Vegetable Crop Update

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

No. 6 – June 25, 2023

In This Issue:

- Potato production updates: effects of high heat and low moisture
- Potato and tomato early blight and late blight disease updates
- Cucurbit downy mildew updates
- Squash vine borer, squash bug, onion thrips
- Hancock Highlight Series: spotlighting agricultural research at the UW Hancock ARS with Natasha Paris

Calendar of Events:

July 6, 2023 – UW Langlade County Extension & WI Seed Potato Certification Program – Ag Research Station Field Day, Antigo, WI
July 13, 2023 – UW Agricultural Research Station Potato Field Day, Hancock, WI (1-4:30PM)
July 20, 2023 – WI Seed Potato Certification Program & WI Potato Coalition Early Generation Seed Potato Field Day, Lelah Starks Seed Potato Farm, Rhinelander, WI (*new date!)*
November 28-30, 2023 – Midwest Food Producers Assoc. Processing Crops Conference, Kalahari Convention Center
January 9-11, 2024 – Wisconsin Agribusiness Classic, Alliant Energy Center, Madison, WI
January 21-23, 2024 – Wisconsin Fresh Fruit and Vegetable Growers Conference, Kalahari Resort, Wisconsin Dells, WI
January 25-26, 2024 – Organic Vegetable Production Conference, UW Madison Division of Extension (Online)
February 2-3, 2024 – Organic Vegetable Production Conference, UW Madison Division of Extension, Alliant Energy Center, Madison, WI
February 6-8, 2024 – UW-Madison Div. of Extension & WPVGA Grower Education Conference & Industry Show, Stevens Point, WI

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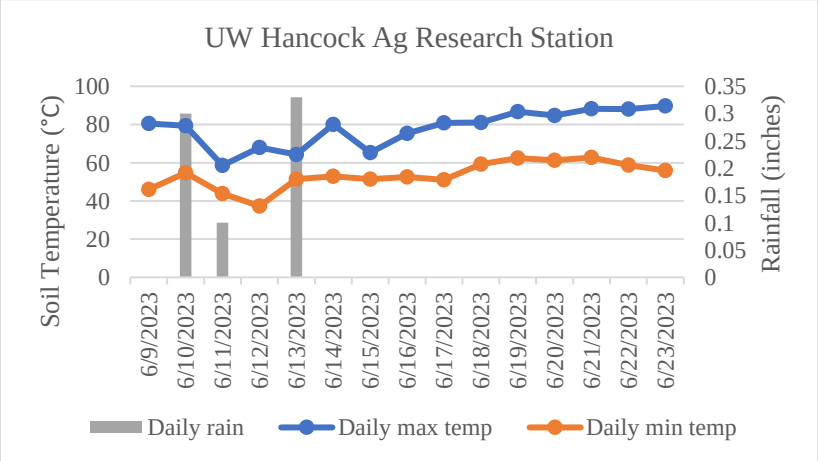
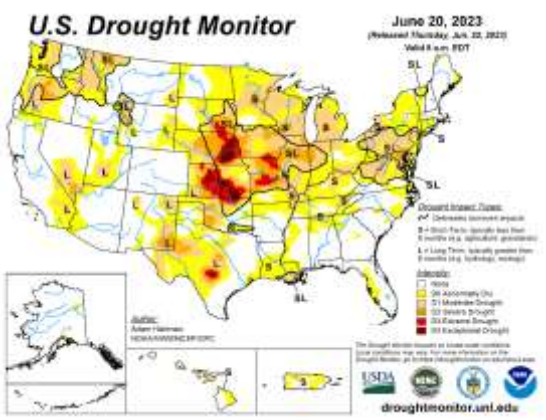
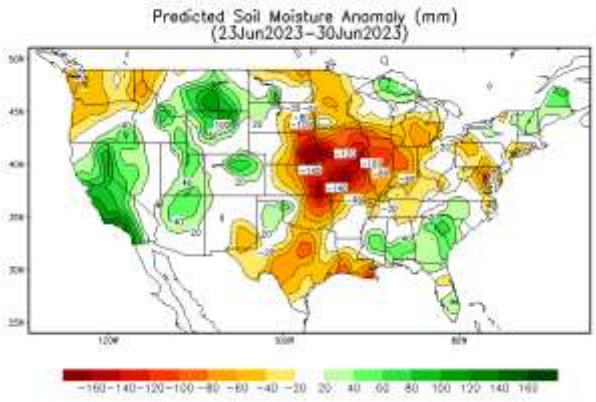
Even though we got some small rain events in the week of June 12th, it is still really dry all over the Midwest. The plot below shows that the daily max temperature exceeded 80°F again on June 17th, and ever since then we haven't had any rain. Growers have been irrigating with 0.5'' – 0.6'' of water at least every other day to catch up with the rapid growth of the plants and the high daily ET demand.



Nationally, the area with abnormal drought to exceptional drought has clearly expanded over the last two weeks, and those regions show substantial predicted soil moisture anomaly. The 10 day future weather forecast shows that it will cool down and we hope that it will alleviate the drought severity.





So far, the plants are generally doing well, except for some rainfed seed potato fields in the Antigo area. Some folks have reported that they have seen tuber chaining caused by the heat (indicated by the picture on the right) on some susceptible varieties like Silverton. The small tubers formed would compete with the primary tubers for nutrients and can lower marketable yield. There is no effect on the fresh market quality of the primary tuber except for reduced tuber size. For processing varieties, the texture of the fried products and starch content may not be desirable. Tuber chaining may also influence the separation of the primary tubers from the stolons at harvest.

Tuber chaining is caused by tuber initiation followed by limited growth of tubers at the nodes of a stolon after the apical tuber at the end of the stolon began to bulk. The physiological cause of this problem is a breakdown of apical dominance of the primary tuber, associated with auxin concentrations basipetal from the primary tuber. The sizing of the primary tuber is inhibited due to reduced carbohydrates because of competition from the secondary tubers. The primary tuber can have very low specific gravity and undesirable processing quality. A similar phenomenon is sprouting from buds on the nodes of the stolon, causing competition for nutrients and loss of apical dominance, similar to tuber chaining. Once these disorders have begun, the return of cooling soil temperature cannot overcome them.

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Early blight of potato/tomato. Accumulations of P-days (recall these are influenced by heat) ramped up this past week and on average we saw roughly 60 P-days across the state of Wisconsin. Spring Green, Arlington, and Grand Marsh early planted potato fields have reached/surpassed threshold and should receive preventative fungicide applications for early blight management. Hancock and more northern locations have not yet reached the threshold of 300 for a recommended initiation of a preventative management program for early blight in potato.

Late blight of potato/tomato. Accumulations of Blitecast DSVs have been low to non-existent. Of the locations that I highlight in the table below, *still* only Hancock has just a single DSV (accumulated on 6/13). Overall, the weather has been very dry, with temperatures a bit too hot to promote the pathogen. The usablight.org website (https://usablight.org/map/) indicates no reports of late blight in potato or tomato from across the US in 2023. This website continues to provide a very useful mechanism for tracking this potentially destructive crop disease, but it's not comprehensive. Fungicides for management of late blight in tomato and potato crops are provided: https://learningstore.extension.wisc.edu/products/commercial-vegetable-production-in-wisconsin

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 again in 2023. 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. TBD indicates that data are To Be Determined as time progresses. Weather data used in these calculations is 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 for missing data points and for additional locations (indicated with *). Data are available in graphical and raw formats for multiple locations at: https://vegpath.plantpath.wisc.edu/dsv/.

	Planting Date		50% Emergence Date	Disease Severity Values (DSVs) *through 6/24/2023*	Potato Physiological Days (P-Days) *through 6/24/2023*
Spring Green*	**Early**	Apr 3	May 9	0	**335**
	Mid	Apr 17	May 12	0	**313**
	Late	May 10	May 23	0	245
Arlington*	**Early**	Apr 5	May 10	0	**331**
	Mid	Apr 20	May 15	0	293
	Late	May12	May 25	0	233
Grand Marsh	**Early**	Apr 5	May 10	0	**305**
	Mid	Apr 20	May 15	0	271
	Late	May 12	May 25	0	219
Hancock	**Early**	Apr 10	May 17	1	269
	Mid	Apr 22	May 19	1	263
	Late	May 14	May 28	1	213
Plover	**Early**	Apr 14	May 19	0	262
	Mid	Apr 24	May 20	0	254
	Late	May 19	May 29	0	205
Antigo	**Early**	May 1	May 28	0	200
	Mid	May 15	June 3	0	155
	Late	June 7	June 23	0	17
Rhinelander*	**Early**	May 7	June 1	0	167
	Mid	May 18	June 5	0	132
	Late	June 9	June 24	0	9

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. 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 2023 Commercial Vegetable Production in Wisconsin Guide, Extension Document A3422, linked here: https://learningstore.extension.wisc.edu/products/commercial-vegetable-production-in-wisconsin

Cucurbit Downy Mildew. The Cucurbit Downy Mildew forecasting webpage (https://cdm.ipmpipe.org/) is not forecasting the movement of the pathogen, but the group is offering reporting of findings of cucurbit downy mildew from the US. Last week, Dr. Mary Hausbeck reported the interception of cucurbit downy mildew spores in an air/spore trap in the Bay County area of Michigan, air samplers in Saginaw and Allegan Counties also resulted in the detection of spores. Through molecular biological testing, Dr. Hausbeck and her laboratory at Michigan State University characterized the pathogen as the Clade 2 type of the cucurbit downy mildew pathogen which tells us that this type is likely to infect cucumber and melon crops. While Bay and Saginaw Counties are on the eastern side of MI, Allegan is in the southwestern corner of MI. In past years, when SW MI had cucurbit downy mildew in production fields, WI did see some movement of the disease into southeastern WI. For this reason, I am being vigilant in tracking reports of the disease in southern Michigan. To date, there have been no reports of the disease developing in cucumber fields in MI. If reports arise, we should be considering preventative treatment of cucumber and melon crops here in southeastern Wisconsin. Pictures of symptoms below from David Perla and Mary Hausbeck of Michigan State University.
https://www.canr.msu.edu/news/cucurbit-downy-mildew-spores-identified-in-air-samples-2023

Photos 1, 2. Early symptoms of downy mildew on cucumber with the yellow-brown tissue bordered by the leaf veins. Photos 3, 4. The dark spores of the cucumber downy mildew pathogen can be seen on the underside of the leaf. These spores move via air currents and infect unprotected plants. Photos by David Perla, MSU.

Again, to date, no symptoms of cucurbit downy mildew have been reported here in Wisconsin. The disease has been confirmed on cucumber in NC and NJ; butternut squash and cucumber in SC; and watermelon, acorn/yellow summer squash, and cucumber in Georgia. These data suggest that there are both strain types of the pathogen active along the east coast. We should be watchful of all cucurbit crops. In past recent years, we have predominantly seen the cucumber strain types impacting cucurbits in Wisconsin. I offer the listing of recommended fungicides most effective in limiting downy mildew from Dr. Hausbeck's MSU field research in 2021 and 2022.

It is very important that cucumber growers use proven downy mildew fungicides (shown below in alphabetical order). These fungicides were effective in our 2021 and 2022 research field plots and include:

- Elumin + chlorothalonil or mancozeb
- Omega (Orbus) + chlorothalonil or mancozeb
- Orondis Opti (chlorothalonil is part of the premix)
- Previcur Flex + chlorothalonil or mancozeb
- Ranman + chlorothalonil or mancozeb
- Zampro + chlorothalonil or mancozeb

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

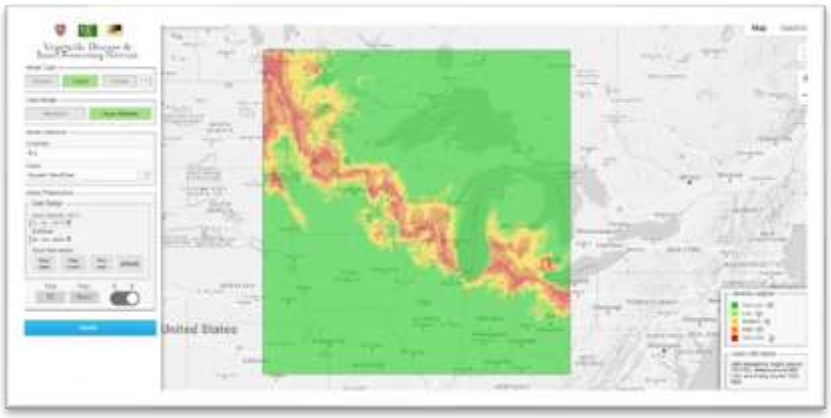
Vegetable Entomology Webpage: https://vegento.russell.wisc.edu/

Squash vine borer - (https://vegento.russell.wisc.edu/pests/squash-vine-borer/) We are reaching the time for overwintering emergence of adult squash vine borers in susceptible cucurbits. Adult squash vine borer is a day-flying clearwing moth that is commonly confused with a large wasp. Forewings of the adults are dark-brown with iridescent green coloration while the hindwings are transparent with a fringe of reddish-brown hairs. The abdomen is a very obvious rusty orange with black spots along the dorsal margin. Hind legs are typically covered with tufts of orange and black hairs.

The squash vine borer is a sporadic pest of pumpkin and squash, meaning not every field will experience an infestation. If you have experienced damage from this insect in the past, it is very likely you could experience risk into the future. Resulting damage can be difficult to diagnose prior to the significant harm that can occur. In years of heavy infestation squash vine borer can become a significant economic pest and susceptibility to squash vine borer is variable among species of cucurbits. Varieties known to be suitable hosts are pumpkins and squashes. Commonly infested cultivars are pumpkin (standard and giant), zucchini, as well as crookneck, straight neck, acorn, patty pan, summer, banana, buttercup, and hubbard squashes.

Beginning in late June to early July, adult vine borers emerge from the ground. In the Midwest the pest typically emerges after 1,000 growing degree-days (base 50°C) have been reached. This degree day threshold has now been surpassed in much of southern Wisconsin and will be reached quickly across central and northern Wisconsin later this week. Newly emerged female moths quickly seek suitable hosts and begin laying small, brown eggs singly at the base of susceptible plants. Depending upon temperature, eggs will hatch within 4-5 days of being laid. Newly hatched larvae quickly bore into the vine stems to feed for four to six weeks.

Squash vine borer is very difficult to manage with chemical insecticides since older larvae are protected within the plant stem. The target life-stage for conventional chemical management is newly hatched larvae that have not yet entered the stem. Effective control requires insecticide residue to be in place before and during the egg laying period (1,000-1,200 DD_{50}). Two to three successive applications of insecticide 5-7 days apart will adequately control most of the larval borers before entering the vines.



As the larvae feed, they leave behind characteristic light brown frass (insect feces) that resembles sawdust. Larvae typically feed at the center of host plant stems this internal feeding greatly restricts the plant's ability to move water and nutrients. Fully-grown borers exit the stems and burrow into the soil to pupate. Squash vine borers produce one generation per year in Wisconsin.

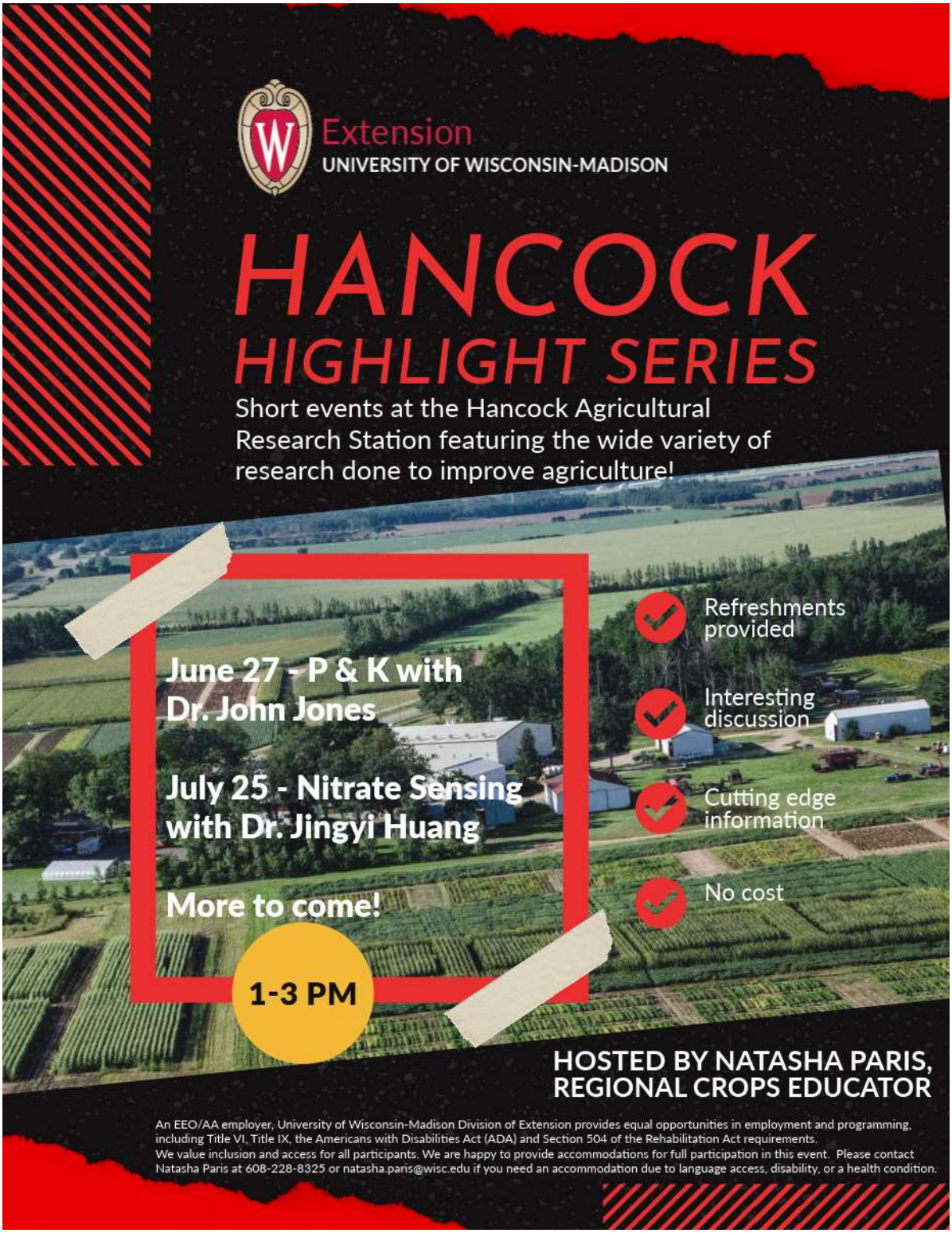
Squash bug – (https://vegento.russell.wisc.edu/pests/squash-bug/). Squash bugs are an emerging problem in Wisconsin. In recent years, these insects have become more prevalent, causing damage to vine crops in commercial fields and home gardens alike. The key to management is early detection. Squash bugs feed on all vine crops, but pumpkins and squash are the preferred hosts with gourds and melons favored next. Unmated adults overwinter in Wisconsin in protected areas. Eggs are laid in late June and early July when cucurbit vines begin to develop. Eggs hatch in about 10 days. The nymphal stage lasts 4-6 weeks and nymphs undergo 5 molts before reaching maturity. Adults appear in late July and early August.

Because they are protected by the lower surfaces of leaves, squash bugs may be difficult to control. Although it is unlikely to find large populations of the bugs early in the season, growers should check their transplants or new seedlings for the presence of adults. Using a base temperature of 58°F, eggs will appear at 193 DD and nymphs will emerge at 554 DD. The threshold for treatment is one egg mass per plant during flowering.

Onion thrips – (https://vegento.russell.wisc.edu/pests/onion-thrips/) Onion thrips may attack nearly all garden crops, but serious damage is generally limited to onions, cabbage and cucumber to a lesser extent. Feeding damage causes whitish blotches and dry, yellow areas on leaves, decreased pollen set, and, under heavy infestations, brown leaf tips and distorted or undersized bulbs. Feeding by both adults and larvae can cause silvery streaking on leaves, which becomes dry and yellow. Immature thrips prefer to feed on the youngest leaves and most easily counted in the neck of a developing onion.

Since thrips prefer tight spaces, cabbage varieties with extremely dense heads are most susceptible to damage. Thrips are often found several layers deep within developing cabbage heads. Heavy thrips buildup may cause the cabbage head to become distorted. Red onions are particularly susceptible, while Spanish onions tend to be somewhat resistant. Cultivars with leaves tightly held to stem are more susceptible to thrips damage, while cultivars with more open growth, circular leaf structure, and glossy foliage suffer less damage.

Although some regions of the state received needed rainfall over the weekend, many areas are still lacking sufficient moisture and thrips populations can be expected to build with forecast warm temperatures.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HANCOCK
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Short events at the Hancock Agricultural Research Station featuring the wide variety of research done to improve agriculture!
June 27 - P & K with Dr. John Jones
July 25 - Nitrate Sensing with Dr. Jingyi Huang
More to come!
1-3 PM
Refreshments provided
Interesting discussion
Cutting edge information
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HOSTED BY NATASHA PARIS, REGIONAL CROPS EDUCATOR
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