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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Calendar of Events:

July 7, 2022 – UW-Hancock Ag Research Station Field Day
July 8, 2022 – UW-Extension Langlade Co. Airport Ag Research Station Field Day
July 28, 2022 – UW-Rhinelander Field Day
November 29-December 1, 2022 – Midwest Food Producers Assoc. Processing Crops Conference, Kalahari Convention Center
February 7-9, 2023 – UW-Madison Div. of Extension & WPVGA Grower Education Conference & Industry Show, Stevens Point, WI

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It has been unseasonably cold for most of April (average daily temperature was below 45°F and only reached above 50°F once, Figure 1). Therefore, those seed tubers planted early in the month did not acquire many growing degree days to encourage emergence. The good news is that it is expected to warm up next week, and hopefully, potato growers in Central Sands will get a chance to finish planting soon. Happy Planting 2022!

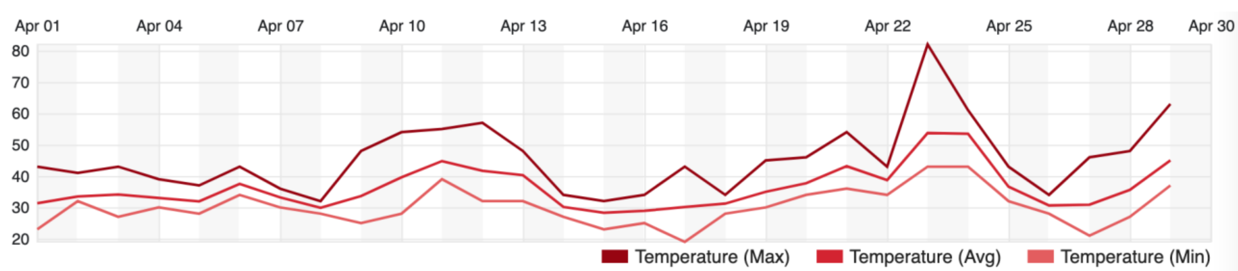
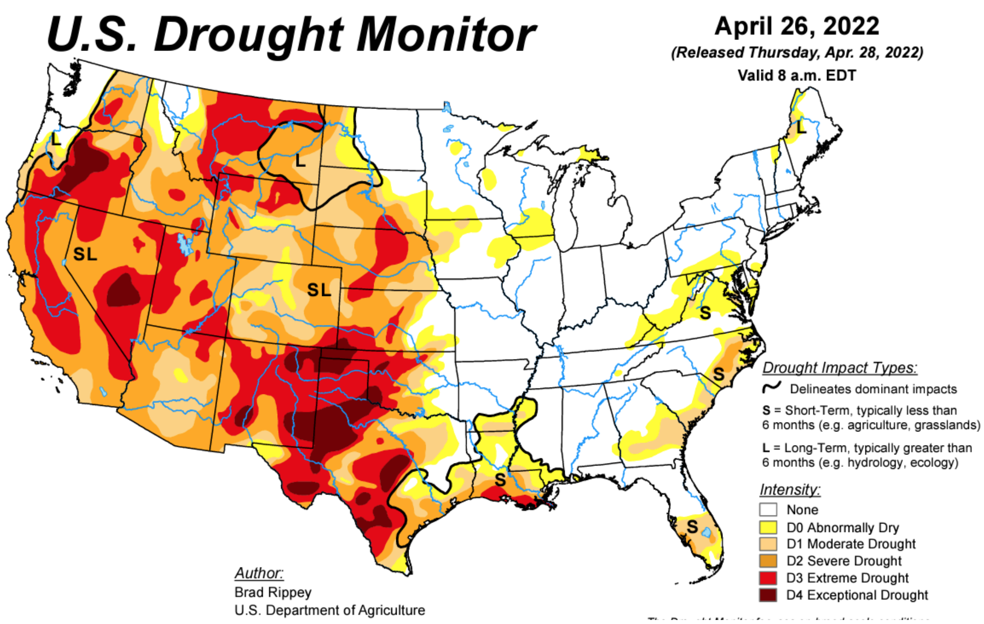


Figure 1. Max, average, and min daily temperatures measured at the Central Wisconsin Airport between April 1st and 29th.

The U.S. drought monitor map (https://droughtmonitor.unl.edu/) indicates that as of April 26th, the western part of the country including potato-producing states like Idaho and Colorado were under severe to exceptional drought, due to lackluster snowpack this past winter. The excessive heat in 2021 resulted in below-average yield in Idaho, and it has been reported that "much of Idaho is poised to enter another summer with below-normal streamflow and concerns about adequate irrigation supply". Situations in the Columbia Basin of Washington were better, where all of the snowpack sites are at normal or slightly above normal level. Although spring temperatures were projected to be below normal. Looking ahead, it will be another unpredictable growing season in 2022.



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/

Ben Bradford, **Russell Groves,** Dept. of Entomology, UW-Madison

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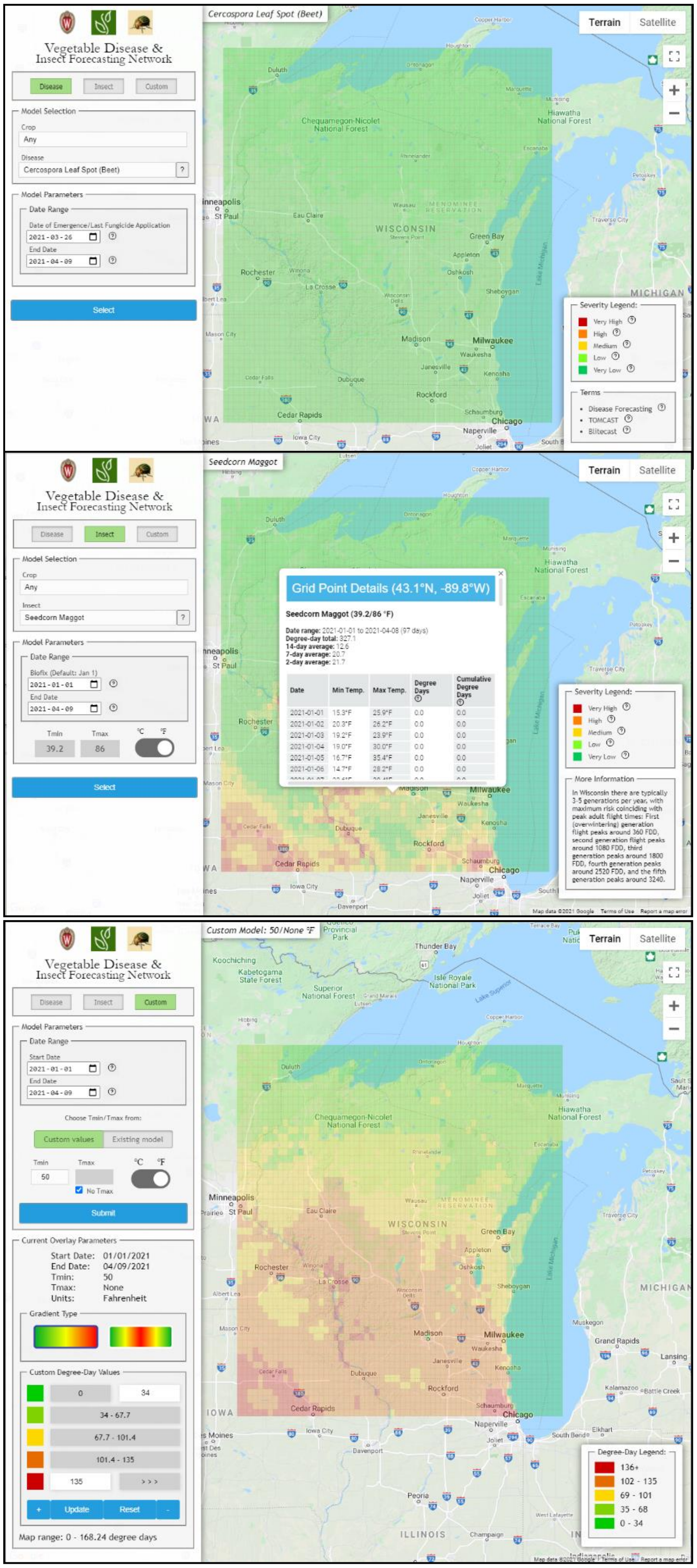
Ben Bradford: **An introduction to the Wisconsin Vegetable Disease and Insect Forecasting Network (VDIFN) website.** One of the pillars of modern integrated pest and disease management strategies is the use of local climatic and environmental variables to model disease and insect pest risk for a particular field or region. Rather than treating pests on a preset schedule or waiting for symptoms to appear, growers can anticipate the onset of increased pest risk using predictive models developed and tested for specific disease and insect risks to crops. The outcomes of the use of such models would be increased awareness of current and near-future pest and disease risks, as well as a reduction in the use of pesticides and increased profits. There are many such predictive tools available on the market with different costs and benefits – here we present VDIFN, a free tool for growers and residents of Wisconsin and ***now*** the Upper Midwestern region of the US, that currently includes five plant disease models (*Cercospora* leaf spot, early blight, late blight, onion Botrytis, and carrot leaf blight), 24 insect models, and a custom degree-day map generator.

VDIFN uses gridded weather data downloaded daily from National Oceanographic and Atmospheric Administration (NOAA) servers. Data include daily min/max temperatures and relative humidity, which are fed into various models and converted into daily disease severity values (or equivalents) or degree-days. These disease severity value and degree-day accumulations are then displayed on the map as color-coded risk scores based on the estimated risk to susceptible crops. Clicking on an individual grid cell brings up the daily history of weather data and disease severity values or degree-days for that location. VDIFN does not currently have the ability to use weather forecasts to run the models out into the future. **How to use VDIFN (https://agweather.cals.wisc.edu/vdifn)**



When you visit VDIFN you will see the navigation and settings pane on the left, the map and pest severity display in the center, and a legend on the lower right. You can switch between disease, insect, and custom model modes with the buttons across the top of the left panel. Pick a model using the **Model Selection** section, and use the **question mark box** to get more information on the disease or insect. After selecting a model, note that the **date range** boxes populate with defaults for each model, but can be adjusted if desired.

Click on an **individual grid point** to bring up more details for that specific location, including a detailed history of weather readings and daily and cumulative disease severity value or degree-days (depending on the model selected). For the following example, I brought up the **Seedcorn Maggot** insect model, which is indicating some level of risk across southern Wisconsin. The **legend** explains that this corresponds to the adult mating and egg-laying flight of the first (overwintering) generation. There will be several more successive generations this year occurring at different degree-day accumulations.

The **custom model**, shown here, is a little more complicated to use, but essentially it allows you to generate and visualize any degree-day model of your choosing (or select the parameters of one of the insect models). Degree-days essentially quantify the amount of heat energy available in a given day for insect development and are calculated from daily min and max temperatures. The map then will show you how much heat has accumulated between the dates that you specify (generally Jan 1 to present). This is an easy way to visualize the progression of the seasons, or you can cross-reference the degree-days to plant or insect developmental milestones. The **color gradient** can be customized using the inputs on the lower left of the page shown. The amount of gradations can be increased or decreased using the **plus/minus buttons**, and any adjustments to the min/max color points can be applied with the **update button**. Use the **reset button** to even space the color gradient between the minimum and maximum degree-days present on the map. The second

gradient type can be used if you want to emulate the green-red-green color pattern of the insect models, and you can specify the start, peak, and end of the color gradient.

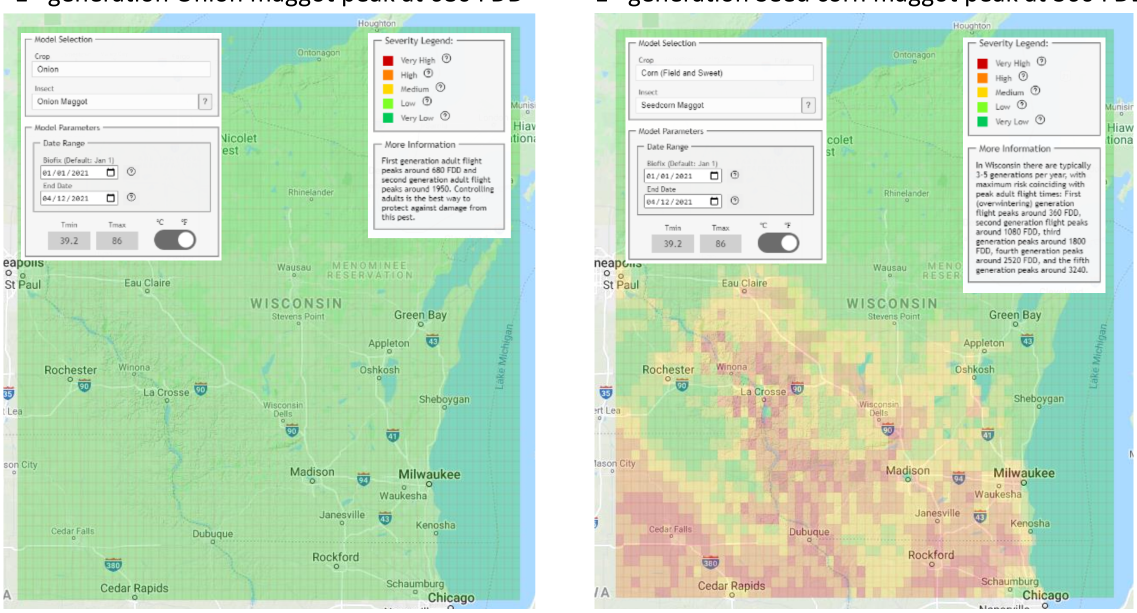
We encourage readers of this newsletter to explore VDIFN and share any feedback with us. We are actively developing this site and can add additional disease or insect models if requested. For more information on degree-days or insect models, visit the Groves lab website: https://vegento.russell.wisc.edu/ipm/degree-day-modeling/.

Russell L. Groves: **Accumulating Degree Days and Insect Forecasting**. As previously noted in this newsletter, the emergence and periods of peak flight of selected insects can be predicted using the VDIFN website. As a good comparison, the first generation of seed corn maggot flies is now fully underway at several locations in southern and southwestern Wisconsin and is approaching several sites in central Wisconsin. Recall that this insect has a base temperature of 39.2°F and the emergence of adult fly populations are expected at accumulated degree days of 360, 1,080 and 1,800 degree days. In many portions of SW Wisconsin, several locations have just exceeded this value with the recent 4-5 days of warm temperatures. Adult seed corn maggot flies will become very active now and will begin to lay eggs at the base of susceptible (young) plants, where larvae tunnel into underground portions. In somewhat of a contrast, however, the first of three generations of onion maggots will occur when degree day totals reach and exceed 680 degree days (spring), 1950 degree days (summer), and 3230 degree days (fall) respectively, using a similar base temperature of 39.2°F. As you can see from the map, the first generation peak of egg-laying onion maggot adults has not been reached in all portions of the state.

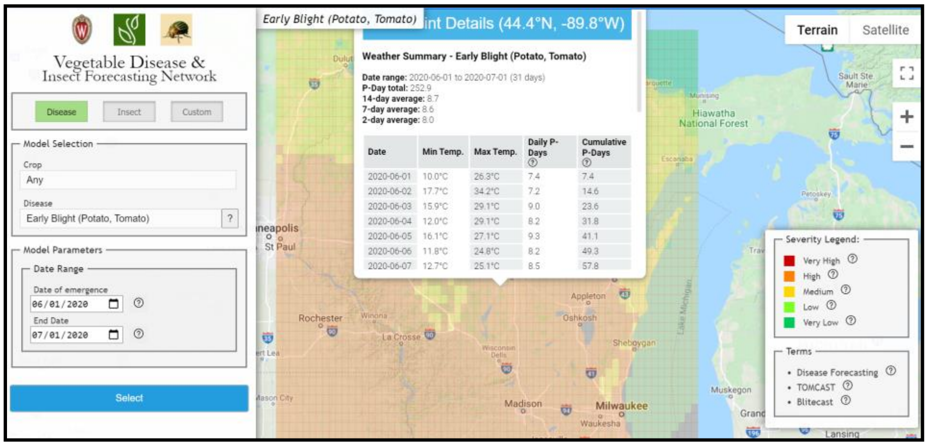
Vegetable Entomology Webpage: http://www.entomology.wisc.edu/vegento/index.html

Onion maggot - degree day base temp 39.2°F
1st generation Onion maggot peak at 680 FDD

Seed Corn maggot - degree day base temp 39.2°F
1st generation Seed corn maggot peak at 360 FDD



Amanda Gevens: **Vegetable disease forecasting.** With recent updates to the VDIFNet site we pleased to now offer tools to forecast early blight and late blight in potato and tomato, onion botrytis, and cercospora in beet. These are in addition to forecasts for potato and tomato late blight and carrot foliar disease. As indicated, above, we can include additional models in time to further expand the utility of this forecasting network. Easy access to these forecasts across Wisconsin with use of the NOAA environmental data is a key advantage of this network. I will routinely highlight outputs of this site in the UW Madison Division of Extension Vegetable Crop Updates Newsletter to provide vegetable disease status reports and management recommendations. The models included on the site have been demonstrated as effective in our growing region. In some cases, we have further validated with on-site field research.



Above, I share a screen capture of the potato early blight risk output on July 1, 2020 for a hypothetical potato field with 50% crop emergence on June 1, 2020. The risk output is shown in the center of the screen and offers early blight risk values ("P-day" values) along with cumulative value for gauging proximity to the 300 P-day threshold, and min and max temperatures by day. Early blight in potato and tomato is caused by the debris-borne fungus *Alternaria solani*. Inoculum can be ample in regions of concentrated potato and vegetable production. This forecast tool supports early season disease management and thus, inoculum decrease for mid- and late-season and longer term.

We will continue to offer the forecast data from the 4 in-potato-field weather stations which generate forecasts for early blight and late blight https://vegpath.plantpath.wisc.edu/dsv/.

The forecast indicates time to protect the crop. The 2022 Commercial Vegetable Production in Wisconsin Guide (A3422) can help you select prophylactic fungicides (conventional and organic) to protect the vegetable crop. https://cdn.shopify.com/s/files/1/0145/8808/4272/files/A3422-2022.pdf