Vegetable Crop Update

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

Division of Extension
University of Wisconsin-Madison

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In This Issue

Calendar of Events

August 2, 2019 – UW-Lelah Starks Elite Foundation Seed Potato Farm Field Day, Rhinelander, WI
December 3-5, 2019 – Midwest Food Producers Association Annual Convention/Processing Crops Conference, Wisconsin Dells, WI
January 26-28, 2020 – WI Fresh Fruit & Vegetable Growers Conference, Wisconsin Dells, WI
February 4-6, 2020 – UW-Madison Div. of Extension & WPVGA Grower Education Conference, Stevens Point, WI

UW-State Seed Potato Farm Tour – Friday, August 2, 2019, Alex Crockford, Program Director.
This year's open house and celebration of the State Farm is scheduled for **Friday August 2, 2019.** Please plan to join us to see what is new at the Lelah Starks Foundation Seed Potato Farm in Rhinelander (about 7 miles west of town on County highway K). Help us welcome our new staff members to the Seed Program: Admin Program Director, Dr. Renee Rioux; Asst. Farm Manager, Matt Cogger, and Research/Outreach Specialist, Cole Lubinski.

A brief orientation for newcomers and field tours at the State Farm will begin at 10:00 a.m. Lunch will be served at about 12:00 p.m. as the field tours are completed. Lunch is provided by the Associate Division of the WPVGA and Altmann Construction, Co. Inc., of Wisconsin Rapids. Hope to see you there!

SCHEDULE OF EVENTS

10:00 a.m.	Orientation and field tour, Alex Crockford, Program Director and Farm Staff
10:15 am	Dr. Amanda Gevens, UW Madison, Dept. of Plant Pathology Dr. Renee Rioux, new Administrative Director Seed Certification, Dept. of Plant Pathology Dr. Jeffrey Endelman, UW Madison, Dept of Horticulture Dr. Russ Groves, UW Madison, Dept. of Entomology
12:00 p.m.	Lunch catered by Swine and Dine hosted by WPVGA Associate Division and Altman Construction in the the grading facility.
12:30 p.m.	Wisconsin Seed Team photo opportunity

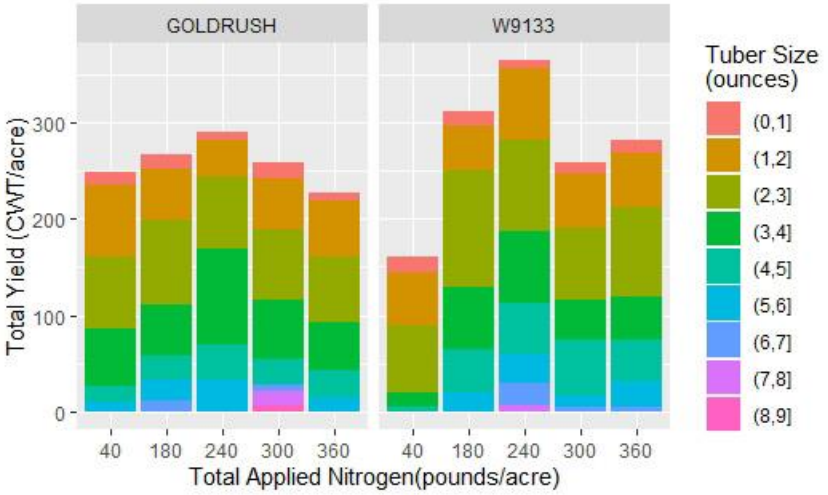
Yi Wang, Assistant Professor & Extension Potato and Vegetable Production Specialist, UW-Madison, Dept. of Horticulture, 608-265-4781, Email: wang52@wisc.edu.

This week we dug 10 plants per variety/treatment from our N trial, where we have two early season russets GoldRush and W9133-1rus, and five N rates. Seeds were planted on May 7th, emergence and hilling on May 29th, tuber initiation on June 13rd, and canopy closure on July 3rd. Our treatments are:

N rates (lb/A)	N application amounts and dates (lb N/A per application)
40	40 starter

180	40 starter + 80 hilling (May 29th) + 60 tuber initiation (June 13rd)
240	40 starter + 80 hilling (May 29th) + 120 tuber initiation (June 13rd)
300	40 starter + 80 hilling (May 29th) + 120 tuber initiation (June 13rd) + 60 early bulking (July 3rd)
360	40 starter + 80 hilling (May 29th) + 120 tuber initiation (June 13rd) + 60 early bulking (July 3rd) + 60 mid bulking (July 18th)

Graph below shows the total yield and size distribution of the two varieties under each N treatment as of July 22nd (55 Days after emergence).



We can see that for Goldrush, 240 lb N/A results in at least 30 bags of more total yield than the other treatments, and the highest production of tubers ≥ 4oz. 300 lb N/A leads to less total yield, but more tubers ≥ 7oz. It is very interesting to see 360 lb N/A is associated with the lowest total yield (even lower than that under 40 lb N/A), however we need to note that the last sidedressing (60 units N) was applied on July 18th, and we collected the data on July 22nd. It will be interesting to see what the final yield under 360 lb N/A turn out to be at harvest.

W9133-1rus has a different story. Total yield under 40 lb N/acre is only 50% or 60% of the numbers under other treatments, and no tubers under this N rate is larger than 4oz. 240 lb N/A results in the highest total yield (at least 50 bags more than the other N rates), and the most tubers ≥ 4oz. No obvious difference is noted between 300 and 360 lb N/A for W9133-1rus. So far W9133-1rus seems to be more responsive to N application than GoldRush. Another interesting point to be made is production of smaller tubers <3oz is about the same between all N rates for both varieties.

In terms of tuber set (Table 1), again 360 lb/A results in the lowest tuber set for GoldRush, and 40 lb/A leads to the least set of tubers for W9133-1rus. 240 lb/A is associated with the highest tuber set for both varieties.

N rates (lb/A)	GOLDRUSH	W9133-1rus
40	15	12
180	16	14
240	17	15
300	15	13
360	12	14

Table 1. Tuber set as of July 22nd for GoldRush and W9133-1rus under each N rate.

Those tubers are scheduled for vine killer application on August 12th, and final harvest 2.5 weeks subsequent to that.

Vegetable Insect Update – Russell L. Groves, Professor and Extension Specialist, UW-Madison, Department of Entomology, 608-262-3229 (office), (608) 698-2434 (cell), or e-mail: groves@entomology.wisc.edu.

Colorado potato beetle –Large numbers of adult Colorado potato beetles have emerged in central Wisconsin central Wisconsin, and these same adults have begun egg laying in portions in southern Wisconsin. Late stage larvae from the first generation are still present in the northern part of the state, although many, late-stage larvae have already pupated. Applications of second generation insecticides be initiated before defoliation exceeds 10% within infested fields. Most potato cultivars can withstand 15-20% defoliation (by chewing insects) before flowering, however potatoes can generally only withstand < 10% defoliation post-flower. Insecticide applications should be initiated very soon if defoliation levels are rapidly increasing, or if scouting reveals large numbers of egg masses accumulating due to adult activity. Second generation application options are provided in the supplemental **Table 1**.

Potato leafhopper – Adult and nymphal (immature) potato leafhoppers (PLH) continue to persist in large numbers in potato, bean crops and alfalfa. The synthetic pyrethroids provide very effective control of PLH, and these products can be applied at mid-rates as specific on the respective labels. Refer to the Commercial Vegetable Production in Wisconsin (A3422) for a list of recommended options (https://learningstore.uwex.edu/Assets/pdfs/A3422.pdf).

Aphids - Aphids, also known as plant lice and are soft-bodied, sucking insects. They feed on plant sap and excrete a sugary honeydew that attracts ants and creates the conditions for sooty mold, a type of fungus (saprophytic) that feeds on decaying organic matter. There are several aphid species, all belonging to the insect family Aphididae, that are capable of attacking any type of vegetation. Aphids that pose the most serious problem to Wisconsin vegetable production include the green peach, melon, and potato aphids. Throughout the summer, wingless females predominate, however, winged forms may arise when populations become too large for the available food source. In late summer, and often in response to the shortening daylight hours, wingless females and males are produced for the purpose of mating and laying fertilized eggs that will survive adverse winter conditions. Look for "hot spots" of aphid activity scattered throughout fields. Because of the spotty nature of infestations, look for aphids on a number of plants in several areas. Examine the under surface of leaves in mid-canopy of 25 consecutive plants or sample units and rate the plants as infested or uninfested. Given the huge reproductive potential of aphids, an infestation level of 5%-10% indicates a potentially damaging infestation. Repeat checks at weekly intervals to determine the need to treat.

Potato fleabeetle - Flea beetles are almost always regarded as early-season pests, commonly found on a variety of crops (and potatoes) in the first 2-3 weeks after emergence. As a result of the cooler and wet conditions on the spring here in the Midwest in 2019, populations flea beetles were very large and damaging on crops where insecticides were not present in the early season. In potato, adult populations were quite large through late May and into June, after which time the adults laid eggs on the soil surface and a second generation was established as larvae below-ground. With the warm temperatures that occurred throughout July, these larvae have nearly completed their development below-ground and will soon pupate and emerge as another adult generation.

Table 1. 2019 CPB Programs – At-Plant and Post-Emergence Foliar Programs

2nd Generation CPB Materials							- + ++ +++		No activity Very little Moderate Excellent activity		
Trade name	Active ingredient	IRAC MOA code	Spray pH	Adjuvant	PHI	Rate	Adult	Egg mass	Early larvae (1st-2nd instar)	Late larvae (3rd-4th instar)	Notes
Coragen 1.67SC	chlorantraniliprole	28	pH < 6.5	MSO (0.25-0.5 % V:V)	14	5.0-7.5 fl oz	++	++	+++	+++	Initiate applications after the emergence of the 2nd generation of CPB, and when defoliation estimates have reached or exceeded 5-10%. Initial foliar application (7.5 fl oz/ac) can be applied to the entire field. Subsequently, apply 2nd foliar application (5.5 fl oz/ac) over entire field one week later. Continue to scout field, and consider a 3rd foliar application 7-10 days later only if populations continue to defoliate. Should be applied with an adjuvant (MSO), and acidify tank pH (pH < 6.5). Ground-application advised. Only two successive applications of Coragen allowed in succession per crop season for control of the Colorado potato beetle. Do not apply a Group 28 material if a Group 28 material was applied in 1st generation, or as an at-plant systemic (e.g. Verimark).
Exirel 0.83SC	cyantraniliprole	28	pH < 6.5	MSO (0.25-0.5 % V:V)	7	5.0-13.5 fl oz	++	++	+++	+++	Initiate applications after the emergence of the 2nd generation of CPB, and when defoliation estimates have reached or exceeded 5-10%. Initial foliar application (13.5 fl oz/ac) can be applied to the entire field. Subsequently, apply 2nd foliar application (10 fl oz/ac) over entire field one week later. Continue to scout field, and consider a 3rd foliar application 7-10 days later only if populations continue to defoliate. Should be applied with an adjuvant (MSO), and acidify tank pH (pH < 6.5). Ground-application advised. Only two successive applications of Exirel allowed in succession per crop season for control of the Colorado potato beetle. Do not apply a Group 28 material if a Group 28 material was applied in 1st generation, or as an at-plant systemic (e.g. Verimark).
Minecto Pro	abamectin + cyantraniliprole	6 + 28	pH < 6.5	MSO (0.25-0.5 % V:V)	14	5.5-10 fl oz	++	++	+++	+++	Initiate applications after the emergence of the 2nd generation of CPB, and when defoliation estimates have reached or exceeded 5-10%. Initial foliar application (10 fl oz/ac) can be applied to the entire field. Subsequently, apply 2nd foliar application (7.5 fl oz/ac) over entire field one week later. Continue to scout field, and consider a 3rd foliar application 7-10 days later only if populations continue to defoliate. Should be applied with an adjuvant (MSO), and acidify tank pH (pH < 6.5). Ground-application advised. Only two successive applications of Minecto Pro

											allowed in succession per crop season for control of the Colorado potato beetle. Do not apply a Group 28 material if a Group 28 material was applied in 1st generation, or as an at-plant systemic (e.g. Verimark).
Besiege	chlorantraniliprole + lambda-cyhalothrin	28 + 3	pH < 6.5	MSO (0.25-0.5 % V:V)	14	6.0-9.0 fl oz	++	++	+++	+++	Initiate applications after the emergence of the 2nd generation of CPB, and when defoliation estimates have reached or exceeded 5-10%. Initial foliar application (9.0 fl oz/ac) can be applied to the entire field. Subsequently, apply 2nd foliar application (7.0 fl oz/ac) over entire field one week later. Continue to scout field, and consider a 3rd foliar application 7-10 days later only if populations continue to defoliate. Should be applied with an adjuvant (MSO), and acidify tank pH (pH < 6.5). Ground-application advised. Three successive applications of Besiege are allowed in succession per crop season for control of the Colorado potato beetle. Do not apply a Group 28 material if a Group 28 material was applied in 1st generation, or as an at-plant systemic (e.g. Verimark).
Voliam Flexi	chlorantranilprole + thiamethoxam	28+4A	pH < 6.5	MSO (0.25-0.5 % V:V)	14	4.0 fl oz	++	++	+++	+++	Initiate applications after the emergence of the 2nd generation of CPB, and when defoliation estimates have reached or exceeded 5-10%. Initial foliar application (4.0 fl oz/ac) can be applied to the entire field. Subsequently, apply 2nd foliar application (3.5 fl oz/ac) over entire field one week later. Continue to scout field, and consider a 3rd foliar application 7-10 days later only if populations continue to defoliate. Should be applied with an adjuvant (MSO), and acidify tank pH (pH < 6.5). Ground-application advised. Only two successive applications of Voliam Flexi are allowed in succession per crop season for control of the Colorado potato beetle. Do not apply a Group 28 material if a Group 28 material was applied in 1st generation, or as an at-plant systemic (e.g. Verimark).
Torac	tolfenpyrad	21A	pH < 6.5	NIS (0.25-0.5% V:V)	14	17-21 fl oz	++	++	+++	++	Initiate applications after the emergence of the 2nd generation of CPB, and when defoliation estimates have reached or exceeded 5-10%. Initial foliar application (21 fl oz/ac) can be applied to the entire field. Subsequently, apply 2nd foliar application (21 fl oz/ac) over entire field two weeks later. Continue to scout field, and consider a 3rd foliar application of another active ingredient 7-10 days later only if populations continue to defoliate. Should be applied with an adjuvant (NIS), and acidify tank pH (pH < 6.5). Ground-application advised. Only two successive applications of Torac are allowed in succession per crop season for control of the Colorado potato beetle. Do not apply a Group 221A material if a Group 21A material was applied in 1st generation.

Amanda Gevens, Associate Professor & Extension Specialist, UW-Madison Plant Pathology, gevens@wisc.edu, 608-575-3029. https://wivegdis.plantpath.wisc.edu/

Cucurbit downy mildew: No reports of downy mildew on cucurbits in Wisconsin at this time. The cucurbit downy mildew reporting and forecasting site http://cdm.ipmpipe.org/ indicated new confirmations of downy mildew in AL, NC, and SC during this past week. In 2019 so far, the site has documented confirmations in AL, FL, GA, MA, MD, NC, NJ, SC, and VA on various cucurbits. No apparent risk of movement of the pathogen to WI at this time. **Please visit our 2019 WI Commercial Vegetable Production Guide** for further information pertaining to the fungicides listed in this newsletter. https://learningstore.uwex.edu/Assets/pdfs/A3422.pdf

There have been no additional reports of late blight on tomatoes or potatoes in Wisconsin since the initial confirmation on Wed July 17, 2019. The clonal lineage/strain type of the late blight pathogen found on potato in Wood County was US-23. This has been the predominant strain type found in the US and WI in recent years. Most isolates of US-23 can be managed with phenylamide fungicides such as mefenoxam and metalaxyl. It is critical that susceptible potatoes and tomatoes in the Wood County area be treated with a combination of antisporulant and protectant fungicides to limit reproduction of the pathogen and new infections. **Antisporulants include: Orondis, Forum, Curzate, Tanos, Ariston, Previcur, Revus, and Ridomil.** While presence of late blight in central Wisconsin trumps the use of DSVs for governing fungicide timing/selection, it should be noted that we surpassed the DSV threshold of 18 in all potato plantings across all monitored sites in Wisconsin. Late blight was confirmed in TN, PA, and WA on July 18th. In each of these three instances, the pathogen was of the US-23 clonal lineage. **Protection of the crop with appropriate fungicides is recommended**. Please see the table below for details at each location. Late blight fungicides registered for use in Wisconsin are available at the UW-Potato & Vegetable Pathology website or at link: https://wivegdis.wiscweb.wisc.edu/wp-content/uploads/sites/210/2019/06/2019-Potato-Late-Blight-Fungicides.pdf

***Phytophthora nicotianae* can also cause disease on potato** and lesions can look very similar to those of late blight caused by *Phytophthora infestans.* Typically, *P. nicotianae* blight shows up in the wheel tracks of field and is often lacking in pathogen sporulation on foliage. This Phytophthora rarely causes significant foliar decline and can be controlled with the same fungicides used in managing late blight. *Phytophthora nicotianae* can cause pink rot-like symptoms on tubers. Recall that pink rot is caused by yet another Phytophthora, *P. erythroseptica*.

P-Days are currently over 300 for all potato across locations and emergence dates. Early blight lesions are beginning to spread in lower canopies in southern and central Wisconsin. Foliar fungicide applications are recommended to manage further spread and vine decline which can result in negative

tuber size and quality. Starting on page 219 in the A3422 Commercial Vegetable Production Guide for Wisconsin please find listing of registered fungicides for early blight caused by *Alternaria solani* and brown spot caused by *Alternaria alternata*.
https://cdn.shopify.com/s/files/1/0145/8808/4272/files/A3422.pdf

Current P-Day (Early Blight) and Disease Severity Value (Late Blight) Accumulations (Many thanks to Ben Bradford, UW-Madison Entomology; Stephen Jordan, John Hammel, & Samuel Meyer, UW-Madison Plant Pathology). A P-Day value of ≥300 indicates the threshold for early blight risk and triggers preventative fungicide application. A DSV of ≥18 indicates the threshold for late blight risk and triggers preventative fungicide application. Red text in table indicates threshold has been met/surpassed. Weather data used in these calculations comes from stations that are in potato fields. Data are available in graphical and raw data formats for each weather station at: https://wivegdis.plantpath.wisc.edu/dsv/

Location	***Planting Date***		**Emergence Date (50%)**	**Disease Severity Values (DSVs) 7/27/19**	**Potato Physiological Days (P-Days) 7/27/19**
Grand Marsh	Early	Apr 10	May 20	**81**	**508.9**
	Mid	May 1	June 1	**79**	**431.7**
	Late	May 20	June 9	**77**	**373.21**
Hancock	Early	Apr 10	May 22	**47**	**510.6**
	Mid	Apr 25	May 27	**46**	**474.7**
	Late	May 15	June 8	**44**	**385.18**
Plover	Early	Apr 22	May 27	**69**	**472.13**
	Mid	May 1	June 1	**69**	**437.73**
	Late	May 29	June 13	**67**	**347.51**
Antigo	Early	May 14	May 29	**40**	**389.26**
	Mid	May 24	June 8	**40**	**382.35**
	Late	Jun 1	June 20	**37**	**300.21**