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

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In This Issue:

Calendar of Events:

July 6, 2023 – UW Langlade County Extension & WI Seed Potato Certification Program – Ag Research Station Field Day, Antigo, WI
July 13, 2023 – UW Agricultural Research Station Potato Field Day, Hancock, WI (1-4:30PM)
July 20, 2023 – WI Seed Potato Certification Program & WI Potato Coalition Early Generation Seed Potato Field Day, Lelah Starks Seed Potato Farm, Rhinelander, WI (*new date!)*
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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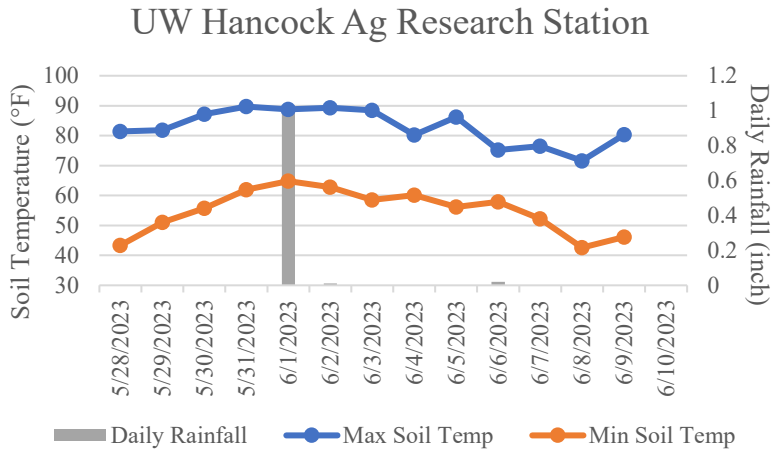
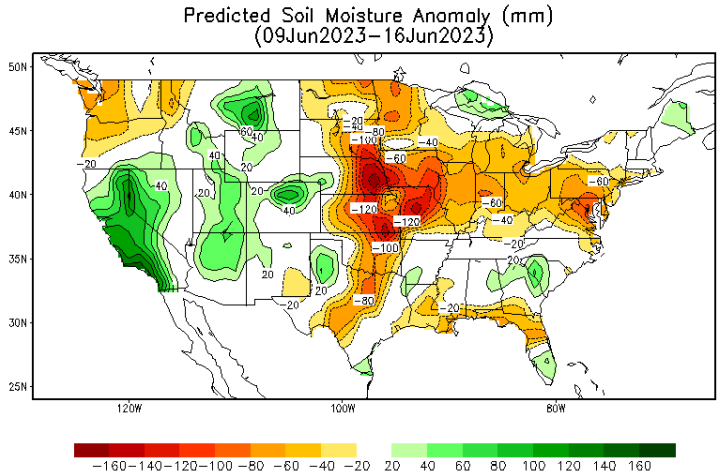
We have had warm and dry weather over the past two weeks. Daily max soil temperatures exceeded 80°F last week, but it mostly fell below 80°F this week. There were several days with daily min soil temperatures above 60°F, causing abnormal emergence and tuber bulking issues, but looking at the forecasting, it should be cool to support tuber growth in the next 10 days or so. However, we only had one rainfall event in the past two weeks, making it necessary to irrigate at least every other day with 0.4 – 0.5''.



Soil moisture in the Midwest will be moderately or substantially below average in general, as shown in the graph above. Overall, with the warm temperature, the long dry spell, and frequent irrigation, soil moisture fluctuates from dry to moist and back to dry on a daily basis. Many folks have said that common scab could be a concern this season.



Common scab could be the most severe when tubers develop under warm and dry soil conditions with a soil pH above 5.2. Soil moisture during tuber initiation has a big impact on common scab development. In particular, tubers are the most susceptible to common scab infection during the first three to four weeks after tuber initiation, when compared to six to eight weeks after tuber initiation. Earlier infection can cause deeper scab lesions on the tuber. There is not much information available about tuber susceptibility to this disease during late season tuber bulking. For cultural practices, maintaining soil moisture levels near field capacity during the first four weeks following tuber initiation will likely inhibit infection. However, irrigation may not always be the most practical method, especially on sandy soils. Furthermore, other diseases like Pythium leak and pink rot, could be worsened by excessive irrigation.

For crop progression, folks in the southern part of the state have reported creamer-size tubers and flowering on some early-planted varieties (planted on April 10th). Plants in the Central Sands have achieved about 20 - 30% canopy closure on average, including our research plots at Hancock. We are seeing pea-size tubers on some early varieties. However, some folks have reported variable crop emergence that was rarely observed over the years. Some plants emerged two weeks ago but are still pretty small in size, likely due to the heat. Some young plants were burned off and started to branch again. Others are showing rhizoc-like symptoms on stems in the top one inch. It is too early to predict yield yet, but for sure this will be a year with lots of uncertainties. For our snap beans and kidney beans that were planted on June 1st, we have seen pretty good emergence rate, as shown below.

Amanda Gevens, Chair, Professor & Extension Vegetable Pathologist, UW-Madison, Dept. of Plant Pathology, 608-575-3029, Email: gevens@wisc.edu, Lab Website: https://vegpath.plantpath.wisc.edu/

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 6/10/2023*	Potato Physiological Days (P-Days) *through 6/10/2023*
Spring Green*	**Early**	Apr 3	May 9	0	232
	Mid	Apr 17	May 12	0	210
	Late	May 10	May 23	0	141
Arlington*	**Early**	Apr 5	May 10	0	226
	Mid	Apr 20	May 15	0	188
	Late	May12	May 25	0	128
Grand Marsh	**Early**	Apr 5	May 10	0	206
	Mid	Apr 20	May 15	0	173
	Late	May 12	May 25	0	121
Hancock	**Early**	Apr 10	May 17	0	165
	Mid	Apr 22	May 19	0	160
	Late	May 14	May 28	0	110
Plover	**Early**	Apr 14	May 19	0	153
	Mid	Apr 24	May 20	0	150
	Late	May 19	May 29	0	101
Antigo	**Early**	May 1	May 28	0	101
	Mid	May 15	June 3	0	56
	Late	June 7	TBD	TBD	TBD
Rhinelander*	**Early**	May 7	June 1	0	73
	Mid	May 18	June 5	0	38
	Late	June 9	TBD	TBD	TBD

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 (stations are not situated within potato fields). 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, linked here: https://learningstore.extension.wisc.edu/products/commercial-vegetable-production-in-wisconsin

Onion Botrytis Leaf Spot/Leaf Blight. Ben Bradford, Russell Groves, UW Entomology; Ariana Abbrescia, UW-Agroecology; Amanda Gevens, UW-Plant Pathology.

We recently added a new disease modeling tool to the Vegetable Disease and Insect Forecast Network website: https://agweather.cals.wisc.edu/vdifn . The descriptive information below is also available at our website: https://vegpath.plantpath.wisc.edu/resources/onion-botrytis/

Symptoms of Onion Botrytis Leaf Spot/Leaf Blight. Note the small, whitish, oval-shaped spots on the leaf surrounded by a light green or silver halo. Photo credit: Lindsey du Toit, Washington State University, via Bugwood.org

Onion Botrytis leaf blight/leaf spot is a fungal disease of alliums caused by *Botrytis squamosa*. Symptoms first appear as small whitish spots on the leaf. These spots are oval-shaped, and sometimes surrounded by a light green or silver halo that often appears water-soaked. Leaf tips will begin to dry and wither as the disease progresses, sometimes until the whole leaf dies back. Progressed infection can stunt bulb growth and reduce yield. Heavily infected fields often appear yellowish and blighted. Severe infection can stunt bulb growth and reduce yield.

Infection. Primary infection occurs from *B. squamosa* spores that overwinter in infected in-field plant debris, cull piles, stored bulbs, volunteer bulbs in-field, and in infected soil. Secondary infection can occur when conidia spores spread from moist, infected leaves. Favorable conditions for disease development include high relative humidity and rainfall, prolonged leaf wetness, and warm temperatures.

Disease Cycle. *Botrytis squamosa* overwinters as sclerotia in infected in-field plant debris, cull piles, stored bulbs, volunteer bulbs in the field, and infested soil. These sclerotia produce airborne conidia spores and ascospores (sexual spores) that travel to and infect onion leaves during periods of high moisture and low air movement. These same favorable conditions allow for secondary cycles of infection, where infected leaves produce more conidia, which spread to further infect the same leaf or others. Sclerotia are once again formed at the end of the season, and the disease cycle will continue the following season.

Disease Modeling. To view the predicted onion botrytis risk on any given day, visit the Vegetable Disease and Insect Forecasting Network (VDIFN) website. From the Disease tab, select the "Botrytis leaf blight" model. This BOTCAST model uses a cumulative disease severity index (CDSI) computed from gridded NOAA weather data to calculate the risk of onion botrytis development, which is displayed as a colored map overlay.

- Threshold 1: ($21 \leq CDSI < 31$) Warning threshold of "no spray applied unless rain predicted or overhead irrigation applied"
- Threshold 2: high risk of rapid disease development, apply initial spray as soon as possible
- $CDSI > 40$: extremely elevated risk

The start point should be set to the date of crop emergence. Click any grid point in VDIFN to get more detailed weather and disease progression information for that location.

Cultural control. Cultural control strategies include scouting regularly to identify the presence of the disease early before it has had a chance to spread and cause significant damage. Disease spread can be limited by avoiding working in fields when plants are wet and disinfecting tools and machinery. The following practices can help mitigate the risk of this disease:

- Maintain proper spacing between plants
- Destroy cull piles
- Rogue volunteer plants
- Distance seed and commercial onion fields
- Destroy infested plant debris
- Rotate away from susceptible crops (Alliums) to reduce sclerotia in soil (3 years)

Chemical control. Use disease forecasting tools to properly time the most effective disease prevention sprays. For Wisconsin-specific fungicide information, refer to the Commercial Vegetable Production in Wisconsin (A3422), a guide available through the UW Extension Learning Store website. Or, for home garden fungicide recommendations, see Home Vegetable Garden Fungicides (D0062), a fact sheet available through the UW Plant Disease Diagnostic Clinic website. Always follow label directions carefully.

Additional References

- Latin, Richard, and Kristan Helms. "Diagnosis and Control of Onion Diseases (BP-23-W)." Cooperative Extension Service of Purdue University, May 2001. https://www.extension.purdue.edu/extmedia/bp/bp-23-w.html.
- Lorbeer, J.W., and J.T. Andaloro. "Onion-Botrytis Leaf Blight (Fact Sheet Page 737.10)." Vegetable MD Online – Cornell University, September 1983. http://vegetablemdonline.ppath.cornell.edu/factsheets/Onion_Botrytis.htm.
- Siddique, Abu-Baker M, and David C Cook. "Botrytis Squamosa – Pathogen of the Month," April 2010. https://www.appsnet.org/publications/potm/pdf/Apr10.pdf.
- Sutton, J.C., T.D.W. James, and P.M. Rowell. "Botcast: A Forecasting System to Time the Initial Fungicide Spray for Managing Botrytis Leaf Blight of Onions." *Agriculture, Ecosystems & Environment* 18, no. 2 (December 1986): 123–43. https://doi.org/10.1016/0167-8809(86)90136-2.

Adapted from UW Extension publication A3803, written by Karen Delahaut and Walt Stevenson in 2004.

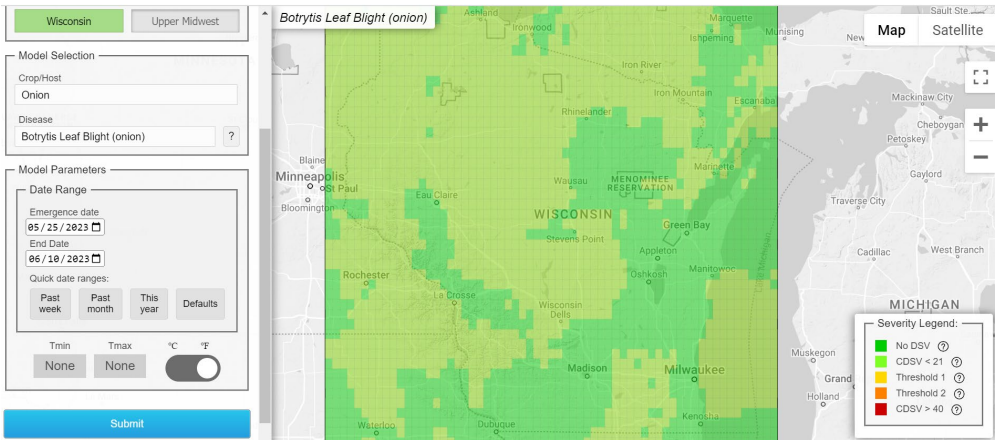


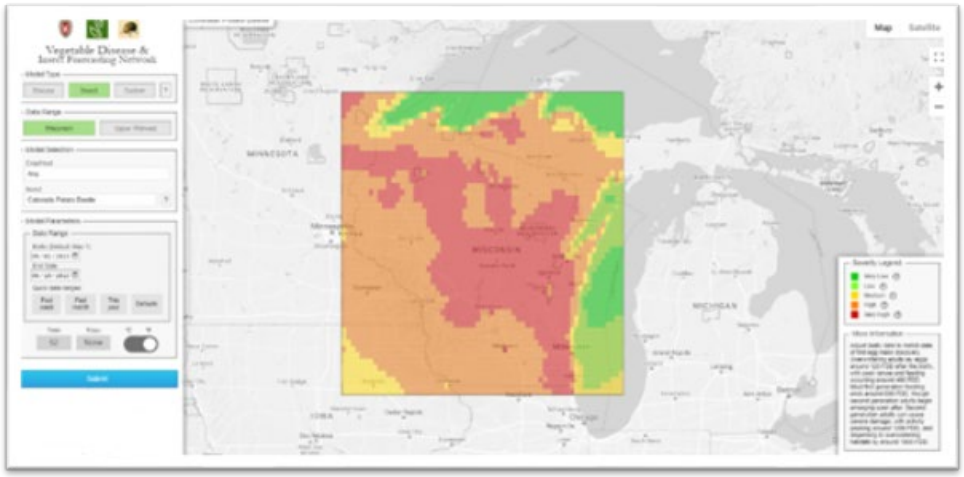
Figure above. Risk values are beginning to accumulate for onion Botrytis in Wisconsin, but we are not yet reaching thresholds for fungicide recommendation. I modeled the above risk map based on a May 25, 2023 emergence date. We have historically seen this disease emerge in Wisconsin at the end of June, into early July.

Vegetable Insect Update – Russell L. Groves, Professor and Department Chair, UW-Madison, Department of Entomology, 608-262-3229 (office), (608) 698-2434 (cell), e-mail rgroves@wisc.edu
Vegetable Entomology Webpage: https://vegento.russell.wisc.edu/

Table 1. Rate of beetle development using degree days
See VDIFN (base: 52°F; max: none; biofix: 1st eggs)

Life stage	Degree days	Accumulated degree days	Treatment
Egg	120	120	Not susceptible – do not treat
First instar	65	185	Most effective time to apply Btt
Second instar	55	240	Most effective time to apply conventional insecticides
Third instar	60	300	Most effective time to apply conventional insecticides
Fourth instar	100	400	Most effective time to apply conventional insecticides
Pupae	275	675	Not susceptible – do not treat

Colorado potato beetle (CPB) – (https://vegento.russell.wisc.edu/pests/colorado-potato-beetle/). Check for CPB early larvae now as many potato plants are reaching canopy closure in central and southern portions of the state. Emerging adults have colonized many fields in southern and central Wisconsin this past week. In northern Wisconsin, early detection of adult colonization and infestation is especially critical in deploying and perimeter sprays. In these northern fields, focus early season scouting on border rows that are adjacent to last year's potato. These have the greatest probability for early infestation by adult CPB and egg masses.



Over the past 20 years, chemical control options have progressed away from very broad-spectrum insecticides to more reduced-risk and biological insecticides. These compounds are designed to control only specific stages of insect development (e.g, eggs, early larvae), so it is critical to follow the development stages of insects within fields to understand the best application times. Remember that insect development is directly related to temperature: cool weather slows growth, warm weather accelerates development. Using a degree-day based, temperature dependent system incorporating daily high and low temperatures instead of calendar dates will help to anticipate pest outbreaks. Begin tracking temperatures when you find the first egg mass (or use an online degree-day calculator like the Vegetable Disease and Insect Forecasting Network). The VDIFN site maintains a running total of degree days to chart insect development and provides a visual map illustrating risk. The number of degree days needed for each stage of Colorado potato beetle development is provided (see inset). First generation emergence (and subsequent risk) is illustrated across central and southern Wisconsin. (Source: https://agweather.cals.wisc.edu/vdifn).

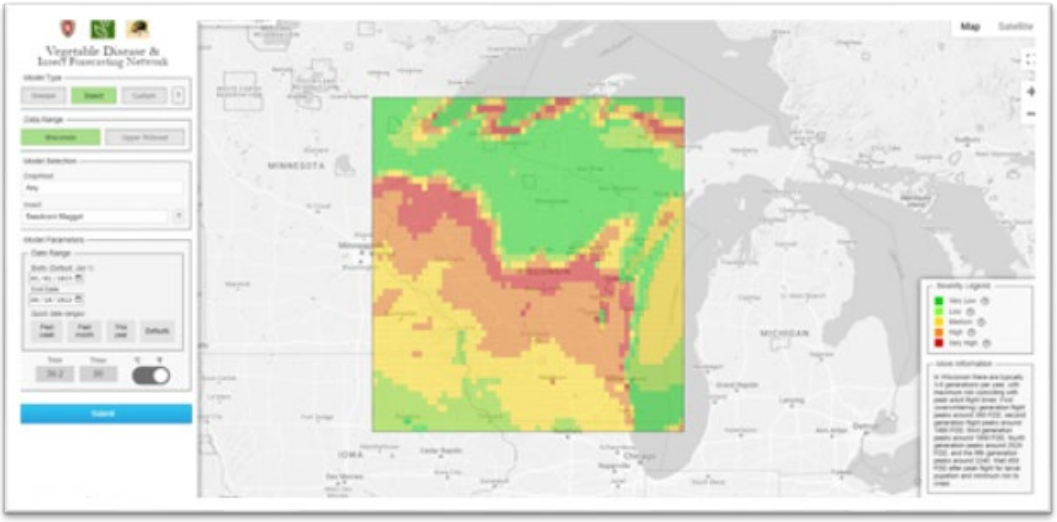
https://www.weather.gov/mkx/omega-block-051816

Potato leafhopper (PLH). In Wisconsin and much of the upper Midwest, the potato leafhopper has remained very low. These (very low) populations are likely the result of a blocking high pressure system referred to as an 'Omega block'. For southern Wisconsin, agricultural producers were under the high pressure portion of the block for as many as 3 weeks. This Omega block has significantly limited the migration of many insects that often move into the state in later spring. This pattern results in a north-to-south jet stream that causes weather patterns to move slowly, which is where the term "block" results. Weather patterns are clogged up, and this prevents weather systems from progressing at a steady pace from west to east like normal. Blocking patterns typically come and go, but the U.S. has been stuck in a rut with various forms of blocking since the start of May. All of them include an exaggerated north-to-south jet stream alignment that causes weather.

When to scout for potato leafhopper																	
	April			May			June			July			August			September		
	early	mid	late	early	mid	late	early	mid	late	Early	Mid	Late	Early	Mid	Late	Early	Mid	Late
Potatoes																		
Beans																		

If the pattern subsides, leafhoppers and other migratory insects could move into the state in the coming weeks. Recall that leafhopper feeding can result in stunted plants, brown leaves and reduced plant vigor. Both adults and nymphs feed by inserting their mouth parts into the plant's vascular tissue and extracting sap. Damage results when the insect injects saliva containing toxic substances and creates physical damage during feeding, plugging the vascular tissue and permanently reducing the plant's photosynthetic efficiency. Snap beans and potatoes should be scouted regularly for PLH activity. Leafhoppers tend to migrate into other crops in early summer after alfalfa is cut. This is a key time to watch for early migrants in vegetable plantings. With snap beans, the greatest amount of injury caused by PLH occurs during the seedling stage.

Seedcorn maggot 'Round #2' across Wisconsin and upper Midwest – (https://vegento.russell.wisc.edu/pests/seedcorn-maggot/). The second generation of the seedcorn maggot has entered southern Wisconsin and is progressing northward. Recall that seedcorn maggots (SCM) have a large host range including numerous common vegetable crops. In high numbers and when peak SCM are predicted, egg laying and larval development can decimate entire crop stands if left untreated. Larvae will feed in the cotyledons and below-ground hypocotyl (stem) tissue of seedling plants, resulting in a variety of damage symptoms. Feeding damage in germinating seeds will often kill seedlings before they emerge. Poor germination or poor stands of susceptible crops may indicate a SCM problem.



Peak flight activity for 2nd generation of seedcorn maggot in the upper Midwest and across southern Wisconsin. The risk of infestation from the developing 2nd generation is illustrated by the warm colors (reds, oranges, yellows) on the map. (Source: https://agweather.cals.wisc.edu/vdifn).