Vegetable Crop Update

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

Extension
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Calendar of Events:

November 29-December 1, 2022 – Midwest Food Producers Assoc. Processing Crops Conference, Kalahari Convention Center
January 29-31, 2023 – Wisconsin Fresh Fruit and Vegetable Growers Conference, Kalahari Resort, Wisconsin Dells, WI
February 7-9, 2023 – UW-Madison Div. of Extension & WPVGA Grower Education Conference & Industry Show, Stevens Point, WI

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Current P-Day (Early Blight) and Disease Severity Value (Late Blight) Accumulations. 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 in 2022. 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. Weather data used in these calculations will come 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. Data are available for each weather station at: https://vegpath.plantpath.wisc.edu/dsv/.

Location	Planting Date		50% Emergence Date	Disease Severity Values (DSVs) 9/11/2022	Potato Physiological Days (P-Days) 9/11/2022
Grand Marsh	**Early**	Apr 5	May 10	77	914
	Mid	Apr 20	May 15	77	873
	Late	May 12	May 25	77	815
Hancock	**Early**	Apr 7	May 12	48	908
	Mid	Apr 22	May 17	48	888
	Late	May 14	May 26	48	829
Plover	**Early**	Apr 7	May 15	119	857
	Mid	Apr 24	May 20	119	823
	Late	May 18	May 27	118	788
Antigo	**Early**	May 1	Jun 3	54	733
	Mid	May 15	June 15	50	659
	Late	June 10	June 24	50	574

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.

Accumulations of P-Days were ~40 in most locations over the past week. Potatoes should continue to be on a preventative fungicide program with effective disease management selections to limit early blight in long-season potatoes.

All monitored Wisconsin locations accumulated ~5 DSVs this past week indicating a relatively low risk week for promoting late blight in potato, however, the DSVs came primarily in the past 3 days with the precipitation which provides can promote late blight. A fungicide list for potato late blight in Wisconsin was provided in a past newsletter and is available here: https://vegpath.plantpath.wisc.edu/2022/07/03/update-10-july-3-2022/

To my knowledge, there have been no reports of late blight in Wisconsin on potato or tomato so far this season. Michigan reported potato late blight in a few fields over this past week. The genotype has not yet been reported. According to usablight.org there were no other diagnoses of late blight in the US in the past week. Previous diagnoses in the US this season included those in NC, FL, CA, TN, and Ontario Canada. These have been primarily on tomato, with only the FL report on potato in early spring.

Cucurbit Downy Mildew: During this past week, cucurbit downy mildew was confirmed in WV and SC. Previously this growing season, the disease was confirmed in AL, CT, DE, FL, GA, KY, MA, MD, ME, MI, NC, NH, NJ, NY, OH, PA, SC, VA, and WI. The first report in WI had come from Waushara County (UW Hancock ARS) on Aug 15; no subsequent reports have followed from WI. Red counties, on the figure below, indicate recent reports (less than 1 week old) of cucurbit downy mildew.

https://cdm.ipmpipe.org/

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As a reminder, the pathogen is now known to have two ‘strains’ for clade types. The type (Clade 2) which infects cucumber, can also infect melon. Due to fungicide resistance within the downy mildew pathogen population, especially in Clade 2, selection of fungicides is important. Management of cucurbit downy mildew requires preventative fungicide applications as commercial cultivars are generally susceptible to current strains (Clades) of the pathogen. Management information can be sourced here: https://vegpath.plantpath.wisc.edu/2022/07/03/update-10-july-3-2022/

Onion Downy Mildew was confirmed on commercial onion leaves from central WI this past week. Onion downy mildew can be very problematic in onion fields. This foliar disease is caused by a fungus-like pathogen called *Peronospora destructor*. Infection is favored by temperatures less than 72°F and high humidity and leaf wetness. The pathogen can overwinter in volunteer onion, culls, and wild Allium weed species if the pathogen was present in your location in previous years. Symptoms include pale or white elongated patches on leaves that start off small and can elongate and produce a purple-gray sporulation which appears “downy.” Leaves can bend over and eventually die due to severe downy mildew infection. Please refer to picture below. This disease can impact bulb size, quality, and storability.

Management recommendations include practicing a 3+ year rotation to non-hosts such as small grains and corn, eliminating culls and volunteers, avoiding dense planting, avoiding excess N and overhead irrigation, and orienting rows parallel to prevailing wind to avoid prolonged leaf wetness.
Effective fungicides for onion downy mildew control include: ametoctradin+dimethomorph (Zampro) azoxystrobin (Quadris, Amistar, others) azoxystrobin + propiconazole (Quilt Excel) copper hydroxide (Kocide, Champ, others) cymoxanil + chlorothalonil (Ariston) cymoxanil + famoxadone (Tanos) dimethomorph (Forum) fenamidone (Reason) fluazinam (Omega) fosetyl-aluminum (Aliette) mancozeb (Dithane, Manzate, others) mandipropamid (Revus) mefenoxam (Ridomil Gold) oxathiapiprolin+chlorothalonil (Orondis Opti) oxathiapiprolin+mandipropamid (Orondis Ultra) pyraclostrobin (Cabrio) pyraclostrobin & boscalid (Pristine) zoxamide+chlorothalonil (Zing!) zoxamide+mancozeb (Gavel)

Although labeled for onion downy mildew, coppers and chlorothalonil are not very effective for downy mildew control, and coppers can be phytotoxic to onions. Please see the 2022 Wisconsin Vegetable Production Guide A3422 for further details on application rates and specifications. If you suspect you have Downy mildew in your onions, please get a sample and contact your county agent, our disease diagnostic clinic, or myself for confirmation. The 2022 A3422 Commercial Vegetable Production in Wisconsin guide is available for purchase through the UW Extension Learning Store: https://learningstore.extension.wisc.edu/products/commercial-vegetable-production-in-wisconsin

Onion Stemphylium This disease has become more common and problematic in commercial onion fields of Ontario, Michigan, and now Wisconsin in recent years. Stemphylium infections were significant in several commercial onion fields in past recent years. This disease is caused by the fungus *Stemphylium vesicarium.* Symptoms begin as small yellow-tan, watersoaked lesions that elongate into lesions that turn dark olive brown to black due to spore production. Leaves can become completely diseased and necrotic when lesions coalesce. See pictures, below, of symptoms of Stemphylium. Symptoms are not easily distinguished until the spore production phase occurs. Stemphylium, as well as purple blotch and Alternaria, can prematurely defoliate the crop causing reduced bulb quality and increased susceptibility to secondary bacterial diseases that may cause storage rots.

Stemphylium most often infects dead/dying onion leaves when temps are warm (64 – 77°F) and humid, with periods of leaf wetness (16+ hours). Since the pathogen infects onions that have been physically damaged or infected by other diseases, it is important to maintain healthy plant stands and control other common foliar diseases such as purple blotch, downy mildew and Botrytis. Herbicide, hail, and blowing sand damage seem to be the primary initial causes for onion foliar damage which then leads to Stemphylium infection; without the damage, infection is much less likely.

The same cultural methods of control that are used to manage other foliar onion disease should be employed for Stemphylium. Fungicides registered for the control of purple blotch can be effective on Stemphylium leaf blight; however, it seems to be harder to control Stemphylium with fungicides that are highly effective on purple blotch. In our trials on onions in Wisconsin in 2015, most programs looked similar in disease control performance with the exception of programs with Quadris Top and Luna Tranquility. Note that Luna Tranquility contains two active ingredients. One is Scala and the second is a fungicide in FRAC group 7. Endura is also a group 7 fungicide with registration on onion in WI. Please see results of our fungicide trial from 2015, below (Program #6 with Luna Tranquility provided best Stemphylium control).

ONION, YELLOW (*Allium cepa* 'Safrane')
Stemphylium Leaf Blight; *Stemphylium vesicarium*
Purple Blotch; *Alternaria porri*
Botrytis Leaf Blight; *Botrytis squamosa*

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Evaluation of fungicide treatments for control of foliar diseases in onion in Wisconsin, 2015: An onion fungicide efficacy trial was established in a commercial field on muck soil in Markesan, Wisconsin on 25 May with 'Safrane' onion using a standard commercial planter. The experimental design consisted of 4 replicates arranged in a randomized complete block design. Each treatment plot consisted of 5-ft-wide beds with four 10-ft-long rows spaced 15 in. apart with 2-ft non-sprayed buffer alleys between plots in the same row. Insect, weed, and fertility management was carried out as per commercial standards for the production region and were applied by the grower cooperator. Naturally occurring inocula of all three pathogens were present from nearby agricultural production fields. The first fungicide application was applied by the grower-cooperator on 18 June and consisted of 1.5 lb/A of Echo 90DF to all trial plots using a commercial fungicide applicator. Subsequent fungicide treatments were applied on 1 Jul, 8 Jul, 15 Jul, 22 Jul, 29 Jul, 5 Aug, and 12 Aug using a CO2 backpack sprayer equipped with four TeeJet 8002VS nozzles spaced 19-in. apart and calibrated to deliver 35 gal/A at a boom pressure of 40 psi. The severity of total, combined foliar disease of the two center rows was rated on 28 Jul, 12 Aug, and 25 Aug using the Horsfall-Barratt rating scale (0-11 rating with 0=no disease, 11=100% disease severity). The Area Under the Disease Progress Curve (AUDPC) was determined by trapezoidal integration and then converted into Relative AUDPC (RAUDPC), i.e. percentage of the maximum possible AUDPC for the whole period of the experiment. On 31 Aug, onions in the center five feet of the two center rows were pulled, hand-topped, weighed, and graded. Data were analyzed using ANOVA (α=0.05) and Fisher's LSD at α=0.05. The experimental plots relied exclusively upon natural precipitation for water, with 10.2 in total during the production season. Disease pressure was very high in this trial. There were significant differences among treatments in grade (data not shown) and yield. All fungicide treatments significantly reduced foliar disease compared to treatment 1, which was a single application of Echo 90DF. Numerically, the treatment that included Luna Tranquility (treatment 6) provided the greatest disease control compared to all other fungicide treatments.

Treatment Number	Fungicide and rate/A	Application Timing[z]	Yield (cwt/A)	RAUDPC[xy]
1	Echo 90DF 1.5 lb	1	669.8	0.266 c
2	Echo 90DF 1.5 lb	1		
	Endura 70WG 5.0 oz + Dithane 75DF 2.0 lb	2,4		
	Quadris Top 2.71SC 12.0 fl oz + Bravo WS 720SC 1.0 pt	3,5		
	Dithane 75DF 2.0 lb	6,7	673.4	0.169 ab
3	Echo 90DF 1.5 lb	1		
	Scala 606SC 18.0 fl oz + Dithane 75DF 2.0 lb	2,4		
	Quadris Top 2.71SC 12.0 fl oz + Bravo WS 720SC 1.0 pt	3,5		
	Dithane 75DF 2.0 lb	6,7	698.8	0.176 ab
4	Echo 90DF 1.5 lb	1		
	Switch 62.5WG 14.0 oz + Dithane 75DF 2.0 lb	2,4		
	Quadris Top 2.71SC 12.0 fl oz + Bravo WS 720SC 1.0 pt	3,5		
	Dithane 75DF 2.0 lb	6,7	695.6	0.188 ab
5	Echo 90DF 1.5 lb	1		
	Rovral 4F 1.0 pt + Dithane 75DF 2.0 lb	2,4		
	Quadris Top 2.71SC 12.0 fl oz + Bravo WS 720SC 1.0 pt	3,5		
	Dithane 75DF 2.0 lb	6,7	725.6	0.185 ab
6	Echo 90DF 1.5 lb	1		
	Luna Tranquility 500SC 16.4 fl oz + Dithane 75DF 2.0 lb	2,4		
	Quadris Top 2.71SC 12.0 fl oz + Bravo WS 720SC 1.0 pt	3,5		
	Dithane 75DF 2.0 lb	6,7	751.0	0.150 a
7	Echo 90DF 1.5 lb	1		
	Dithane 75DF 2.0 lb	3,7		
	Bravo WS 720SC 2.0 pt	5	720.1	0.203 b

[z]Fungicide application dates: 1=18 Jun, 2 = 8 Jul, 3= 15 Jul, 4 = 22 Jul, 5 = 29 Jul, 6 = 5 Aug, 7 = 12 Aug.
[y]Column numbers followed by the same letter are not significantly different at P=0.05 as determined by Fisher's Least Significant Difference (LSD) test.
[x]RAUDPC= Relative Area Under the Disease Progress Curve.

Watermelon/Cucurbit Anthracnose has been a severe foliar disease concern on cucurbits in central Wisconsin this late summer. Anthracnose caused by the fungus *Colletotrichum orbiculare* can infect all above-ground plant parts on all cucurbits and symptoms can vary in appearance based on cucurbit type. Irregular brown leaf spots form on squash, melon and cucumber. The center of the leaf spot may drop out resulting in a ragged appearance (very common cucumber). Cucumber leaf spots often have a yellow halo. Watermelon leaf spots are smaller and dark brown to black. Sunken elongated stem infections can occur on cucumber and melon but are not common on other cucurbits. Infections on melon often exude a reddish gum. Fruit infections are sunken black spots 1/4 -1/2 inch across and 1/4 inch deep. Spots may have fluffy white cotton-like mycelia and sticky salmon-colored spores during wet weather.

This pathogen survives in infected plant debris and on seed. Spores form on infected leaves and fruit and are readily spread by splashing rain and/or irrigation water, and on hands and tools. The pathogen is favored by warm, moist conditions and typically appears first in mid-to late summer after canopy closure.

To manage this disease, varietal resistance is available and seed should be purchased from a clean and reputable source. Do not save seed from infected plants. Crop rotation away from cucurbits on a 3-year schedule can limit inoculum and subsequent disease. Irrigate cautiously to limit foliar moisture as possible (drip irrigation is best). Limit work in the field when plants are wet and consider possible practices of removal or destruction of infected vines (cultivation) at the end of the season to reduce residual inoculum.

Several commercial, conventional fungicides are registered for control of anthracnose on cucurbits including: benzovindiflupyr, boscalid, chlorothalonil, cyprodinil, difenoconazole, fluopyram, fluoxastrobin, fluxapyroxad, mancozeb, pyraclostrobin, tebuconazole, thiophanate methyl, and trifloxystrobin. Page 107 of the A3422 Commercial production guide for Wisconsin addresses further details: https://cdn.shopify.com/s/files/1/0145/8808/4272/files/A3422-2022.pdf

For more information on this disease:
https://edis.ifas.ufl.edu/pdf%5Carchived%5CPP%5CPP266%5CPP266-1026374.pdf

Pictures of watermelon anthracnose courtesy of University of Florida IFAS.