollinizer variety.



Figure 3. The symptom appeared on one seeded watermelon variety in our variety trial. It is similar to initial symptoms caused by ozone toxicity. More information about air pollution on melons can be found in this article *Identifying Air Pollution Damage on Melons*.



Figure 4. The symptom occurred when soil pH \leq 5.5, which leads to manganese toxicity or magnesium deficiency. The symptom is more often observed on cantaloupes.

It is important to correctly identify the source of the symptom to prevent unnecessarily pesticide spray. In the article *When a yellow leaf is just a yellow leaf*, Dr. Dan Egel discussed general rules for determining if the symptom is a disease or not.

If you are not certain whether the symptom is associated with a disease or pest, send samples to Plant and Pest Diagnostic Laboratory for identification.

Bacterial Spot of Tomato

(Dan Egel, egel@purdue.edu, (812) 886-0198)

Bacterial spot of tomato has been observed across Indiana this summer. Leaf spots are usually 1/16 inch, and dark. Where lesions are numerous upon a leaf, the tissue may be chlorotic (yellow) (Figure 1 & 2). (In contrast, each lesion of bacterial speck is often accompanied by chlorosis whether lesions are numerous or not.) Lesions of bacterial spot on fruit are dark, raised and up to 1/3 inch in diameter (Figure 3). The disease prefers warm, wet weather. Overhead irrigation will also spread this disease. Although much of Indiana has been dry recently, rainy weather earlier in the year has increased the severity of bacterial spot.



Figure 1. Lesions of bacterial spot of tomato may result in shothole lesions such as shown here.



Figure 2. Bacterial spot can cause lesions of stems.



Figure 3. Lesions of bacterial spot of tomato often appear scabby.

Bacterial spot is much more common in field tomatoes than in greenhouse or high tunnel tomatoes. This is because bacterial spot requires leaf wetness for infection to take place and rain to spread the bacteria from leaf to leaf and from plant to plant. For the most part, tomato plants under cover lack sufficient leaf wetness to allow bacterial spot to become a problem.

You may have heard about bacterial spot of pepper and pumpkin. Bacterial spot of pepper is closely related and may be able to go to tomato. Bacterial spot of pumpkin is related but will not go to pepper or tomato.

Successful management of bacterial spot will take a combination of cultural and pesticide treatments. Since bacterial spot may be seed borne; the disease may have been brought in on your seed/transplants. However, the causal bacterium also survives on crop residue. Tomatoes should be rotated 2 to 3 years away from peppers or tomatoes. Treatment with copper hydroxide may reduce spread in the field. Some strains of the bacterial spot pathogen are resistant to copper products. In a recent Purdue University study in 2016 and 2017, 84% of bacterial spot strains collected were copper insensitive (resistant). To increase the amount of copper available on the leaf, copper products may be mixed with fungicides with the active ingredient mancozeb (e.g., Dithane[®], Manzate[®], Penncozeb[®]). Many copper products may be used in some organic schemes.

Streptomycin products are labeled for use on tomatoes only in the transplant greenhouse (e.g., Agri-mycin®, Harbour®). The survey mentioned above found that 58% of bacterial spot strains were insensitive to streptomycin. So, it makes sense to treat with a streptomycin in the transplant greenhouse before going to the field.

Products with the active ingredient hydrogen dioxide (e.g., Oxidate®) are also labeled for bacterial spot in the field and greenhouse. Hydrogen dioxide can kill bacteria on contact, however, it has very little to no residual. In general, I do not recommend the application of hydrogen dioxide products in the field for control of bacterial spot. The use of Oxidate® in the greenhouse makes more sense since the product can be easily applied multiple times. Do not substitute hydrogen dioxide for copper, streptomycin or Actigard®. Be careful when mixing Oxidate® with other products. When used with copper products, for example, Oxidate® may not mix well. Read the labels of all the products carefully. Oxidate® may be used in some organic schemes.

Another product that has been used for management of bacterial spot of tomato is acibenzolar-S-methyl (trade name Actigard®). Acibenzolar (ASM) does not have any activity against bacteria or fungi. ASM is known as a systemic acquired resistance product. That is, it 'tells' the plant to turn on biochemical pathways that defend the plant from infection. ASM has been used with copper products to lessen the severity of bacterial spot of tomato. However, ASM can cause yield loss if used on tomatoes that are stressed due to drought or other environmental factors.

Serenade Opti® (an older name for this product is Serenade Max®) is labeled against bacterial spot of tomato. The action of Serenade Opti® is reported to be due to a protein component of the bacterial ingredient and to a systemic acquired resistance activity similar to that described for ASM. In a Purdue University study last year, where Serenade Opti® was applied every two weeks, Serenade Opti® did not significantly lower bacterial spot compared to the untreated control. Other researchers have had better results. Serenade Opti® may be used in some organic schemes.

A similar microbial product is called LifeGard® (the active ingredient of LifeGard® is a different, but related bacterium). The mode of action is similar to Actigard® and to Serenade Opti®-the product is reported to activate plant host defenses. Since this product is very new, I know very little about it. However, I am trialing this product this summer.

Another product that will not be influenced by whether the pathogen is copper resistant or not is AgriPhage[®]. This product is a microbe that parasitizes and ultimately kills the pathogens described here. AgriPhage[®] is very specific in which strain of pathogen is attacked. One must work closely

with the manufacturer, Omnilytics®, to obtain product that will be most likely to work in one's region. In a two-year study (the same Purdue University study referenced above) AgriPhage® was used in processing tomato trials in commercial fields. I was not able to show that AgriPhage® was any better than the commercial standard of copper, mancozeb and Actigard®. But AgriPhage® was no worse. The best treatment seemed to be 3 or 4 applications of AgriPahge® after first flower. Then the growers returned to the commercial standard. AgriPhage® should not be tank mixed or contaminated with copper products. Similarly, Oxidate® will react adversely with AgriPhage®. AgriPhage® is recognized by the National Organic Program (NOP) but not by the Organic Materials Review institute (OMRI).

The fungicide Tanos® (common name of active ingredients, famoxadone, cymoxanil) has been trialed for activity against bacterial spot of tomato. While the results have not always been positive, it might make sense to use Tanos® when one is trying to manage one of the fungal diseases on the Tanos® label (for example anthracnose, early blight, late blight, Septoria leaf blight) and hope for some activity against bacterial spot as well.

Organic growers should always carefully consult with their certifying agency about what is allowed in their certification program.

New Plastic Equals More Light in a High Tunnel

(Liz Maynard, emaynard@purdue.edu, (219) 548-3674)

Have you ever wondered how much difference new plastic would make in terms of light getting to crops in a high tunnel? We replaced 6-year-old plastic on High Tunnel 1 at Pinney Purdue Ag Center last week. Figure 1 below shows the high tunnel before and after recovering, and pieces of the old and new plastic.

We had a sensor measuring PAR (photosynthetically active radiation, light available for plant use in photosynthesis) in the structure, and a similar sensor in High Tunnel 2, which had new plastic in Dec., 2017. The Ag Center also has an automated weather station that measures solar radiation. Here is what these sensors showed us (Figure 1).



Figure 1. Top left: old plastic viewed from inside High Tunnel 1. Top right: old plastic as it is being removed. Bottom left: old plastic on left and new plastic on right over a piece of lined paper. Bottom right: High Tunnel 1 with new plastic covering.

Figure 2 shows the PAR readings throughout the day in the two high tunnels and solar radiation outside. High Tunnel 1 had the 6-year-old plastic. The plastic was removed on July 9. On July 7 and 8, before old plastic was removed, the maximum PAR was about 1100. This was only about 80% of the maximum recorded in High Tunnel 2. On July 9, 10, and 11, after plastic was removed from High Tunnel 1, the maximum was about 1800. Since the peak solar radiation was similar on on these days, the difference is due to the plastic. Compared to outside, the old plastic reduced maximum PAR by about 40%. The newer plastic on High Tunnel 2 reduced maximum PAR by about 20-25%.

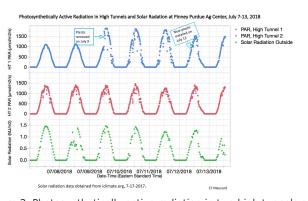


Figure 2. Photosynthetically active radiation in two high tunnels and solar radiation outside at Pinney Purdue Ag Center, July 7-13, 2018. Plastic was removed from High Tunnel 1 on July 9 and replaced on July 12.

But more important for plant growth than the maximum PAR during the day is the total PAR over the course of the day. This is called the daily light integral, or DLI. Figure 3 and Table 1 show the DLI in the two high tunnels, and the total daily solar radiation measured outside over the same time period. DLI under the old plastic on High Tunnel 1, was about 80-85% of DLI under the newer plastic on High Tunnel 2. Solar radiation is measured in different units than DLI, but the measurements show that there were no really cloudy days during this period.

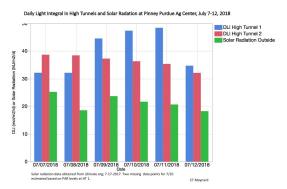


Figure 3. Daily light integral in two high tunnels and daily solar radiation outside at Pinney Purdue Ag Center, July 7-12, 2018. Plastic was removed from High Tunnel 1 on July 9 and replaced on July 12.

Daily light integral (DLI) in two high tunnels (HT) and solar radiation outside at Pinney Purdue Ag Center, July 7-12, 2018.

	DLI HT 1	DLI HT 2	Solar Radiation
Date	mol/m2/d		MJ/m2/d
07/07/2018	32	39	25
07/08/2018	32	38	19
07/09/2018	45	37	24
07/10/2018	47	36	22
07/11/2018	48	35	21
07/12/2018	35	32	18

Table 1. Daily light integral (DLI) in two high tunnels (HT) and daily solar radiation outside at Pinney Purdue Ag Center, July 7-12, 2018. Plastic was removed from High Tunnel 1 on July 9 and replaced on July 12.

The reduction in light due to old plastic will make a bigger difference for production during fall, winter and spring, when light is likely to limit crop growth. If you have old plastic and plan to grow in the high tunnel this winter, it may be worth recovering in the fall.

Society of St. Andrew Expands Gleaning in Indiana

Does your farm often have excess produce in your growing period? We would love to connect our volunteers to come and glean that produce and put it on a plate of someone who needs this fresh food!

Gleaning America's Fields - Feeding America's Hungry.

We do it simply, effectively, and efficiently. Since 1983, Society of St. Andrew has saved fresh, nutritious produce from America's farms – produce that otherwise go to waste – and delivered it to hunger-relief agencies.

In January 2018, Society of St. Andrew (SoSA) opened a new office in Indiana. The office is based in Indianapolis but the work is throughout the state. SoSA has gleaned here in the past, but will now make a significantly larger impact across

the Hoosier State.

In the first year, we expect to glean about one million pounds of produce from Indiana farm fields. All of this gleaned food will be distributed by local hunger relief agencies to feed the state's most vulnerable residents. More than 900,000 Indiana resident sometimes don't know where their next meal will come from, and one-third of those residents are children. Through gleaning, Indiana farmers and volunteers will provide fresh, nutritious food to those who need it most. This will ultimately provide not only wholesome food but increased health benefits around diabetes, high blood pressure and obesity. Gleaning also has a positive environmental impact. It prevents edible fruits and vegetables from being dumped in landfills and rotting in fields and will therefore also prevent the waste of other resources such as soil, fertilizer, and water used to grow the food as well as reduce the greenhouse gas emission in its decomposition.

For more information please see the website at www.endhunger.org or contact Ann Radtke at inglean@endhunger.org or at (317) 607-0004. We look forward to conversations and partnerships with farmers, volunteers and hunger relief agencies!

Time to Dispose of Unwanted Pesticides

The Indiana Pesticide Clean Sweep Project is a great opportunity to legally dispose of unwanted chemicals. It is free of charge up to 250 pounds.

To dispose of pesticides, complete the 2018 Pesticide Clean Sweep Planning From (the form is attached to the newsletter) and mail, fax or e-mail the completed form to Garret Creason at Purdue University. 175 South University Street, West Lafayette, IN 47907-2063, (765)494-1492 (phone), (765) 494-4331 (fax) or gcreaso@purdue.edu no latter than Monday, July 30, 2018. Then bring your labeled, leak free and safe to transport containers to the collection site. Do NOT mix materials.

Pesticides will be accepted from 9:00 am to 3:00 pm local time at the following dates and locations:

- August 14, 2018: Steuben County Fairgrounds in Angola, IN
- August 15, 2018: Jasper County Fairgrounds in Rensselaer, IN
- August 16, 2018: Henry County Fairgrounds in New Castle, IN
- August 21, 2018: Gibson County Fairgrounds in Princeton, IN

- August 22, 2018: Washington County Fairgrounds in Salem, IN
- August 23, 2018: Hendricks County Fairgrounds in Danville, IN

More information about the project please refer to http://www.oisc.purdue.edu/pesticide/clean_sweep.html

Information provided by the Indiana State Chemist and Seed Commissioner's office.

Upcoming Events

Roger Wenning Annual Field Day

Date: July 24, 2018, 9:00 am - Noon, Registration starts

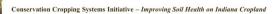
8:30 am

Location: Wenning Farms, 1513 N County Road 80 E,

Greensburg, IN 47240







Daviess Co. Produce Production Meeting

Date: Aug. 14, 2018 6:30 pm - 8:30 pm

Location: Daviess Co. Produce Auction, LLC, 5567 N 900 E,

Montgomery, IN 47558





John Kempf grew up on a fruit and vegetable farm in northeastern Ohio and experienced first-hand the challenges faced by crop producers everywhere. Growing fresh market vegetables since 1994. John witnessed intensifying disease and insect pressure on crops which did not respond to the usual pesticide treatments.

John began seeking to understand the underlying causes of disease and insect pressure on crops. He learned and continues to learn how to prevent pest damage to plants by enhancing natural plant immunity with nutrition.

Meeting Topics To Focus On

Produce Productions
Row Crops
Cover Crops
Improving Soil Health







Meeting Sponsors







ited States Department of Agriculture

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Small Farm Education Field Day

Date: Aug. 30, 2018

Location: Purdue Daniel Turf Center (1340 Cherry Lane, West Lafayette, IN 47907) and Purdue Student Farm (1491

Cherry Lane, West Lafayette, IN 47906)





Small Farm Education Field Day

Thursday, August 30th 8:30am-2:00pm

Purdue Daniel Turf Center 8:30-II:30am 1340 Cherry Lane West Lafayette, IN 47907

Purdue Student Farm noon-2pm 1491 Cherry Lane West Lafayette, IN 47906



The Purdue University Student Farm is a working small farm. We grow vegetables and herbs using the principles that naturally govern balanced eco systems, including emphasis on diversity, healthy soil, healthy plants, and healthy people. Our educational work is all about food: how to grow it on a small, ecological scale, the art of production and marketing produce for profit, understanding how food intersects with environment, economy and community.

The Purdue Student Farm is proud to host its first Small Farm Field Day. The event is packed with educational sessions during the morning, followed by a tour and practical experiences on the farm. Topics of discussion throughout the day include Small Farm Design, Hoop House Production, Organic Nutrient and Pest! Management, Social Media and Marketing, Food Safety (Good Agricultural Practices and Fresh Produce Safety - FSMA), and Small Farm Implements. Lunch will be provided by Juniper Spoon.

\$10 registration

Register here http://www.cvent.com/d/hgqx6g For questions or reasonable accommodation needs, contact Lori Jolly-Brown ljollybr@purdue.edu, 765-494-1296





Extension HORTICULTURE AND LANDSCAPE ARCHITECTURE

Greenhouse and Indoor Hydroponics Workshop

Date: Sep. 5, 2018

Location: 625 Agriculture Mall Drive, West Lafayette, IN

47907



Extension HORTICULTURE AND LANDSCAPE ARCHITECTURE

Greenhouse and Indoor Hydroponics Workshop

Wednesday, September 5, 2018 8:00am-3:00pm

(Lunch provided)

Classroom sessions 8am-noon

Deans Auditorium Pfendler Hall-PFEN 1159 Purdue University, 715 W State St West Lafayette, IN 47907

Hands-on activities/tours I:00-3:00 pm

Horticulture Greenhouse 625 Agriculture Mall Drive West Lafayette, IN 47907





You will learn about best varieties, nutrient recipes, production systems, artificial lighting and temperature needs for hydroponic lettuce produced in greenhouses and indoors Attendees will tour our latest state-of-the art greenhouse and indoor hydroponic facilities (built this year!) and experience many hands-on activities. Hurry up! Seating is limited!

Registration is free but required

Register Here https://tinyurl.com/yaxd4k2

Questions? Contact Lori Jolly-Brown ljollybr@purdue.edu, 765-494-I296 or

Dr. Krishna Nemali, knemali@purdue.edu

Drip Irrigation and Sensor Technology Field Day

Date: July 25, 2018, 1:00 pm - 4: 00 pm or 6:30 pm -8:30

pm

Location: SWMREC, 1791 Hillandale Rd, Benton Harbor, MI

49022

Drip Irrigation and Sensor Technology Field Day

Wednesday, July 25, 2018

SWMREC 1791 Hillandale Rd Benton Harbor, MI 49022

1:00 - 4:00 p.m.

Or

6:30 - 8:30 p.m.

Steve Miller, Irrigation Specialist, MSU Biosystems and Agricultural Engineering, mill1229@msu.edu

Younsuk Dong, MSU Biosystems and Agricultural Engineering, dongyoun@msu.edu

Lyndon Kelley, Purdue/ MSU Extension, Irrigation Educator, kelleyl@anr.msu.edu

MICHIGAN STATE |

Getting the most from your drip irrigation system. Compare results from various soil moisture sensors

This field day will cover in greater depth the information presented at the June 28, 2018 Ag Innovation Day seminar. You can attend either the 3-hour afternoon presentation or the 2-hour evening presentation.

Observe and evaluate the flow distribution in soil under surface and subsurface drip tape and visualize distribution in trenches excavated to exposed flow patterns.

Compare the different types of volumetric water content sensors at multiple soil depths. Sensors include Campbell Scientific, Sentek, METER Group, Watermark Blocks, and Irrometers. Representatives from some of the sensor companies will attend to discuss results from their sensors at the site.

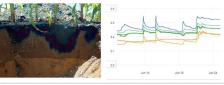
Explain how irrigation scheduling can be improve with the use of volumetric moisture content sensors.

What drip emitter spacing is best for you:

- Spacing of drip emitters does impact the water distribution of water to plants when grown under plastic.
- Visualize the flow patterns with a trench and determine if 16 in spacing provides as good spacing as 12 inch spacing.

Look at the entire system:

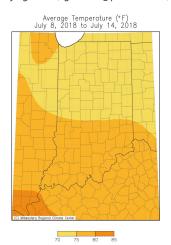
- Evaluate the irrigation scheduling system.
- Evaluate the sensors to manage water application rates
- · Evaluate the timing for tomatoes and sweet corn.



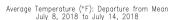
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Temperature and Precipitation July 8 and July 14

(Wenjing Guan, guan40@purdue.edu, (812) 886-0198)



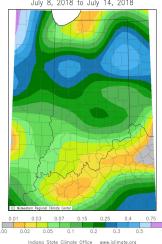
Indiana State Climate Office www.iclimate.org Purdue University, West Lafayette, Indiana email: iclimate@purdue.edu



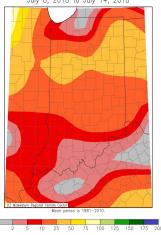


Indiana State Climate Office www.iclimate.org
Purdue University, West Lafayette, Indiana
email: iclimate@purdue.edu

Accumulated Precipitation (in) July 8, 2018 to July 14, 2018



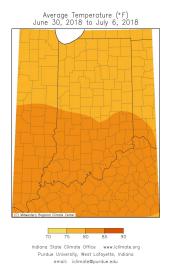
Accumulated Precipitation: Percent of Mean July 8, 2018 to July 14, 2018



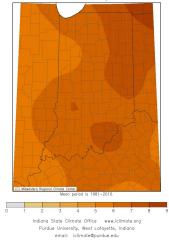
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Purdue University, West Lafayette, Indiana
email: iclimate@purdue.edu

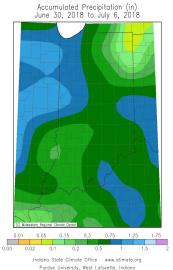
Temperature and Precipitation June 30 and July 6

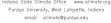
(Wenjing Guan, guan40@purdue.edu, (812) 886-0198)

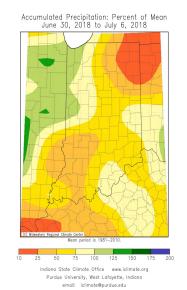












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2018 PESTICIDE CLEAN SWEEP PLANNING FORM

I have the following pesticides (weed killers, insecticides, rodenticides, fungicides, miticides, etc.) to bring to the Indiana Pesticide Clean Sweep. I understand that there will be no charge for disposal of up to 250 pounds of pesticides per participant. I also understand that if there is not adequate demand for these disposal services, I will be contacted by the Office of Indiana State Chemist to be notified of the program cancellation.

Contact Name	Contact Phone #	
Please indicate at wh	ich location you will be participating.	
☐ Angola – August 14	☐ Rensselaer – August 15	
☐ New Castle – August 16	☐ Princeton – August 21	
☐ Washington – August 22	☐ Danville - August 23	
List of pesti	cide products to be disposed:	
1. Trade Name	•	
Active Ingredient		
Check One: Solid Pound	ls □LiquidGallons □Aerosol	
2. Trade Name	· · · · · · · · · · · · · · · · · · ·	
Active Ingredient	THE STATE OF THE S	
Check One: Solid Pound	ls □LiquidGallons □Aerosol	
3. Trade Name		
Active Ingredient		
	ls □LiquidGallons □Aerosol	
4. Trade Name		
Active Ingredient		
Check One: Solid Pound	ls □LiquidGallons □Aerosol	

RETURN by July 30, 2018, to GARRET CREASON, gcreaso@purdue.edu OR 765-494-4331 (fax). Questions may be directed to Garret at 765-494-1585.