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. 15 – July 17, 2021

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- Disease Forecasting Updates for Potato
- Cucurbit Downy Mildew Updates
- Colorado Potato Beetle, Japanese Beetle, and Cabbage Looper Updates
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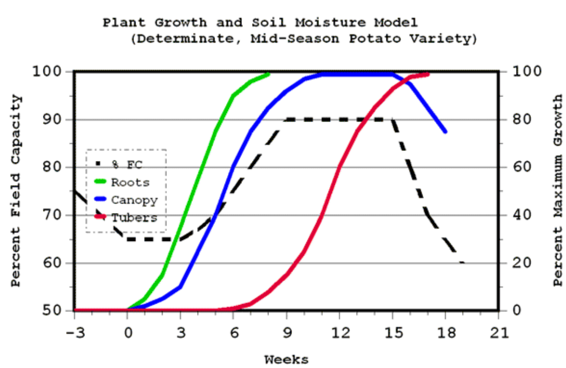
Calendar of Events:

July 21, 2021 – UW-Hancock Ag Research Station Field Day (1-4:30PM)
July 22, 2021 – UW-Extension Langlade Co. Airport Ag Research Station Field Day
November 30-December 2, 2021 – Midwest Food Producers Assoc. Processing Crops Conference, Kalahari Convention Center
February 8-10, 2022 – UW-Madison Div. of Extension & WPVGA Grower Education Conference, Holiday Inn, Stevens Point, WI

Yi Wang, Assistant Professor & Extension Potato and Vegetable Production Specialist, UW-Madison, Dept. of Horticulture, 608-265-4781, Email: wang52@wisc.edu.

Since all potato plants have entered their full bloom to plant senescence stage, which runs about six weeks in July and August, the canopy and roots are fully grown except for indeterminate varieties. Tubers are growing rapidly and are in their log phase of growth. It is important to keep in mind that tubers are 76 to 82% water and that water must come from the environment, rain or irrigation. Irrigation plus rain should be 2 to 2.5 inches per week or about 15 inches for this growth stage. Soil moisture should be at 80 to 90% field capacity, because this is the period when plants have their highest demand for water and are the most sensitive to soil moisture deficit, while daily evapotranspiration (ET) is the highest of the year. Water stress will reduce tuber growth and result in tuber malformations, early dying, early blight, brown spot, and common scab. On the flip side, excessive water will increase water rots of vines and tubers, and create conditions which could be conducive for late blight.

The figure below summarizes the relations of the production periods and the relative growth of roots, canopy and tubers to field capacity or soil moisture. The graphic model is based on a determinate, mid-season variety such as Atlantic.



0 wk= Planting, 3 wk= Emergence, 5-6 wk= Tuber Initiation
8-9 wk= Full Bloom, 15 wk= Senescence, 18 wk= Vine Kill
Max. Growth Phases: <15%= Lag, 15-85%= Log, >85%= Flat

Change of topic, a team of Chinese researchers recently published a paper in the highest ranking biological science journal (Cell) entitled "Genome design of hybrid potato". Compared with other major crops, the complexity of containing four sets of chromosomes is the key factor hampering the genetic improvement of cultivated potato. For example, the 119-year-old Russet Burbank is still the biggest processing cultivar, despite it being susceptible to many major diseases. Clonal propagation (planting seed tubers) involves ~10% of the total production costs, and bears a significant carbon footprint for seed tuber production associated with pest control, storage, and shipment.

Actually, ~70% of the natural potato germplasm are diploid (containing only two sets of chromosomes), the extensive diversity of which has not been exploited. The Chinese team utilized the theory and methods of genome design to carry out hybrid potato breeding, re-invented the potato from a clonally propagated tetraploid crop using seed tubers into an inbred-line-based diploid crop, propagated by true seeds. The team developed the first generation of highly homozygous inbred lines and F1 hybrids, which exhibited strong heterosis in growth vigor and yield in the greenhouse. The estimated tuber yield of these F1 hybrids in the first plot trial is 380 cwt/acre, indicating a good yield potential. In addition, the hybrid potatoes are rich in dry matter and nutrient value.

The team concluded that potato hybrid breeding is still in its infancy, but genome design can transform potato breeding from a slow, non-accumulative mode into a fast-iterative one, making potato both a more productive crop and a more nutritious food. They anticipate that hybrid breeding and genome design will transform potato into a non-host to its most devastating disease, late blight, making it a more environmentally friendly crop.

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

Potato Disease Modelling and Management of Early Blight and Late Blight: 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. 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 comes from weather stations that are placed in potato fields in each of the four locations (substitute data from https://agweather.cals.wisc.edu/vdifn as needed). Data are available in graphical and raw formats for each weather station at: https://vegpath.plantpath.wisc.edu/dsv/

Location	Planting Date		50% Emergence Date	Disease Severity Values (DSVs) 7/16	Potato Physiological Days (P-Days) 7/16
Grand Marsh	**Early**	April 2	May 10	**50**	**69**
	Mid	April 10	May 15	**50**	**459**
	Late	May 1	May 23	**44**	**397**
Hancock	**Early**	April 5	May 12	**29**	**469**
	Mid	April 15	May 15	**29**	**460**
	Late	May 5	May 23	**23**	**398**
Plover	**Early**	April 7	May 12	**48**	**450**
	Mid	April 20	May 20	**46**	**405**
	Late	May 7	May 30	**41**	**343**
Antigo	**Early**	April 26	May 28	**19**	**376**
	Mid	May 10	June 5	**19**	**338**
	Late	May 20	June 13	**19**	269

All potato fields of Wisconsin have reached/surpasesed the threshold for Disease Severity Values (18) and should continue to be preventatively treated for late blight management. Weather conditions over the past week, especially in areas which received elevated rainfall, were conducive to late blight. **Late blight** hasn't yet appeared in the US this season (usablight.org), however, when environmental conditions are favorable the pathogen can become active and quickly cause crop destruction. For more information on this disease: https://vegpath.plantpath.wisc.edu/resources/potato-late-blight/

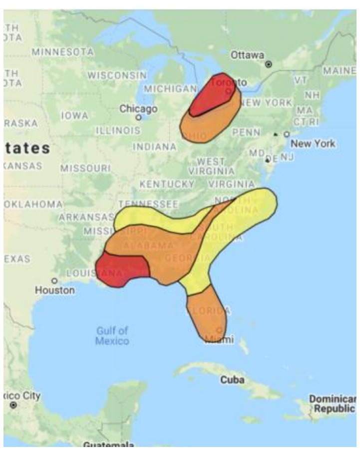
To help in selection of fungicides for managing late blight in potato in Wisconsin, I have updated a table, a second attachment in the UW Veg Crop Updates Newsletter email (and soon available at UW Vegetable Pathology website), which includes modes of action and resistance risk management groups.

The **early blight** P-Day threshold of 300 has been met/exceeded in nearly all potato plantings of Wisconsin with the exception of latest plantings in the Antigo area. Early blight is active around Wisconsin in the lower and mid-canopies. A listing of details of currently registered fungicides for early blight management can be found in our 2021 Wisconsin Vegetable Production guide: https://cdn.shopify.com/s/files/1/0145/8808/4272/files/A3422-2021.pdf

Performance of newer fungicides in our Hancock trials from recent years is provided at our website: https://vegpath.plantpath.wisc.edu/field-trials/

Cucurbit Downy Mildew Update: Cucurbit downy mildew was reported in OH (cucumber), VA, NY (cucumber), AL, PA (cucumber), and Ontario Canada (cucumber) during this past week. This season, so far, the disease has been documented in AL, DE, FL, GA, LA, MD, MS, NC, NJ, NY, OH, Ontario Canada, PA, SC, VA.

There is no predicted movement of the pathogen into Wisconsin at this time– as reflected in the recent forecast depicted below from https://cdm.ipmpipe.org/



Management recommendations:
https://vegpath.plantpath.wisc.edu/2021/06/20/update-11-june-20-2021/

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/

Colorado potato beetle (CPB) – https://vegento.russell.wisc.edu/pests/colorado-potato-beetle/

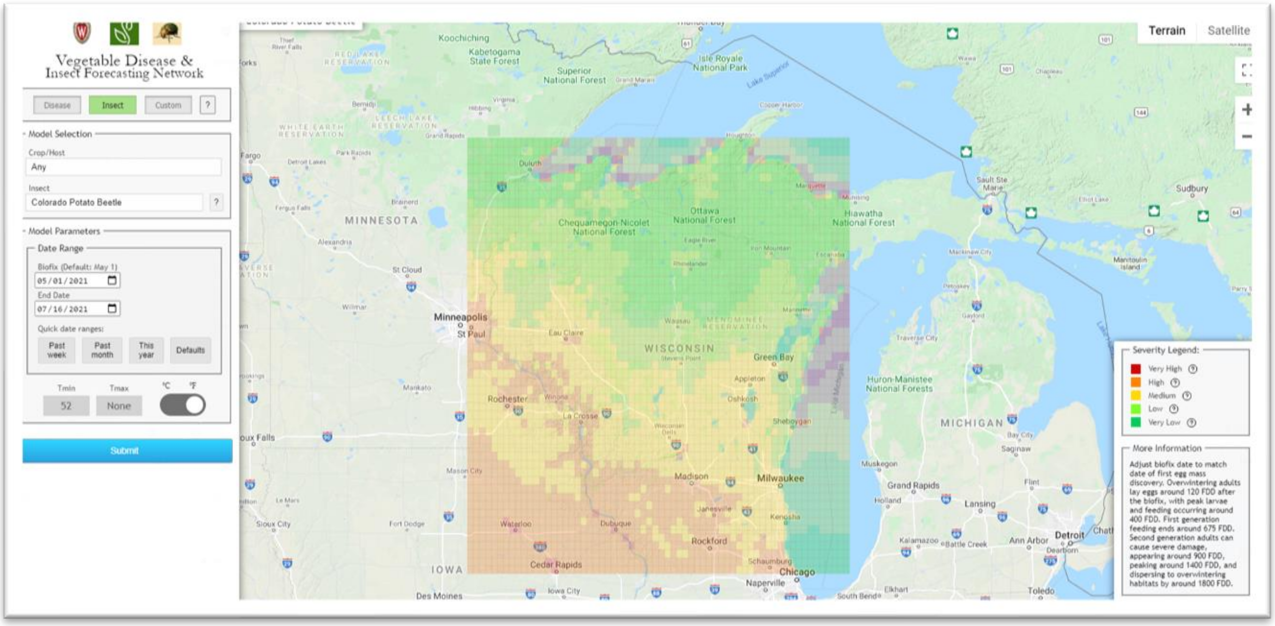
Emergence of adult CPB is well underway throughout much of southern and central Wisconsin. Unlike their overwintered parents, this next generation (2nd generation) of adults are very active feeders and can quickly defoliate unprotected foliage. Second generation adults normally appear in mid-July and if numbers are large, severe defoliation of the crop can occur. Generally, second generation adults will produce another generation of larvae. Under the forecast weather conditions, these adults will undoubtedly produce a complete, second generation and the subsequent adults (3rd generation) will seek overwintering sites as the crop begins to senesce. Typically, there are two discrete generations of beetles per year in South-Central Wisconsin and only a single generation in Northern Wisconsin.

The magnitude of the 2nd (and even 3rd) generation often results from the successes (challenges) experienced in controlling the 1st generation throughout June. If many larvae escaped control, then numbers of 2nd generation adults can be very challenging to manage. On the other hand, if larvae were very adequately managed with well-timed, at-plant or foliar sprays, then the 2nd generation adults can be easier to manage.

Potato plants can tolerate varying levels of defoliation before they will suffer yield losses. The level of tolerance depends on the plant's growth stage. Flowering plants can tolerate the least defoliation, (e.g. only 5-10% of total leaf area). Post-flower potato is able to withstand a slightly greater amount of defoliation, but since this is a critical point for tuber formation and bulking, producers and pest management practitioners should limit the amount of feeding done by CPB not to exceed 5-8%. Late season feeding on potato that is beginning to senesce is the least critical period for yield loss. It should be noted that (accurate) estimation of crop defoliation is an exceptionally challenging task. Defoliation estimates are typically 10-15% higher than true leaf area eaten by CPB. To ensure a good representation of damage and associated defoliation, newer applications (e.g. Canopeo - https://canopeoapp.com/#/login), can be useful.

Recall that nearly all foliar-applied compounds should be applied as a series of two, successive applications spaced 7–10 d apart to improve control of staggered life stages. Moreover, several of the reduced-risk compounds require specific spray tank conditions (e.g., pH of water source), companion adjuvants, and timing with vulnerable early stage life stages (e.g., first and second instar). Moreover, several of these compounds (e.g., anthranilic diamides or spinosyns) may have less activity on other key potato pests (e.g., potato leafhopper and colonizing aphids); scouting and economic thresholds for secondary pests will remain a critical component of weekly field management activities. The decision to apply any insecticide for this next generation of CPB should be completed for each field based on scouting results and established economic damage observed in that individual management unit. Second generation management options are available here.

Colorado Potato Beetle – 2nd generation occurrence (17 July 2021)



https://agweather.cals.wisc.edu/vdifn

Japanese beetle - https://vegento.russell.wisc.edu/pests/japanese-beetle/

The emergence of adult Japanese beetle is progressing in much of central Wisconsin. Considered the single most important turfgrass-infesting pest in the United States, this is an introduced pest that feeds on foliage or flowers of over 350 species of plants, including fruits, vegetables, ornamentals, field and forage crops, and weeds. Japanese beetle grubs feed below ground and chew on the roots of grasses and ornamentals. As a result, they reduce a plant's ability to take up enough water and nutrients to withstand stresses of hot, dry weather.

Japanese beetles have only one generation per year. In early July, or around 1,100 growing degree day units, adults begin emerging from the soil. Immediately thereafter, females mate and begin laying eggs. Adult beetles are most active in the afternoon in full-sun. Females leave ornamental plants where they feed and mate, and burrow two to four inches into the soil (under the turf and in mulched areas) in a suitable area to lay their eggs. Eggs hatch in about two weeks, after which grubs begin feeding on the roots of turfgrass and ornamental plants. The grubs grow quickly, and by late-August are nearly full-grown (about one inch long).

As soil temperatures cool in the fall, and the first meaningful frost occurs, grubs begin to move deeper into the soil. Grubs overwinter in the soil about two to six inches below the surface, although some may be a deep as 20 inches. They become inactive when soil temperatures fall below 50°F. In the spring, when soil temperatures reach 50°F, the grubs begin to move up into the root-zone to resume feeding for about three to five weeks. Thereafter, the grubs stop feeding and begin creating an earthen cell where they pupate (i.e., transform) into adults.

Japanese beetle (*Popillia japonica*)
Photo: Bruce Marlin

Removing beetles by hand, or trapping, may provide adequate protection for small plantings when beetle numbers are low. However, Japanese beetle adults are capable of migrating from other areas, and the presence of beetles on or near a plant will attract more beetles. Consequently, use of Japanese beetle traps often attracts more beetles, and results in even greater, subsequent damage to plants.

Cabbage loopers – **https://vegento.russell.wisc.edu/pests/caterpillar-pests-of-cole-crops/**

Cabbage looper adults overwinter in the south and migrate to Wisconsin from mid-July through September. In July, female moths lay single white eggs on the lower surfaces of leaves. Female moths can lay 200 to 300 eggs, usually over a 10 to 12 day period. Larvae hatch 3 to 6 days after being laid and begin to feed immediately. Larvae feed for up to 5 weeks before pupating. Moths emerge 10 to 14 days later, mate and lay their eggs, giving rise to the second generation, which causes the most damage to several cole crops.

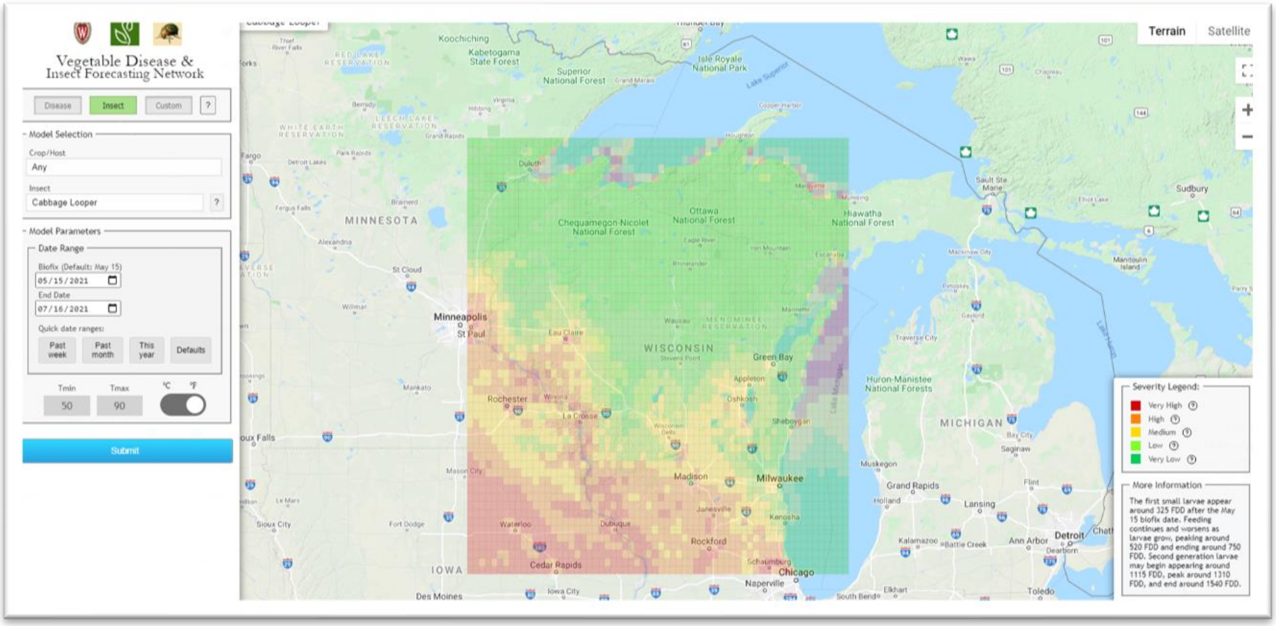
The cabbage looper often feeds between veins on the underside of lower leaves. Large loopers will make larger holes in the foliage and can burrow through 3 to 6 layers of tightly wrapped head leaves in cabbage. A good indicator of the presence of loopers and imported cabbageworms is fresh frass (droppings) on leaves.

Cabbage looper
Photo: Alton Sparks, Jr.

Cabbage looper adult
Photo: 'Dumi'

Biological control occurs regularly in Midwest fields and can be highly effective in controlling populations of Cabbage loopers that feed on cole crops. *Bacillus thuringiensis* (Bt) applied to early instar larvae can be very effective in controlling imported cabbageworms (DiPel, Xentari, othe rformulations). There are more than 20 types of Bt, most of which are highly selective against caterpillars. Bt does not directly affect predators or adult wasp parasites and therefore does not disrupt the activity of these beneficial insects. Target early instar larvae and ensure good plant coverage to improve the effectiveness of insecticides. Spinosyns (e.g. Delegate, Blackhawk, Entrust) are examples of other reduced-risk insecticide options. Spinosans are biologically based materials that are quite selectively active on caterpillar pests but are regarded as safe to beneficials.

Cabbage looper – 2nd generation occurrence (17 July 2021)



Hancock Ag. Research Station Annual Potato Field Day

Potato Research Field Day Agenda

Wednesday July 21, 2021 1:00PM – 5:00 PM

Kick-off & Introductions (HARS Grounds) 1:00-1:20 pm

1:00 – 1:10 Troy Fishler (HARS Superintendent) – 'Welcome & Introductions'
Mike Peters (UW-Madison ARS Director)

1:10 – 1:15 Amber Gotch – 'Storage Research Facility Update & Tour Times

1:15 – 1:20 Tony Johnson (Forestry Educator; UW-Madison Extension) – 'Forestry/Agroforestry Outreach'

Field Wagon Tours & Research Reports 1:20pm-3:45pm

MC: Ken Schroeder (Central Wisconsin UW-Extension Agricultural Agent)

K1 East End of Field

1:30 – 1:45 Russ Groves – 'Insect Issues 2021: New Active Ingredients for Integrated Pest Management'

K2 East End of Field

1:45 – 2:00 Yi Wang – 'Potato Production Research Update'

R2 West End of Field

2:05 – 2:20 Jed Colquhoun – 'Weed Management & Vine Desiccation Update'

K7 Southwest Corner of Field

2:25 – 2:40 John Bamberg – 'US Potato Genebank Research at HARS'

K7 Northwest Corner of Field

2:40 – 2:55 Paul Bethke – 'Diploid Potatoes and True Potato Seed'

S11-S16 North End of Field

3:00 – 3:15 Amanda Gevens – 'Updates on Field Diseases and Management'

C33 North End of Field

3:25 – 3:40 Matt Ruark – 'Slowly Advancing Improvements in Nitrogen Management'

Field Day Wrap-up and Announcements (HARS Grounds) - 3:45-4:00 pm

MC: Troy Fishler

3:45 – 4:00 WPVGA Exec. Dir. Tamas Houlihan: 'Wisconsin Potato & Vegetable Growers Association Update' &
WPVGA Associate Division President Chris Brooks: 'Associate Division Update'

Social Hour will begin at 4:00 PM around the outdoor pavilion

(Due to UW Covid-19 policies still in place, beverages and snacks will be provided instead of dinner this year)

***Tours of the Hancock Storage Research Facility at 2:30pm and immediately following wrap-up.**
***Self-Guided Tours of the A.R. Albert & Villetta Albert-Hawley Horticultural Garden**

NO Registration Fee

Langlade County Agriculture Research Station
N3689 Langlade Rd.
Antigo, WI 54409

Thank you to our local Businesses and Industries for your continued donations and support:

Wisconsin Potato Industry Board

WPVGA Associate Division

Wisconsin Seed Potato Improvement Association

Insight FS

Quinlan's Equipment

Riesterer & Schnell

Langlade County

1pm Welcome & Introductions, Cole Lubinski, Agriculture Research Station Manger

1:05pm Load Wagons

PRESENTERS

RPE research and commercial crop update

- Mike Copas, RPE

Get the most from your fertilizer investment and ensuring top quality yeilds

- Robert Jarek, Timac Agro

The Future of potato herbicides

- Jed Colquhoun - UW Fruit and Vegetable Production

Lets talk about disease other than COVID-19

- Amanda Gevens, UW Plant Pathology

Timing oils and insecticides -lessening the drag on yields

- Russell Groves, UW Entomology

3:30pm ***Food and Refreshments, Provided by Insight FS at the East City Park.***