VEGETABLE CROPS HOTLINE

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

Issue: 664
August 15, 2019

In This Issue

Welcome Dr. Laura Ingwell

Dr. Laura Ingwell

Please welcome Dr. Laura Ingwell as she continues her experience in the Department of Entomology as an Assistant Professor in Horticulture Entomology. Laura received her Bachelor of Science in Biology from the University of Wisconsin-Milwaukee in 2006. She received her Masters of Science in Ecology from the University of Rhode Island in 2009 and her PhD in Entomology from the University of Idaho in 2014. Prior to her new faculty position, Laura has been a Postdoctoral Associate in the Department of Entomology since 2014. Laura is a member of the Indiana Small Farm Conference Committee where she is working to engage with diverse small farmers by providing educational sessions to improve production and facilitate conversations around increasing diversity in agriculture. Dr. Ingwell's research has focused on managing insect pests and insect transmitted pathogens in high tunnel cucumber, cantaloupe and tomato production and investigating the impacts of pesticide use on pollinator communities in these systems. Laura is excited to continue her collaborations with growers throughout the state.

Welcome Dr. Elizabeth Long

Dr. Elizabeth Long

Welcome to Dr. Elizabeth Long as she returns to the Purdue Department of Entomology family as our second hire in Horticulture Entomology. Elizabeth received her Bachelors of Science in Biological Sciences from North Carolina State University in 2007 and obtained her PhD in Plant, Insect and Microbial Sciences from the University of Missouri in 2013. Elizabeth previously was a Post Doctoral Associate in our department from 2013-2016. Elizabeth has spent the last three years as an Assistant Professor in the Department of Entomology at The Ohio State University. Her research has

centered around three key themes: (1) addressing the consequences of human-mediated change to the environment for ecosystem services and function, (2) building our understanding of the impacts of biodiversity loss, and (3) evaluating the unintended impacts of agricultural management on non-target organisms in agroecosystems and surrounding areas. Elizabeth looks forward to engaging with horticultural crop producers in Indiana.

Plectosporium blight

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

Recently, I have had a few phone calls about Plectosporium blight on pumpkins. This disease can be difficult to describe in words. However, once observed, Plectosporium blight is easy to remember. Therefore, this article will include photos of the disease.

Lesions of Plectosporium blight are most often observed on the stems of affected plants. The lesions are small and irregularly shaped. The lesions often coalesce to form a scabby area (Figure 1 and 2). When the handle of the pumpkin is affected, the marketability of the pumpkin is affected. In severe cases, the pumpkin itself may have lesions of Plectosporium blight.

Figure 1. Plectosporium blight lesions may occur on the handle or on the fruit.

Figure 2. Plectosporium blight can cause spindle shaped lesions on the stems of pumpkins.

Plectosporium blight lesions on fruit may be confused with bacterial spot. However, bacterial spot lesions are usually larger than Plectosporium blight lesions and do not coalesce over large areas like Plectosporium blight.

This disease may be managed through a combination of cultural and fungicide treatments. Crop rotations of 3-4 years and fall tillage will help keep the crop residue to a minimum. A regular contact fungicide program will also help to keep Plectosporium blight in check. This fungicide schedule purdue.ag/pumpkinfs for pumpkins lists the systemic fungicides Cabrio®, Inspire Super®, Merivon® and Quadris®/Satori®.

Powdery Mildew of Watermelon

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

While cantaloupe and pumpkin growers are used to combating powdery mildew in Indiana, watermelon growers may not be familiar with the disease. Occasionally, I observe this disease on watermelon as well. If left uncontrolled, this disease can cause loss of foliage, loss of yield and lower quality fruit. This article will discuss the biology and management of powdery mildew of cucurbits with an emphasis on watermelon.

While powdery mildew often causes a white talc-like growth on either side of the leaf, on watermelon the symptom may show up as a chlorotic lesion on the upper side of the leaf (Figure 1). The talc-like growth on the lower side of the leaf may be more idiffuclut to observe than on other hosts. Occasionally, powdery mildew may be observed on watermelon fruit (Figure 2). This article **https://vegcropshotline.org/powdery-mildew-symptoms-vs-variegated-leaves/** has additional information about powdery mildew symptoms. The fungus that causes powdery mildew, *Podosphaera xanthii*, does not require leaf wetness

for infection of leaves, only high humidity. The optimum temperature for disease development is 68 to 81°F. *P. xanthii* may survive for a period in crop residue as a resilient fungal structure, but the disease is so easily windborne, that crop rotation is not always a practical control measure.

Figure 1. Powdery mildew may cause a round, chlorotic lesion on the top of the leaf, whereas, the white fungus may often be observed on the bottom of the leaf.

Figure 2. Although unusual in Indiana, powdery mildew can cause infections on watermelon fruit as seen here.

The fungus that causes powdery mildew of cucurbits does not cause powdery mildew on other plant families. In the same way, powdery mildew of other plant families does not affect cucurbits.

Fortunately, commercial varieties of pumpkin and cantaloupe exist with partial resistance to powdery mildew. Most growers, however, find it necessary to apply systemic fungicides to manage powdery mildew, even when using partially resistant varieties. As far as I know, there are no differences in the susceptibilities of watermelon varieties to powdery mildew.

To avoid additional sprays, watermelon growers who are worried about powdery mildew and wish to apply fungicides may want to choose products that are effective on more diseases than just powdery mildew. For example, Luna Experience® should be effective on powdery mildew and gummy stem blight. Merivon®should be effective on anthracnose and powdery mildew. Aprovia Top® has proven effective on powdery mildew of cucurbits plus it is labeled on anthracnose and gummy stem blight. However, I don't have any information about how effective Aprovia Top® is on the latter two diseases.

Inspire Super®, may not be as effective as the products listed above on powdery mildew, however it should be effective against both anthracnose and gummy stem blight. Similarly, fungicides with the active ingredient tebuconazole (e.g., Monsoon®, Onset®, Toledo®, Vibe®) should have good efficacy against gummy stem blight and moderate efficacy against powdery mildew.

More information about powdery mildew management can be found in the Midwest Vegetable Production Guide 2017 **mwveguide.org**. A proposed fungicide schedule can be found at purdue.ag/pumpkinfs. More information about powdery mildew can be found at **https://vegcropshotline.org/article/powdery-mildew-of-cucurbits/.** Finally, always read the label.

Whitefly Identification and Control

(Laura Ingwell, lingwell@purdue.edu, (765) 494-6167), (Ashley Leach, ableach@purdue.edu) & (Dan Egel, egel@purdue.edu, (812) 886-0198)

Here in Indiana, whitefly problems are rare, but when encountered it is most often in protected ag production (greenhouse or high tunnel) and less often in the field. However, this is the time of year that you may be seeing them in either environment. Whiteflies are not true flies, but rather Hemipteran insects, more closely related to aphids and plant hoppers. They are sap sucking insects that feed on the phloem of the plant, making them efficient vectors of plant pathogens. Whiteflies produce honeydew secretions which can attract other insects or host the growth of sooty mold on infested leaves. There are two main species of whiteflies that may be encountered in Indiana: the greenhouse whitefly (*Trialeurodes vaporariorum*) and the sweetpotato whitefly (*Bemisia tabaci*; Figure 1). They can be distinguished by the way in which they hold their wings when at rest on the plant: sweetpotato whiteflies hold their wings tilted against the surface of the plant like a tent while the greenhouse whitefly hold their wings flat, parallel to the leaf surface and appear to be more broad. Regardless of the species, both have large host ranges (feed on many plants) and reproduce quickly in warm temperatures. A single female can lay up to 100 eggs in her lifetime. The eggs, laid on the underside of leaves, are tiny and oblong. They can take up to 6 days to hatch (Figure 2). Upon hatching, the

larvae are in a mobile 'crawling' stage and find a suitable feeding location on the plant. They become immobile and develop through several larval instars, pupate in place under the larval skin, and the adult emerges approximately 16 days later. Adults can live for several weeks.

Sweet potato whiteflies overwinter in the Gulf region. This is why the presence of the sweet potato whitefly in the Midwest is unusual. This whitefly must be wind-blown to the Midwest, usually in the late summer. Sweet potato whiteflies can cause cucurbits to have a silver leaf symptom (Figure 3). In addition, some whiteflies can transmit serious virus diseases on cucurbits and tomato.

Figure 1. Whiteflies on tomato leaf. Photo by John Obermeyer

Figure 2. Whiteflies on cucumber leaf. Photo by John Obermeyer

Figure 3. The pumpkin leaves on the left are silvered from feeding by the feeding of the sweet potato whitefly.

In order to prevent infestations in protected environments, careful screening of any new plant stocks should be done. Sanitation is important; remove infested residue as soon as possible. Yellow sticky cards can be used as a monitoring tool, but will not attract and control an infestation. Biological control of this pest is often used in greenhouse settings with much success and is more practical if there are no plant pathogens being vectored by the population. There are two parasitoid wasps commercially available: *Encarsia Formosa* and *Eretmocerus eremicus*. *Formosa* lay eggs in the developing nymphs of the whiteflies, perform better under cooler temperatures and are effective at controlling the greenhouse whitefly. *Eremicus* also attack the nymph stage of the whiteflies, performs better under warmer temperatures and provides good control of the sweetpotato whitefly. The predatory beetle, *Delphatus catalinae*, is a predator that will attack all species of whiteflies and avoid those which have been parasitized, so it can compliment either of the aforementioned species of parasitoids. If you are considering biological control, it is imperative to properly identify the pest and release natural enemies at the onset of the infestation. The Purdue Plant and Pest Diagnostic Lab can assist with pest identification.

Insecticides also provide control of whiteflies in greenhouse and field settings (Table 1). A number of neonicotinoid active ingredients are effective against whiteflies including imidacloprid (Admire®), thiamethoxam (Actara®), and acetamiprid (Assail®). Neonicotinoids should be applied with care, as some of these products have been shown to negatively impact pollinating insects. Relatively newer chemistries, like anthranilic diamides and tetramic acids, also offer control of whitefly populations. Effective active ingredients in these classes include cyantraniliprole (Exirel®), chlorantraniliprole (Coragen®), spiromesifen (Oberon®), and spirotetramat (Movento®). Insect growth regulators (IGRs) products, like pyriproxyfen (Knack®) and buprofezin (Talus®), can reduce whitefly populations and may be effective options in greenhouse production. In small scale or organic production systems, azadirachtin (Aza-direct) or insecticidal soaps may be effective and less disruptive to biological control agents.

When using contact insecticides, coverage is key. Whiteflies reside on the underside of leaves, so sufficient coverage of the underside and on overlapping leaves of the plant is crucial to improve the efficacy of applications. **Resistance is a concern in whitefly management, and the onset of resistance can be slowed with proper insecticide class rotation and only applying insecticides when needed.** Other insecticides, not mentioned here, are available for whitefly management. For a complete listing of chemical recommendations see the ID-56 guide. And remember the label is law, so please consult it before

making an insecticide application.

Table 1: Some recommended insecticides for whitefly control.

Trade name	Active ingredient	activity	IRAC code	Use in greenhouse?	Notes
Aza-direct	Azadirectin	Contact and systemic	UN*	Yes.	Suppression only.
Actara	Thiamethoxam	Systemic	4	No.	Negative impacts on pollinating insects.
Admire	Imidacloprid	Systemic	4	No.	
Assail	Acetamiprid	Systemic	4	No.	
Knack, Distance	Pyriproxyfen	Translaminar	7D	Yes.	
talus	Buprofezin	Contact	16	Yes.	
Movento	Spirotetramat	Systemic	23	No.	
Oberon	Spiromesifen	Systemic	23	No.	
Coragen	Chlorantraniliprole	Systemic	28	No.	
Exirel	Cyantraniliprole	Systemic	28	Some.	Consult label for greenhouse applications.

*unknown mode of action

Indiana Climate and Weather Report

(Beth Hall, hall556@purdue.edu)

Even the climate models are confused by this year's weather. When the August monthly outlook was released (July 31st; national Climate Prediction Center) it showed significant confidence that August would have below-normal temperatures and below-normal precipitation. However, the shorter-range outlooks (that update daily) the last few days, seem to contradict that prediction. Whether it is the 6-10-day (August 20-24), the 8-14-day (August 22-28; Figures 1 & 2) or the 3-4-week experimental outlooks (August 25 – September 7), all are predicting significant confidence for above-normal temperatures and precipitation. Given the recent development of drought conditions across the state, these climate predictions (particularly for precipitation) are strongly desired! Will those climate outlooks verify? The current 7-day quantitative precipitation forecast is indicating very little precipitation over the next seven days. That is slightly below normal for this time of the year in Indiana (Figure 3 & 4). It is a roller coaster ride, it seems.

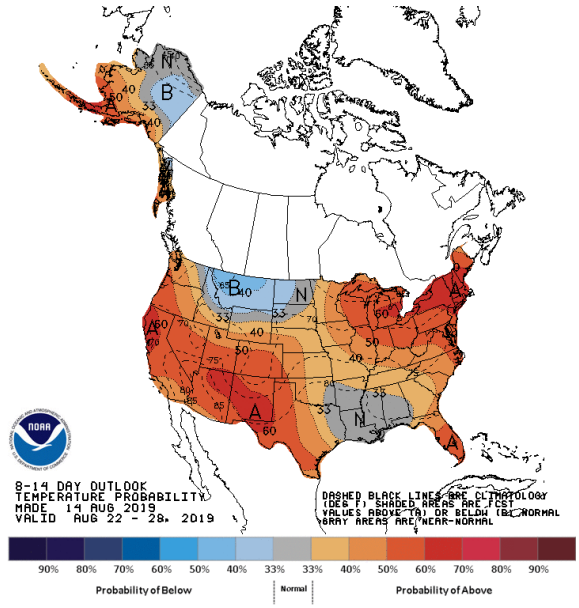

Figure 1. Climate outlook for August 22-28, 2019 that indicates the probability for either above- or below-normal temperature.

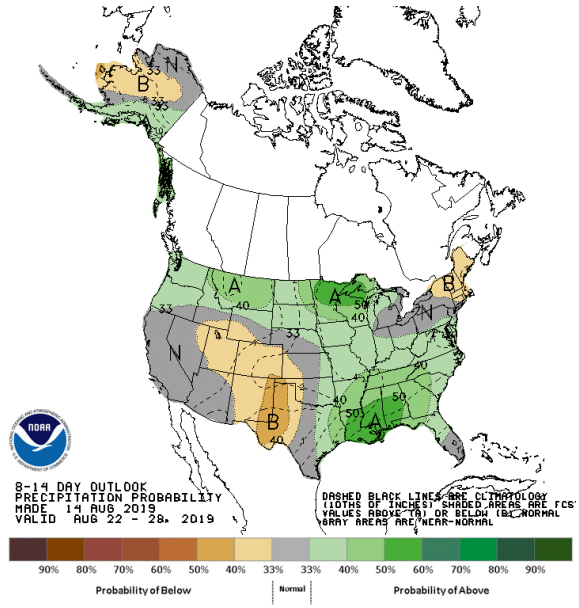

Figure 2. Climate outlook for August 22-28, 2019 that indicates the probability for either above- or below-normal precipitation.

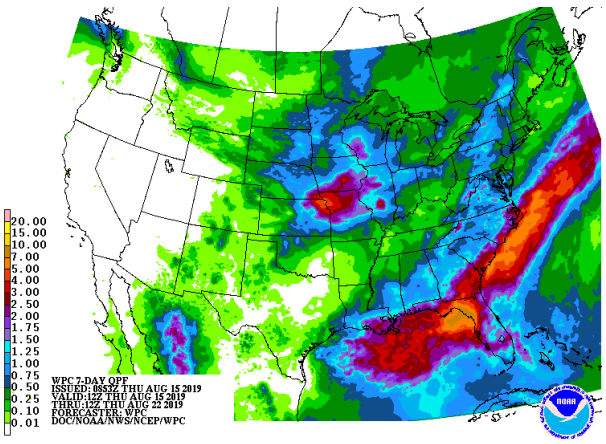

Figure 3 & 4. Quantitative precipitation forecast for August 15-22, 2019 (above) compared to the 30-year average of precipitation for Indiana

during the same time period (below).

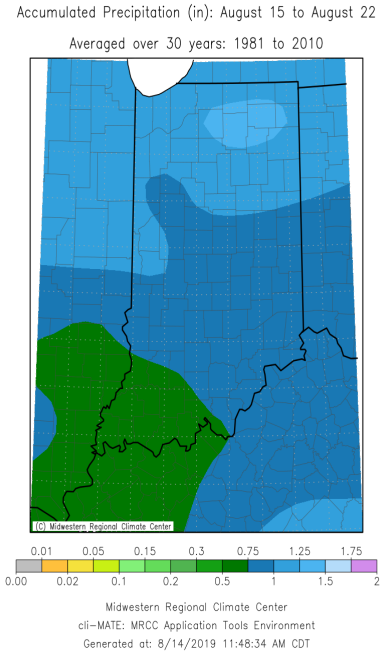

Figure 4.

Upcoming Events

Greenhouse and Indoor Hydroponics Workshop

Date: September 5, 2019 8:00 am-3:00 pm

Location: Pfendler Hall- PFEN 241, Purdue University, 715 W State St. 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 and experience many hands-on activities. Registration fee is $15.

Register here https://tinyurl.com/yxm5ttb9

Northwest Indiana Food Council 2019 FarmHop: Local Farm Tour

Date: September 21, 2019, 9 to 4 pm Central Time

Location: Valparaiso or Gary, IN

Valparaiso, IN departure – This widely diverse tour will take you to a lively family farm with nearly 600 egg-laying chickens; an organic tilapia farm; a biodynamic farm producing vegetables, fruits, and flowers; and a homestead with incredible diversity including fruit production, heritage breed animals, and value-added products.

Gary, IN departure – See several thriving urban farms with unique solutions for community food access, a beautiful aquaponics system, an urban farmstead with exotic plants and medicinal garden and a church changing the face of farming with an abundant supply of homegrown produce!

Tickets are only $20 for adults or $10 for kids 12 and under and include a locally-sourced lunch! Plus, adult ticketholders will receive an added bonuses.

Register at: https://farmhop2019.eventbrite.com or call (219) 313-8828.

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