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. 13 – July 23, 2022

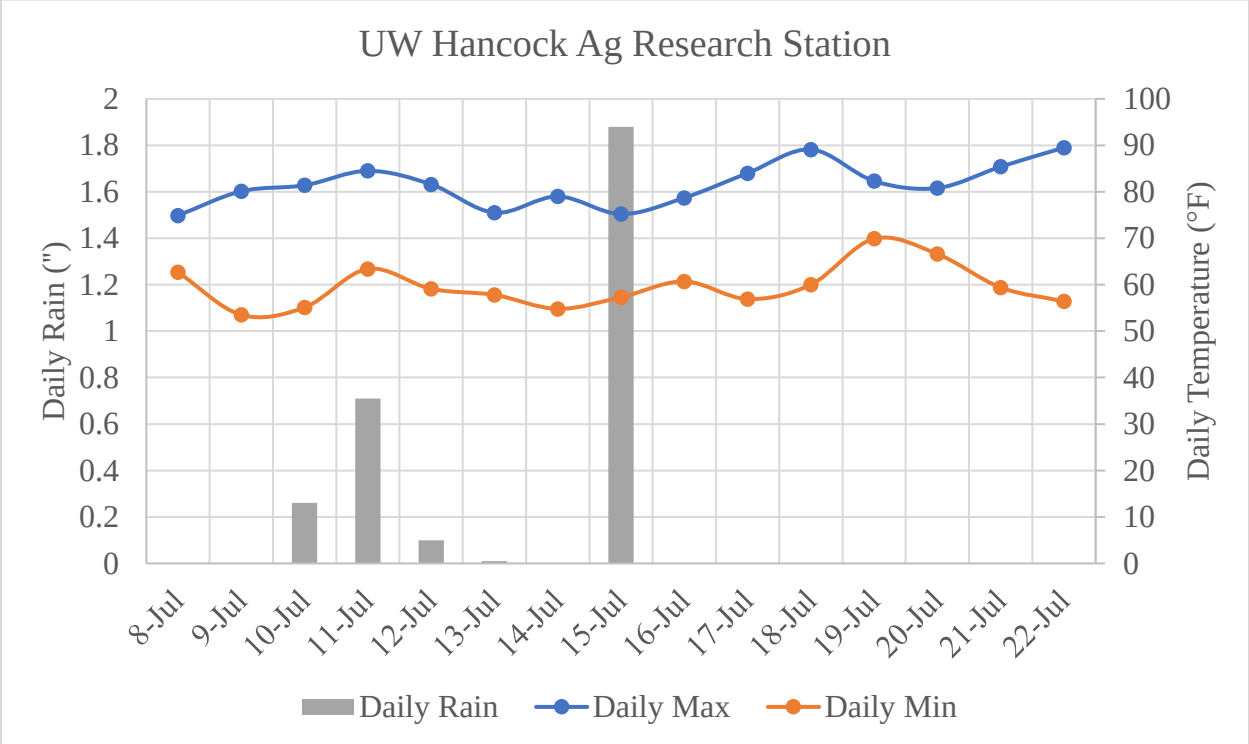
In This Issue:

Calendar of Events:

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

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

It has been a hot week without any rain, growers have to run irrigation constantly to keep soil moist and avoid drought stress. Some folks have seen wilting along edges of the fields that weren't getting irrigated well enough. Looking at the weather forecasting, we should get cooler temperatures in the next 10 days, which should help keep tuber bulking potential high.



Growers have reported average yield based on test digs. Only a couple of reds demonstrated good yield, yellows seem to be about average, russets and whites so far are progressing on schedule but no barn burner varieties are found yet. Test digs of russets in the past two days showed that yield ranged from 200 – 300 cwt/ acre. Scab issues have been observed on some reds and yellows due to dry weather.

I just got back from the Potato Association of America Annual meeting. I attended a nice talk made by Ben Eborn from North American Potato Market News. Based on Ben's reports, total operating costs per acre for Idaho Russet Burbank potatoes increased by 18.7% in 2020-2021, and by 23.6% in 2021-2022; total costs (including ownership costs and operating costs) per acre went up by 14.8% in 2020-2021, and by 19.0% in 2021-2022. These increases are due to inflation that caused skyrocketed costs of fertilizers/chemicals/fuel, the severe drought situation in Idaho in 2021 that led to substantial shortage of potatoes, and supply chain issues. With all those factors together with strong grain prices, Idaho growers have cut their planting acreage by 25,000 acres this season. In Wisconsin, planting acreage went down by about 1,000 acres compared to last year. Wisconsin folks have said that we will have plenty of potatoes in the country if we get near trend line yields. Hopefully weather stays good for the rest of the season.

Below are the groundwater testing results from wells at our UW Hancock Ag Research Station. Again the K well that irrigates a lot of our potato and vegetable trials showed the highest nitrate-N level.

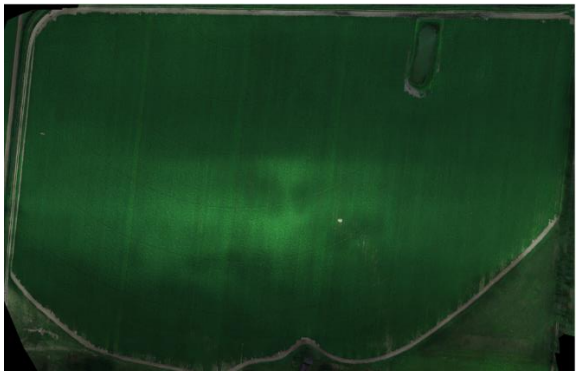
Well	NO_3^- level (ppm)
C east	7.0
C west	9.9
E	8.9
K	25.3
R	18.9
S	18.9

These numbers matched with what we got from the water quality test strips that I previously mentioned in my articles.

C west well (5-10 ppm):

K well (>20 ppm):

We have irrigated 7.73'' of water to our trials in the K field so far this season. **There is 0.23 lb of N per 1ppm of nitrate-N per 1'' of irrigation water**, so we have received 0.23 × 25.3 × 7.73 = 45 lb of N per acre from the irrigation water. These N credits will need to be included in our N rate calculations.



This past Tuesday we flew a commercial Caribou field that has a treatment strip with 0 N applied at tuber initiation. All other N applications at other growth stages are the same as the standard program. We can certainly see the yellower canopy color from this 0 N strip. Stayed tuned for yield and quality data from this treatment.

Vegetable Insect Update – Russell L. Groves, Professor and Department Chair, UW-Madison, Department of Entomology, (608) 698-2434 (mobile), e-mail rgroves@wisc.edu

Vegetable Entomology Webpage: https://vegento.russell.wisc.edu/

Potato virus Y (PVY) – (https://vegento.russell.wisc.edu/pests/plant-pathogens/). The application of foliar insecticides in the growing season to potato has almost no effect on preventing PVY inoculation of plants by non-potato colonizing aphid species that are migrating into and transmitting the virus through susceptible potato. At-plant, systemic insecticides can, however, help to reduce populations of potato-colonizing species, and this can provide some relief from virus spread in the current season.

Foliar applications of paraffinic oils have previously been shown to modify the feeding behaviors of non-potato colonizing, migrating aphids alighting onto the potato canopy as they move through the local landscape. Specifically, these investigations have revealed that aphids are discouraged from probing on leaves that possess residues of compounds containing (> 95%) of paraffinic oils, resulting in limited inoculation attempts. A portion of our applied research program has investigated the value of these paraffinic oils in limiting non-persistent PVY transmission, by (1) determining the periods of greatest risk for aphid movement and transmission, coupled with (2) experiments to evaluate the timing and coverage of these different oil-containing compounds.

Mode of Action Class (Group)[a]	Active Ingredient	Trade Names	Application / Delivery[b]
Nicotinic acetylcholine receptor (nAChR) agonists (4A, 4C & 4D)	imidacloprid[c]	Admire Pro®, Gaucho®, Provado®	IF, ST, F, SD
	thiamethoxam	Platinum®, Cruiser®, Actara®	IF, ST, F, SD
	clothianadin	Belay®	IF, ST, F, SD
	dinotefuran	Scorpion™	F
	acetampirid[c]	Assail®	F
	sulfoxaflor	Transform®	F
	flupyradifurone	Sivanto®	F
Selective Homopteran feeding blockers (9B)	pymetrozine	Fulfill®	F
Chordotonal organ modulator (29)	flonicamid	Beleaf®	F
Narrow-range mineral and paraffinic oils (UN)	petroleum oil	Aphoil™, JMS Stylet oil®, PureSpray Green®	F
Terpene constituents (C. album) (UN)	terpene	Requiem®	F
Inhibitors of acetyl CoA carboxylase (23)	spirotetramat	Movento®	F
Ryanodine receptor modulators (28)	cyazypyr	Verimark™, Exirel™	IF, F

[a] Insecticide Resistance Action Committee (http://www.irac-online.org)
[b] Application types include: in-furrow (IF), seed treatment (ST), foliar (F) and side-dress (SD)
[c] Several generic formulations exist

Of principal interest to potato seed growers in Wisconsin is the prevention of PVY in seed potato lots. Reductions in PVY transmission can be prevented, in part, by the timely application of paraffinic oils, which discourage aphids from probing leaf tissues in search of their preferred host and inadvertently transmitting the virus. Using the Upper Midwest, Aphid Suction Trap Network we have

modeled the flight patterns for a number of different aphid species captured by these traps. These species-specific, predictive models have been aligned to cumulative degree-days (base 39^{o} F) to account for site-to-site and annual climatic variations. We have taken these species-specific models and incorporated published PVY transmission efficiency values (**Table 1**) to compute risk-adjusted counts for each species. These counts are then summed for individual aphid species, or collections of species presumed to account for the majority of PVY transmission, into a single model illustrating the aggregate risk values.

Table 1. A comparison of computed risk rankings for selected aphid species commonly captured in Wisconsin suction traps and capable of transmitting PVY. Estimates computed from mean capture data, 2008-2018.

Species Name	Common name	Transmission efficiency	Mean annual WI captures	Computed risk rank
Aphis glycines	Soybean aphid	44.5%	2400	1067.84
Rhopalosiphum padi	Bird cherry-oat aphid	6.7%	1526	103.73
Myzus persicae	Green peach aphid	46%	71	32.61
Acyrthosiphon pisum	Pea aphid	10.5%	187	19.67
Rhopalosiphum maidis	Corn leaf aphid	2%	896	17.91
Macrosiphum euphorbiae	Potato aphid	28%	25	7.06
Capitophorus elaeagni	Artichoke aphid	2%	199	3.99
Aphis craccivora	Cowpea aphid	4%	83	3.32
Sitobion avenae	English grain aphid	1%	88	0.88

When taken together, these aggregate values can be modeled to better define a predicted 'risk window' in Wisconsin for the transmission of PVY (**Fig. 1**). The model output is a curve where the primary rising segment indicates the start, midpoint, and end of the predicted 'risk interval' (aka. flight event for a combination of important vector species) or the risk window for the aggregate PVY risk model. This model incorporates all potential PVY aphid vectors and so is more useful than flight models generated for any one species. Based on the model illustrated, the PVY risk window begins around 1967 degree-days (base 39°F), peaks around 2473 degree-days, and ends around 3228 degree-days.

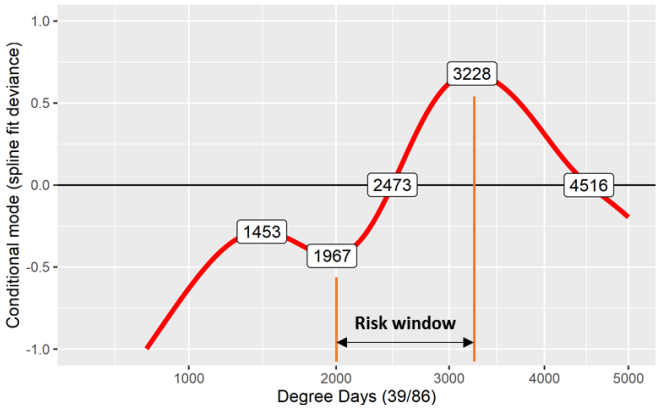


Figure 1. Aggregate Potato virus Y 'risk index' computed by cumulative degree-days combining important aphid vector species in Wisconsin.

Different aphid species vary in the efficiency with which they can acquire and subsequently inoculate PVY into a susceptible potato, and this is collectively termed transmission efficiency. The potato colonizing species are generally regarded as having greater, estimated transmission efficiencies, whereas the non-colonizing aphid species reportedly have lower estimated transmission efficiencies. Estimates of transmission efficiency, combined with mean annual abundance estimates for each species, have been used to generate an adjusted 'risk ranking' for selected species

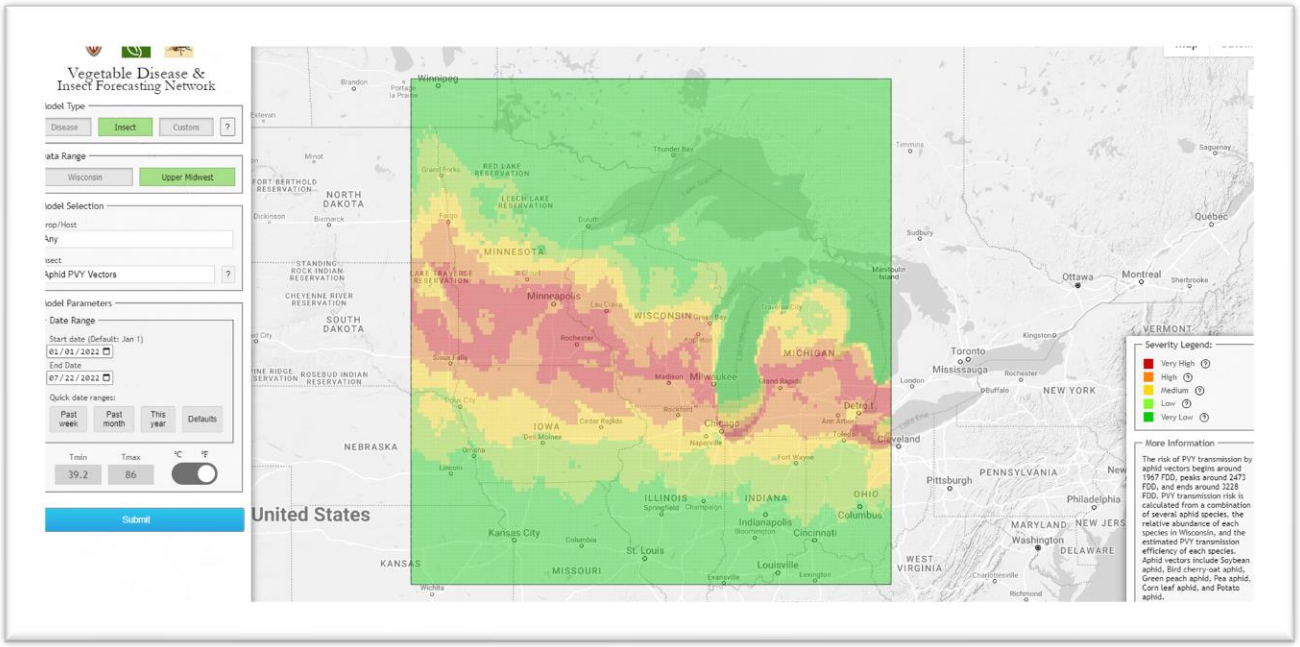
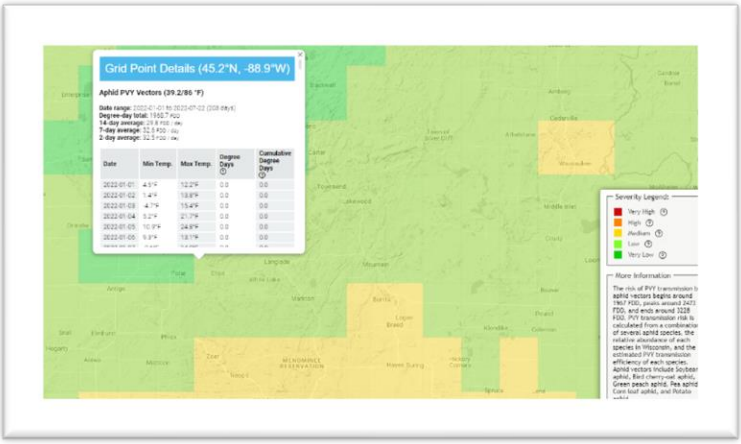


Figure 2. Vegetable Disease and Insect Forecasting Network (VDIFN) map of risk for transmission of Potato virus Y (PVY), https://agweather.cals.wisc.edu/vdifn (sourced 07/23/2022). Notice areas within the 'orange or red shaded' zones indicate high risk zone for transmission of PVY, and these remain to our south currently.



Many seed growing areas of the state are now entering the period with the highest overall risk for PVY transmission. The inset to the right illustrates that 1969 degree days have just been generated in the areas immediately surrounding the Antigo Flats. For seed producers, the timeframe for PVY transmision is reaching its beginning and will continue over the next 30-45 days.

A few quick guidelines when attempting to manage this virus in seed:

- Don't plant (or re-plant) a problem! Replant only the best foundation or certified seed potatoes. This is the absolute best defense any grower can have against PVY.

- Isolate seed fields from commercial production. Proximity to commercial potato increases your chances for disease spread considerably.

- Use border crops to surround high-valued seed lots. Border crops can "cleanse" PVY from aphid sytlets (mouthparts) before the aphids move into potatoes.

- Time planting and top kill to avoid peak aphid flights. Prevent late-season virus infection by planting and top-killing seed potato fields early.

- Spraying for potato-colonizing aphids can reduce spread of PVY within the field under circumstances where they have colonized and gained access. Spray only when scouting indicates green peach or potato aphid populations are above threshold levels.

- Plant immune cultivars whenever possible and avoid planting tolerant cultivars in close proximity to fields with susceptible cultivars.

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. 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 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, once 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) 7/22/2022	Potato Physiological Days (P-Days) 7/22/2022
Grand Marsh	**Early**	Apr 5	May 10	**38**	**548**
	Mid	Apr 20	May 15	**38**	**507**
	Late	May 12	May 25	**38**	**449**
Hancock	**Early**	Apr 7	May 12	**26**	**522**
	Mid	Apr 22	May 17	**26**	**488**
	Late	May 14	May 26	**24**	**452**
Plover	**Early**	Apr 7	May 15	**68**	**486**
	Mid	Apr 24	May 20	**68**	**453**
	Late	May 18	May 27	**67**	**418**
Antigo	**Early**	May 1	Jun 3	**22**	**393**
	Mid	May 15	June 15	**18**	**318**
	Late	June 10	June 24	**18**	248

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.

We have reached thresholds for preventative fungicide treatment in potatoes to manage early blight in all potato plantings in Grand Marsh, Hancock, Plover, and most plantings of potatoes in Antigo areas of Wisconsin. Accumulations of P-Days were moderate to high over the past week. Potatoes should be on a preventative fungicide program with effective disease management selections to limit early blight.

All monitored Wisconsin locations accumulated between 2 and 9 DSVs this past week indicating a relatively low-risk week for promoting late blight in potato plantings in Grand Marsh, Hancock, Plover, and Antigo. However, Antigo plantings have now reached/exceeded the threshold for receiving a preventative application of fungicide for the management of late blight. A fungicide list for potato late blight in Wisconsin was provided in last week's newsletter and is available here: https://vegpath.plantpath.wisc.edu/2022/07/03/update-10-july-3-2022/

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 2022 Commercial Vegetable Production in Wisconsin Guide, Extension Document A3422, linked here: https://learningstore.extension.wisc.edu/products/commercial-vegetable-production-in-wisconsin

According to usablight.org there have not been recent diagnoses of late blight in tomato or potato crops in the US. For this year, there were just 2 reports entered back in March in southern Florida (US-23 clonal lineage/strain type).

Cucurbit Downy Mildew: During this past week, cucurbit downy mildew was confirmed on cucumber in OH, and other cucurbits in PA, DE, MD, VA, and NC. Previously in this growing season, the disease was confirmed in AL, CT, FL, GA, MA, NC, NH, NJ, NY, OH, PA, SC, and VA. No findings of cucurbit downy mildew in our Wisconsin-based sentinel plots in Dane County. Red counties below indicate recent reports (less than 1 week old) of cucurbit downy mildew.

https://cdm.ipmpipe.org/

There are no confirmations of downy mildew on cucurbits in our region at this time, nor risk of spread of the pathogen to Wisconsin.

As a reminder, the pathogen is now known to have two 'strains' for clade types. The type (Clade 2) which infects cucumber, can als 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/

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Rhinelander Agricultural Research Station Field Day

July 28th 9:30 a.m. to 1:00 p.m.

Itinerary

9:30 a.m.-9:35 a.m.	**Mike Peters**	
opening remarks	ARS Director	
9:35 a.m.-9:45 a.m.	**Becky Eddy**	
RARS since 2016	RARS Superintendent	
9:45 a.m.-9:55 a.m.	**Manny Oradei**	
timber management	DNR Forester	
9:55 a.m.-10:10 a.m.	**Dr. Ron Zalesny &**	
phytofiltering	USDA Plant Geneticist	
of disinfectant	**Ryan Vinhal**	
wastewater	UM-Columbia M.S. Student	
10:10 a.m.-10:20 a.m.	**Dr. Kurt Thelen**	
bioenergy crop yields	MSU Professor	
10:20 a.m.-10:30 a.m.	**Brooke Babler**	
seed cert. update	WSPCP Cert. Manager	
10:30 a.m.-10:40 a.m.	**Alex Crockford**	
K Farm update	WSPCP Program Director	
10:40 a.m.-11:00 a.m.		
travel to field with a stop at the pollinator plot		
11:00 a.m.-11:10 a.m.	**Lin Song**	
diploid breeding	UW-Madison Ph.D Student	
11:10 a.m.-11:20 a.m.	**Chelang'at Sitonik**	
aerial imagery	UW-Madison Ph.D Student	
11:20 a.m.-11:35 a.m.	**Dr. Jeff Endelman**	
new potato variety showcase	UW-Madison Professor	
11:35 a.m.-11:45 a.m.	**Dr. Amanda Gevens**	
plant pathology update	UW-Madison Professor	
11:45 a.m.-11:55 a.m.	**Dr. Russ Groves**	
insect management	UW-Madison Professor	
11:55 a.m.-12:10 p.m.		
travel back to station		
12:10 p.m.-1:00 p.m.		
lunch sponsored by Insight FS		

Come join us for our field day on July 28th at the Rhinelander Agricultural Research Station (RARS) of UW-Madison, home to the Wisconsin State Potato Breeding Program & one of the nation's top potato research facilities. Along with updates on the latest in potato breeding research, there will be presentations on the bioenergy, timber management, phytoremediation, and pollinator projects happening at our station.

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4181 Camp Bryn Afon Rd, Rhinelander, WI 54501
follow signs for parking

check out
our website