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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Calendar of Events

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

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.

Swede midge – Native to Europe and southwestern Asia, the swede midge, *Contarinia nasturtii* (Kieffer) Diptera: Cecidomyiidae, was identified on pheromone trap samples from Dane and Milwaukee counties this summer in 2019. Specifically, officials with the USDA APHIS confirmed two samples as positive for the presence of swede midge, using traps baited with pheromone lure, and set in broccoli as part of a USDA Farm Bill, 'Pathways Survey'. The two records were collected on 06/17/2019 in Madison, WI (Dane Co.), and on 07/01/2019 in Wauwatosa, WI (Milwaukee Co.), and following definitive identifications, this information was released to the Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP) on Tuesday, September 10, 2019. An additional four trapping locations (located in Dane, Sauk, Columbia counties) did not find any swede midge through the 2019 survey season. Reports were initially provided by the USDA APHIS to Mr. Brian Kuhn, State Plant Regulatory Bureau Director, and Ms. Krista Hamilton, Entomologist with the Bureau.

This is regarded as the first Wisconsin detection of the insect which was originally identified in North America in 2000, where it was detected in Ontario, Canada. In 2004, the first detection in the US occurred in Niagara County, New York. The insect was later detected in Michigan in 2015, and in Minnesota in 2016, and appears to have been spreading across NE states and Canadian provinces since this time. Climatic projections suggest that the insect can easily become established in production areas within and around the State of Wisconsin (**Fig. 1)**.

Hosts affected. In areas of Europe where the swede midge is endemic, the insect is regarded as a pest of cruciferous vegetable crops, such as broccoli, cabbage, cauliflower, Brussels sprouts, kale, collards and rutabagas. The insect can also be found infesting many cruciferous weed species to include wild mustard, wild radish, shepherd's-purse, field pennycress, common pepper grass and yellow rocket.

Identification. The swede midge adult is a very small, light-brown fly or midge (1-2 mm), and can be very difficult to distinguish from other closely related midge species (**Fig. 2**). New occurrences in uninfested areas require confirmation by a qualified insect taxonomist. Suspected samples can initially be directed to the Insect Diagnostic Laboratory in the Department of Entomology (http://labs.russell.wisc.edu/insectlab/).

Life History. Over-wintered adults emerge in the spring from mid-May through mid-June, with peak emergence usually occurring around June 1. After emergence, mated females will begin to lay eggs on the youngest, actively growing vegetative tissue of susceptible cruciferous crops (and weeds), typically near the growing point (apical meristem). Larvae hatch from eggs in about 3 days and begin to feed (as maggots) as groups of individuals on succulent plant tissue, completing their development in about 12-20 days (temperature dependent). Larvae complete development and drop from affected plants onto the soil where they pupate for 5-7 days re-emerging as adults ready to initiate as many as four to five overlapping generations in a season.

Impact. Larvae of the swede midge damage crops through their oral secretions (saliva) that break down plant cell walls, allowing larvae to feed on the cellular contents. The saliva interacts with the plant tissues to produce swollen, distorted and twisted leaves and meristems (**Fig. 3**). Significant damage to the terminal leader (meristem) can result in the formation of a blind head. Damage symptoms can be easily confused with other common problems. Check suspected plants carefully for the presence of larvae, examining the new growth more carefully.

Detailed information discussing the impact of the pest, and associated management and control of the pest can be found:

http://web.entomology.cornell.edu/shelton/swede-midge/index.html

http://www.omafra.gov.on.ca/english/crops/facts/08-007.htm

https://www.canr.msu.edu/news/swede_midge_biology_and_management

https://pdfs.semanticscholar.org/199c/c0da2ab56e586762a7c8ea29f30cff12b1e1.pdf

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

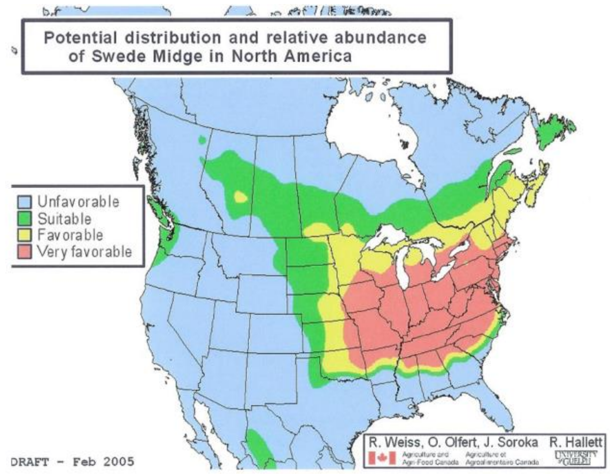


Figure 1. Potential distribution of Swede midge populations in areas of the US and Canada as determined by climate projections (photo credit: Olfert et al. 2006).

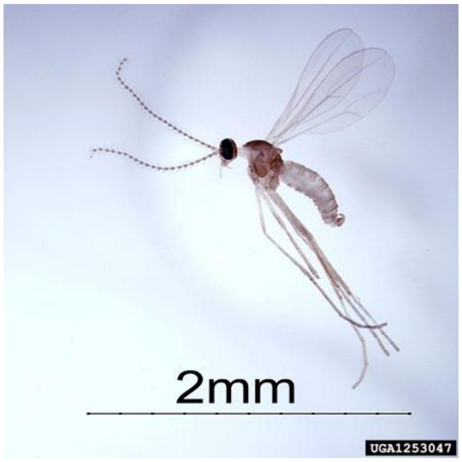


Figure 2. Swede midge adult fly. Photo credit: Susan Ellis, Bugwood.org (#1253047).

Figure 3. Swede midge damage in a terminal leader (meristem). Yellow circles indicate larval infestations. Photo credit: K. Hoepting, (http://web.entomology.cornell.edu/swede-midge/monitoring.html).

Dr. Michelle Marks, Research Associate, UW-Madison Soil Science & **Dr. Matthew Ruark,** Professor & Extension Specialist, UW-Madison Department of Soil Science

Enhancing Soil Health in U.S. Potato Production Systems – Project Summary & Harvest 2019 Update

As potato harvest gets under way, we are wrapping up the first year of work in a national effort to better understand indicators of soil health and effective methods for increasing soil health in potato production systems. This four year, eight million dollar research project, funded through the National Institute of Food and Agriculture (NIFA) Specialty Crop Research Initiative (SCRI), spans 10 universities and nearly 30 collaborators including soil scientists, plant pathologists, and potato agronomists.

The project has four main objectives: 1) to optimize soil microbiomes and physiochemical characteristics to enhance potato health, productivity, and quality through soil management practices, 2) to identify on-farm indicators of soil health associated with potato crop health, productivity, and quality, 3) to identify incentives and barriers to adopting practices that improve soil health in potato production, and 4) to share the results with the potato industry to facilitate the adoption of soil health best management practices.

Controlled experiments at university research stations around the country will be generating data for the first objective. Two coordinated experimental field plots, representing 2-year and 3-year potato rotations provide the core experimental design. Each experiment consists of six treatments: two controls planted to Russet Burbank and a region-specific variety, plus four treatments that vary by state and may include alternative crop rotation sequences, microbial inoculants, green manure or cover crop treatments, fumigation, nutrient amendments, or combinations of these. Soil sampling will be performed at multiple time points to establish biotic activity, physicochemical characteristics, microbiome composition and diversity, and levels of pathogen inoculum. The study will identify soil characteristics most critical to target in crop management regimes.

Objective 2 seeks to determine the feasibility of subfield management and identification of field locations where plant protection is most needed by employing GIS-based spatial analysis of geo-referenced field sampling points. In these on-farm investigations, fields with diverse histories and characteristics are being systematically sampled and the data will be used to build models that predict soil characteristics between measured points, thus getting a whole-field view with just a few sampling locations. This data will be used to examine relationships between soil biological & physical properties and soilborne pathogen density & disease severity. Further, we'll be learning about the spatial variability of soil characteristics that may be associated with potato health, yield, or quality at multiple scales (sub-field, among fields within a region, or among regions).

Agricultural economists will be analyzing farm budgets and crunching the numbers to examine the additional costs associated with soil enhancement practices and rotations and evaluate the feasibility of each activity or how new rotation strategies compare to current practices. If investments into soil improvement decrease profitability, the analysis will estimate incentives that may be required to facilitate adoption (assuming that the adoption of new practices is socially preferred). A further goal of this third objective is to examine producers' likelihood of adopting new practices by utilizing an experimental choice design administered through interactive surveys. The benefits & value of each potential soil improvement practice will also be calculated, incorporating the findings of Objectives 1 and 2.

The final objective seeks to develop state-level, regional, and national extension programming and materials to facilitate the adoption of soil health best management practices by the potato industry. We will be working closely with state extension specialists to disseminate information and resources associated with the project, as well as assembling small groups of farmers, consultants, and stakeholders to determine needs and provide the most relevant information. Regionally, we will be developing Potato Soil Health Manuals for the West (ID, OR, WA, MT, CO) and Midwest/East (ND, MN, WI, MI, ME) that address the differences in soil and climate with each area. These manuals will engage numerous collaborators from both within and outside of the project. Programming on the national level is also planned.

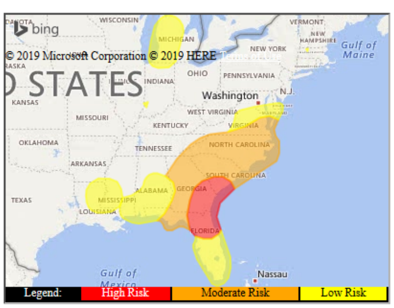
At this time at the end of year 1, we are still very much in the data collection phase. Summer soil sampling is complete for the 2019 growing season and analysis is under way. The appropriate soil physicochemical tests and pathogen screens are in progress, as is the microbiome analysis. Potato harvest is in progress in most regions at this time, and many states are preparing for cover crop planting this fall. Extension materials, including a series on core soil health concepts, are in production.

For additional news, updates, resources, and project information (including protocols and research plans), please visit our project website at https://potatosoilhealth.cfans.umn.edu/.

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

Cucurbit downy mildew: To date, we've had a few cucurbit downy mildew confirmations in WI including Buffalo (watermelon; 9/5); Vernon (cucumber; 8/20) and Dane County (butternut squash and pumpkin, 8/20). While downy mildew doesn't directly infect fruit, cucurbits that require several more weeks in the field could lose foliage, creating little/no sun protection for fruit resulting in sun scald. Additionally, plants infected with downy mildew often become more susceptible to other diseases esp. on fruit of late seasoning maturing hard winter squashes and pumpkins. Protection of cucurbits with use of effective fungicides is recommended at this time. **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 The cucurbit downy mildew reporting and forecasting site http://cdm.ipmpipe.org/ indicated new confirmations of downy mildew in AR, MS, NY, OH, and SC during this past week. In 2019 so far, the site has documented confirmations in AL, AR, CT, DE, FL, GA, IN, KY, MA, MD, MI, MO, NC, NH, NJ, NY, OH, PA, RI, SC, TN, VA, and WI on various cucurbits.

Risk prediction map for Day 3: Sunday, September 15



HIGH Risk for cucurbits in northern FL, southeast GA, and southern SC. Moderate Risk in the eastern FL panhandle, southwest / central / northern GA, SC except the southern areas, NC, southeast VA. Low risk for cucurbits in central and southern FL and the western panhandle, northeast LA, southern MS, central and southern AL, central VA, southern MD and DE, and western and central MI. Minimal Risk to cucurbits otherwise.

Forecaster: TK at NCSU for the Cucurbit *ipm*PIPE - 2019

The disease forecast indicates no risk of downy mildew movement within WI.

Potato & Tomato Late Blight Updates: Reports of late blight from both potato and tomato have been confirmed in a few additional counties this past week.

Date	County	Host Crop	Clonal Lineage
7/17/2019	Wood	Potato	US-23
8/2/2019	La Crosse	Tomato	US-23
8/6/2019 **8/15/2019** **8/22/2019** **9/3/2019**	Portage	Potato Potato Potato Potato & Tomato	US-23 US-23 US-23 US-23
8/13/2019	Monroe	Tomato	US-23
8/14/2019 **8/27/2019**	Adams	Potato Potato	US-23 US-23
8/14/2019 **8/15/2019** **8/19/2019**	Waushara	Potato Potato Tomato	US-23 US-23 US-23
8/14/2019	Vernon	Tomato	US-23
8/19/2019 **9/13/2019**	Crawford	Potato Potato & Tomato	US-23 US-23
8/24/2019	Sauk	Potato	US-23
8/29/2019	Juneau	Tomato	US-23
9/12/2019	Shawano	Potato	US-23
9/13/2019	Green Lake	Tomato	US-23

Most isolates of US-23 can be managed with phenylamide fungicides such as mefenoxam and metalaxyl. My lab is isolating and screening the late blight pathogen collected from WI this summer and we'll better understand the response of this group of US-23 with respect to phenylamide resistance. It is critical that susceptible potatoes and tomatoes in and around the counties of reports 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.
Outside of WI, late blight was confirmed in NY (tomato) this past week. In 2019, late blight had been confirmed in FL, NC, NY, PA, TN, WA, and WI. 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

Current P-Day (Early Blight) and Disease Severity Value (Late Blight) Accumulations - As potato fields are vine killed and harvested, our stations will be shut down for this season. Many thanks to Ben Bradford, UW-Madison Entomology; Stephen Jordan, John Hammel, & Samuel Meyer, UW-Madison Plant Pathology for maintaining stations and advancing data collection and processing in 2019. 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) 9/15/19**	**Potato Physiological Days (P-Days) 9/15/19**
Grand Marsh	Early	Apr 10	May 20	**149**	**907.48**
	Mid	May 1	June 1	**147**	**830.28**
	Late	May 20	June 9	**145**	**771.79**
Hancock	Early	Apr 10	May 22	**99**	**901.57**
	Mid	Apr 25	May 27	**98**	**865.67**
	Late	May 15	June 8	**96**	**776.15**
Plover	Early	Apr 22	May 27	**139**	**872.29**
	Mid	May 1	June 1	**139**	**837.89**
	Late	May 29	June 13	**137**	**747.67**
Antigo	Early	May 14	May 29	**77**	**751.46**
	Mid	May 24	June 8	**77**	**744.55**
	Late	Jun 1	June 20	**74**	**662.41**