Vegetable Crop Update

A newsletter for commercial potato and vegetable growers prepared by the University of Wisconsin-Madison vegetable research and extension specialists

Extension
UNIVERSITY OF WISCONSIN-MADISON

No. 12 – August 6, 2023

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- Potato and tomato early blight and late blight disease updates
- Cucurbit downy mildew updates
- Corn earworm and potato colonizing aphids

Calendar of Events:

November 28-30, 2023 – Midwest Food Producers Assoc. Processing Crops Conference, Kalahari Convention Center
January 9-11, 2024 – Wisconsin Agribusiness Classic, Alliant Energy Center, Madison, WI
January 21-23, 2024 – Wisconsin Fresh Fruit and Vegetable Growers Conference, Kalahari Resort, Wisconsin Dells, WI
January 25-26, 2024 – Organic Vegetable Production Conference, UW Madison Division of Extension (Online)
February 2-3, 2024 – Organic Vegetable Production Conference, UW Madison Division of Extension, Alliant Energy Center, Madison, WI
February 6-8, 2024 – UW-Madison Div. of Extension & WPVGA Grower Education Conference & Industry Show, Stevens Point, WI

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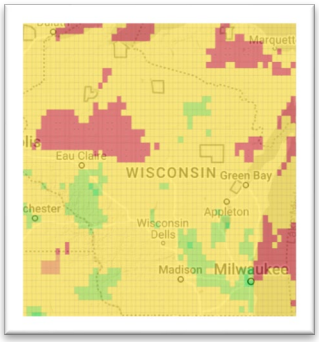
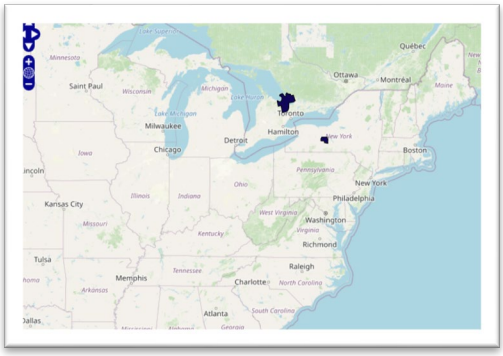
Early blight of potato/tomato. Accumulations of P-days this past week were between 55-62 across the state of Wisconsin. In all locations and all planting dates, potato fields have surpassed the threshold and should receive (and continue to receive) preventative fungicide applications for early blight management. Hotter days generate roughly 10 P-days per day if you are looking ahead to likely accumulations and preventative fungicides.

Late blight of potato/tomato. Accumulations of Blitecast DSVs were extremely low this past week, ranging from 0 to 1. However, a look at the state shows that there is a geographical patch of higher DSV accumulations in the northwestern quadrant of the state (Figure on right from the Vegetable Disease and Insect Forecasting Network). The usablight.org website (https://usablight.org/map/) indicates a new report of tomato late blight from Yates County New York on July 25, 2023.





This detection is proximal to the previous Ontario Canada detection. Ontario and Quebec Provinces of Canada have reported late blight over the past two weeks and the clonal lineage of the late blight pathogen from potato in Ontario was US-23. Fungicides for the management of late blight in tomato and potato crops are provided: https://learningstore.extension.wisc.edu/products/commercial-vegetable-production-in-wisconsin. A specific list of fungicides for potato late blight in Wisconsin was also offered in a special report shared via email on July 28.

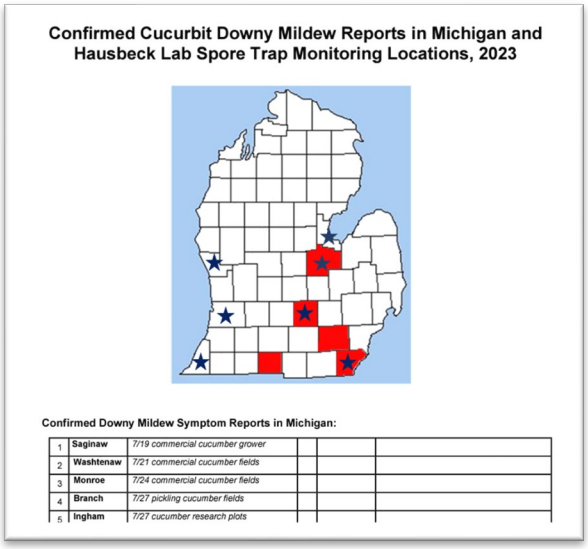
Current P-Day (Early Blight) and Disease Severity Value (Late Blight) Accumulations. Many thanks to Ben Bradford, UW-Madison Entomology; Stephen Jordan, UW-Madison Plant Pathology; and our grower collaborator weather station hosts for supporting this disease management effort again in 2023. A Potato Physiological Day or P-Day value of ≥300 indicates the threshold for early blight risk and triggers preventative fungicide application. A Disease Severity Value or DSV of ≥18 indicates the threshold for late blight risk and triggers preventative fungicide application. Red text in table indicates threshold has been met or surpassed. TBD indicates that data are To Be Determined as time progresses. Weather data used in these calculations is from weather stations that are placed in potato fields in each of the four locations, as available. Data from an alternative modeling source: https://agweather.cals.wisc.edu/vdifn will be used to supplement as needed for missing data points and for additional locations (indicated with *). Data are available in graphical and raw formats for multiple locations at: https://vegpath.plantpath.wisc.edu/dsv/.

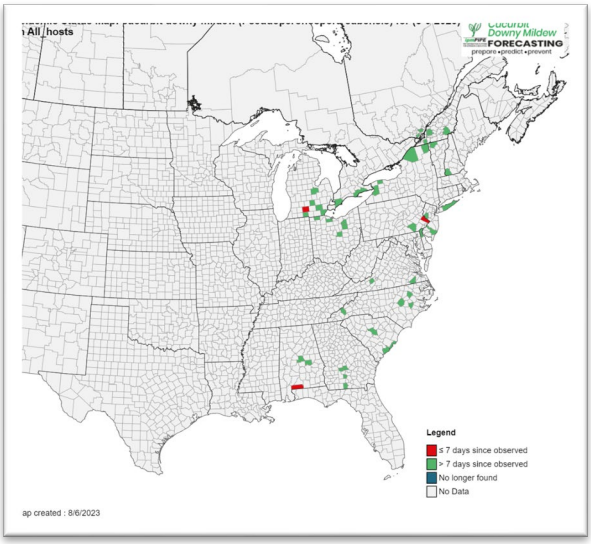
	Planting Date		50% Emergence Date	Disease Severity Values (DSVs) *through 8/5/2023*	Potato Physiological Days (P-Days) *through 8/5/2023*
Spring Green*	**Early**	Apr 3	May 9	8	**688**
	Mid	Apr 17	May 12	8	**666**
	Late	May 10	May 23	8	**597**
Arlington*	**Early**	Apr 5	May 10	7	**694**
	Mid	Apr 20	May 15	7	**656**
	Late	May12	May 25	7	**596**
Grand Marsh	**Early**	Apr 5	May 10	5	**656**
	Mid	Apr 20	May 15	5	**623**
	Late	May 12	May 25	5	**571**
Hancock	**Early**	Apr 10	May 17	6	**623**
	Mid	Apr 22	May 19	6	**617**
	Late	May 14	May 28	6	**568**
Plover	**Early**	Apr 14	May 19	10	**610**
	Mid	Apr 24	May 20	10	**608**
	Late	May 19	May 29	10	**555**
Antigo	**Early**	May 1	May 28	10	**530**
	Mid	May 15	June 3	10	**486**
	Late	June 7	June 23	10	**350**
Rhinelander*	**Early**	May 7	June 1	4	**501**
	Mid	May 18	June 5	4	**466**
	Late	June 9	June 24	4	**342**

In addition to the potato field weather stations, we have the UW Vegetable Disease and Insect Forecasting Network tool to explore P-Days and DSVs across the state (https://agweather.cals.wisc.edu/vdifn). This tool utilizes NOAA weather data. In using this tool, be sure to enter your model selections and parameters, then hit the blue submit button at the bottom of the parameter boxes. Once thresholds are met for risk of early blight and/or late blight, fungicides are recommended for optimum disease control. Fungicide details can be found in the 2023 Commercial Vegetable Production in Wisconsin Guide, Extension Document A3422. https://learningstore.extension.wisc.edu/products/commercial-vegetable-production-in-wisconsin

Cucurbit Downy Mildew. The Cucurbit Downy Mildew forecasting webpage (https://cdm.ipmpipe.org/) is not forecasting the movement of the pathogen, but the group is offering reporting of findings of cucurbit downy mildew from the US (see current map below from https://cdm.ipmpipe.org/. Dr. Mary Hausbeck reported

cucumber downy mildew in commercial fields in Saginaw, Washtenaw, Monroe, Branch, and Ingham Counties Michigan (7/19-7/27/23). To date, there have been no reports of the downy mildew here in WI. If reports arise, we should be considering preventative treatment of cucumber and melon crops here in due to the likelihood of the disease resulting from clade 2 downy mildew.





August 6, 2023

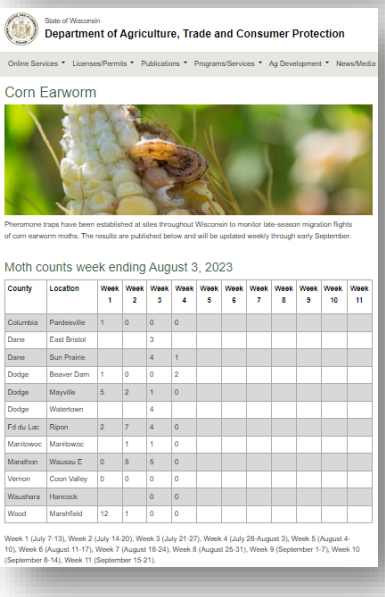
Vegetable Insect Update – Russell L. Groves, Professor and Department Chair, UW-Madison, Department of Entomology, (608) 698-2434 (mobile), e-mail rgroves@wisc.edu

Vegetable Entomology Webpage: https://vegento.russell.wisc.edu/

Corn earworm – (https://vegento.russell.wisc.edu/pests/corn-earworm/). The corn earworm can cause serious economic damage to fresh market and processing sweet corn and hybrid dent seed corn. Also known as the tomato fruit worm in the upper midwest, the larvae can also attack and feed tomatoes, lettuce, peppers, and snap beans. For persons scouting susceptible corn, full-grown larvae of the corn earworm can vary significantly in color and can be olive-brown, tan, maroon, pink, or even black with three or four dark stripes along their backs. The head is consistently yellow and not spotted. Mature larvae can measure up to 2 inches in length and are found imbedded in the tip of a susceptible corn ear. The adult moths are medium to large in size (wingspan 1.5") with grayish-brown coloration and front wings are marked with dark gray, irregular lines with a dark area near the wing tip.

Corn earworm adult moth
Image source

Corn earworm larva
Photo: 'cyanocorax'



Pheromone captures (as reported from the Wisconsin Home Pest Survey) continue to confirm low numbers of adult moths over the past 7-10 days. These captures are likely to increase in the coming weeks as a second generation of moths are expected to be present in southern Wisconsin by mid- to later August. Recall that few corn earworms are known to survive winter in Wisconsin. Instead, they overwinter as pupae buried in the soil in middle portions of the US, and are thought to overwinter near, or south of, 40ºN latitude (just a bit south of Interstate 80).

In early spring, the pupae complete their development and emerge as moths in early May. Some of these moths migrate northward, flying mainly at dusk or during warm, cloudy days. The females lay eggs singly on fresh corn silks and on foliage. Fertilized females deposit up to 1000 eggs each. They are particularly attracted to sweet corn in the late tassel through early silking stages. Eggs hatch within 1 to 8 days and the larvae immediately crawl into the silk channels at the ear tip to feed.

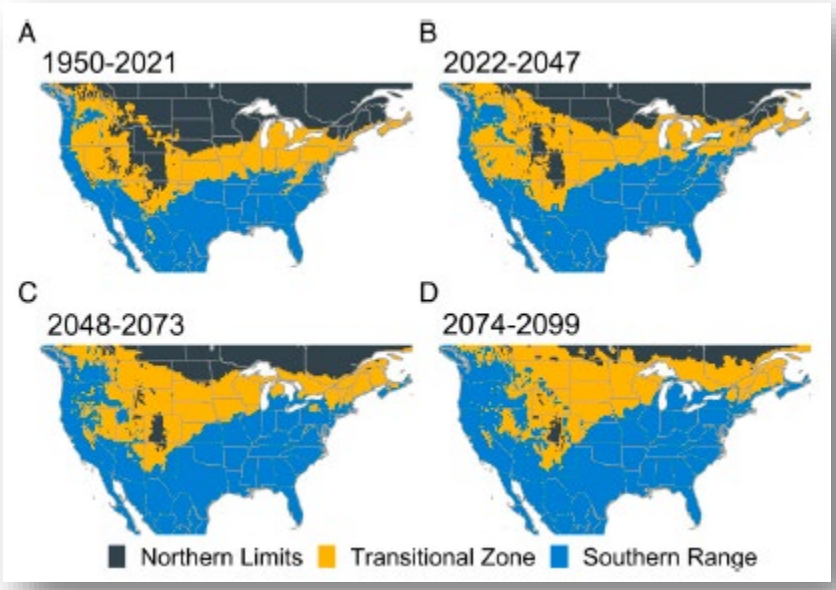
North of this 40º parallel, few pupae are assumed to survive Wisconsin winters to complete development in the spring. As a result, sweet corn growers may find some adult moths in traps in the early season, but this is generally considered as rare. This overwintering generation will only pose a problem in very early planted sweet corn. The more damaging migratory adults appear between mid-August and early September when a second generation is completed and fresh market or processing sweet corn is in the silking stages of development.

Once larvae enter the ear, they're protected from insecticides. Therefore, treatment timing is critical, and control must be targeted at the adults, eggs, and young larvae before they're protected. The amount of time for egg hatch varies with temperature, but during

periods of hot summer days and nights, eggs can hatch within 24 hours after they're laid. Thus, each day's delay in treatment may reduce the number of clean ears by 10 to 15%.

Insecticides must be present on vulnerable silks when eggs hatch. The first application is the most critical and tank-mixes containing an ovicide (an egg killer) and a larvicide (eg. spinosad, spinetoram, chlorantraniliprole) are recommended. On sweet corn, treat every 3 to 4 days beginning when silks first appear and continuing until they are brown in color. Discontinue treatments 10 days before harvesting fresh market sweet corn as additional sprays will not improve product quality.

Although varying from year to year, some corn earworm larvae in the Midwest have been confirmed to be resistant to synthetic pyrethroid insecticides, signaling that this insecticide may cease to be an effective means of control. However, commercial sweet corn growers have not yet reported significant problems in 2023, but it is important for pest managers to monitor earworm populations and adjust treatment recommendations accordingly.



A recent study (Lawton et al. 2022, https://doi.org/10.1073/pnas.2203230119) investigating changes in winter-time soil temperatures associated with human-induced climate change suggests the overwintering areas for corn earworm can be expected to change. Projected overwintering zone change from historic and current averages to 2099 are illustrated. In this study, the area was estimated using NASA's Earth Exchange Global Daily Downscaled Climate Projection and adjusted to expected changes in soil temperatures. Because these data were derived from projected air temperatures, they only provide a coarse understanding of potential overwintering zone shift. Expected changes in 2-4" soil temperatures suggest larger populations may persist at higher latitudes in the future due to reduced low-temperature lethal events during winter. Because corn earworm is a highly migratory pest, predicting when populations arrive and accumulate in one region will still be based upon pheromone captures over successive nights. However, it will become increasingly likely we will see overwintering pupae emerge as adults earlier in the production season.

Potato colonizing aphids – (https://vegento.russell.wisc.edu/pests/aphids/). It is difficult to generalize the life cycle of all aphids because of the diversity of their life habits, which can range from single to multiple hosts. One of the unique characteristics of aphids that sets them apart from all other insects is their ability to bear live young. Two aphid species that can infest potato include the green peach aphid (*Myzus persicae*) and potato aphid (*Macrosiphum euphorbiae*). Potato colonizing aphids will feed and reproduce on potato as a preferred host. The immigrating aphid if carrying PVY will inoculate the plant during its taste testing and then subsequently feed long term in the phloem while it deposits offspring on the plant. The non-winged offspring are likely to acquire the virus and then can spread it as they walk to adjacent plants. If the aphid colonies become too large and too crowded, winged forms of offspring will be generated

and those will fly to other plants or longer distance to other fields taking the virus with them. Colonizing aphids usually feed on new, succulent shoot tips or young leaves, often on the underside of the leaf.

Green peach aphid (Myzus persicae)
Photo: Scott Bauer

Non-colonizing winged aphids are those species that do not feed on potato, but may taste test several plants as they move through the field, acquiring and inoculating virus as they go. While colonizing aphids are generally more efficient vectors of PVY than non-colonizers, the sheer numbers of migrating non-colorizing aphids can pose a significant threat by introducing and moving virus into and within a field. The standard use of systemic insecticides (neonicotinoids) on most potatoes has minimized the populations of colonizing aphids, but as the season continues into August, much of the systemic neonicotinoids have been diminished in the phloem leaving the plant unprotected from colonizing species.

It is critical to scout seed potatoes at this time in the production season to determine whether any potato colonizing species have become established. If scouting reveals any small clusters of wingless aphids, it is very likely to be green peach or potato aphids. Once observed, it is essential to consider an application of an appropriate aphicide to limit the development of these populations. Compounds including Transform, Sivanto, Fulfill, Beleaf, or Exirel are all very good for the control of colonizing species.

Foliar applications of paraffinic oils have also been shown to modify the feeding behaviors of both potato colonizing and non-potato colonizing aphids alighting onto the potato canopy as they move through the local landscape. Specifically, these investigations have revealed that aphids are discouraged from probing on leaves that possess residues of compounds containing residues of paraffinic oils, resulting in limited inoculation attempts.

Mode of Action Class (Group)[a]	Active Ingredient	Trade Names	Application / Delivery[b]
Nicotinic acetylcholine receptor (nAChR) agonists (4A, 4C & 4D)	imidacloprid[c]	Admire Pro°, Gaucho°, Provado°	IF, ST, F, SD
	thiamethoxam	Platinum°, Cruiser°, Actara°	IF, ST, F, SD
	clothianadin	Belay°	IF, ST, F, SD
	dinotefuran	Scorpion™	F
	acetampirid[c]	Assail°	F
	sulfoxaflor	Transform°	F
	flupyradifurone	Sivanto°	F
Selective Homopteran feeding blockers (9B)	pymetrozine	Fulfill°	F
Chordotonal organ modulator (29)	flonicamid	Beleaf°	F
Narrow-range mineral and paraffinic oils (UN)	petroleum oil	Aphoil™, JMS Stylet oil°, PureSpray Green°	F
Terpene constituents (C. album) (UN)	terpene	Requiem°	F
Inhibitors of acetyl CoA carboxylase (23)	spirotetramat	Movento°	F
Ryanodine receptor modulators (28)	cyazypyr	Verimark™, Exirel™	IF, F

[a] Insecticide Resistance Action Committee (http://www.irac-online.org)
[b] Application types include: in-furrow (IF), seed treatment (ST), foliar (F) and side-dress (SD)
[c] Several generic formulations exist