Vegetable Crop Update

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

No. 4 – May 5, 2018

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Calendar of Events

July 10-12, 2018 – Farm Technology Days, Sternweis & Weber's Farms, Marshfield, WI
July 19, 2018 – UW-Hancock Agricultural Research Station Field Day, Hancock, WI
July 26, 2018 – UWEX Langlade County Field Day & Potato Virus Y Detection Training Workshop, Antigo, WI
August 2, 2018 – UW-Rhinelander Field Day, Rhinelander Agricultural Research Station, WI
November 27-29, 2018 – Processing Crops Conference & MWFPA Annual Convention, Wisconsin Dells, WI
January 15-17, 2019 – Wisconsin Agribusiness Classic, Alliant Energy Center, Madison, WI
January 27-29, 2019 – Wisconsin Fresh Fruit & Vegetable Conference, Kalahari Conference Center, Wisconsin Dells, WI
February 5-7, 2019 – UWEX & WPVGA Grower Education Conference, Stevens Point, WI

Amanda J. Gevens, Associate Professor & Extension Vegetable Plant Pathologist, Interim Co-Director of Wisconsin Seed Potato Certification Program, UW-Madison, Dept. of Plant Pathology, 608-890-3072 (office), Email: gevens@wisc.edu. Webpage: www.plantpath.wisc.edu/wivegdis/

National Late Blight Updates: **http://usablight.org** is again up and running for 2018 in effort to support the detection and characterization of late blight on tomato and potato crops from the U.S. Already this year, late blight has been confirmed on potato and tomato in Florida. **No new cases detected in the past week.** In all cases reported to the usablight website, the pathogen genotype was US-23. This has been the predominant genotype in Wisconsin, and across the U.S., in recent years. US-23 can still generally be managed well with use of phenylamide fungicides such as mefenoxam and metalaxyl (ie: Ridomil). However, a potato sample from northeastern FL was sent to my lab last week and the genotype was US-8. This information does pose some additional concern for management as US-8 cannot be managed with phenylamide fungicides as isolates are resistant to the fungicide.

Hop downy mildew was confirmed on hops in WI this week (Thursday, May 3, 2018). My graduate student, Michelle Marks, saw downy mildew sporulating on basal 'spikes' in south central Dodge County

this past week. As a reminder, common symptoms of downy mildew infected spikes include stunted, brittle shoots, often showing yellow-green/chlorotic coloration (above). Leaves are typically seen to be curling downward, particularly leaves closer to the ground. The black/gray fuzz of sporulation (pathogen reproduction) may be visible on the undersides of leaves (below, photo taken on April 26, 2017). Note that these symptoms can vary slightly depending upon the hop variety, so it's a good idea to get familiar with what to look for.

This period of early-season disease management occurring from now until training is complete in another month or so is focused on reducing the initial pathogen inoculum as much as possible to prevent further plant infection later in the season. Due to the aggressive and potentially devastating nature of this disease in our Wisconsin climate, chemical intervention is often prescribed. A popular active ingredient to use at this time of year (post-prune but before training) is mefenoxam, which has good systemic activity within the hop plant and has been demonstrated to be highly effective. A complete list of fungicides registered in Wisconsin for hop downy mildew control can be found under the "Hops" tab of the UW Vegetable Pathology website. If you're uncertain if you have downy mildew in hops, please contact us at the Vegetable Pathology Lab or at the UWEX Plant Disease Diagnostic Clinic (address below).

Plant Disease Diagnostic Clinic
1630 Linden Drive
Plant Pathology Dept.
Russell Laboratories
University of Wisconsin
Madison WI 53706

For more information please visit the clinic website at http://labs.russell.wisc.edu/pddc/ or contact Dr. Brian Hudelson at 608-262-286.

Powdery Scab Symptoms and Management. (with contributions from Professor Emeritus Walt Stevenson). While powdery scab doesn't develop in a potato crop until tuberization, management of the disease and exclusion of inoculum starts at time of planting. Powdery scab shares part of its name and some similarity in symptomology with common scab, but the two diseases are unique in nature and management. Both diseases can significantly reduce tuber appearance and quality. While the powdery scab pathogen can also vector Potato Mop Top Virus, we have not yet detected the virus in powdery scab-infected tubers from Wisconsin field. Table below summarizes differences between the 2 scabs and was included in a 2009 fact sheet by Stevenson. https://learningstore.uwex.edu/Assets/pdfs/A3833.pdf

Photos of potato powdery scab on a red cultivar from 2010. Note the raised and corky lesions. Additional photos of symptoms on tubers and true roots are offered below the information table from work of W.R. Stevenson.

	Common scab	Powdery scab
Causal organism(s)	Three species of bacteria cause common scab. Various common names—russet scab, pitted scab, and acid scab—describe the symptoms or conditions of infection. *Streptomyces acidiscabies* *S. scabies* *S. turgidiscabies* Because of their threadlike habit, these bacteria resemble fungi more than they do other bacteria.	Protozoan pathogen *Spongospora subterranea* f. sp. *subterranea* Alternate hosts for powdery scab include other members of the nightshade family (Solanaceae) such as pepper, tomato, jimsonweed, and black nightshade.
Yield loss	Common scab does not normally affect total yield but often significantly affects tuber appearance, reducing marketable yield. When common scab produces deep-pitted lesions, the marketability for both fresh markets and processing (chips and fries) is greatly reduced because of increased peeling requirements and quality losses. Common scab does not normally lead to secondary rots while tubers are in storage. The scab pathogen can also infect table beet, carrot, parsnip, radish, turnip, and rutabaga crops, but it rarely has a significant economic impact on any of these crops.	Infection may reduce yield and infected tubers will continue to lose moisture in storage. Powdery scab lesions on tubers may serve as entry points for secondary tuber-rotting organisms. The powdery scab pathogen serves as a vector of the potato mop-top virus.
Symptoms and infection timing	Symptoms of common scab appear only on the tubers. Tubers are susceptible as soon as they begin to form. The severity of symptoms depends on a combination of the potato variety, the environment, and the aggressiveness of the infecting pathogen strain. The pathogen produces a phytotoxin that induces symptoms including cell swelling and cell death. Initially, symptoms appear as a browning and swelling of affected cells. Corky lesions typically have raised margins and slightly sunken centers. Individual lesions may spread to cover large portions of affected tubers. **Russet scab—**At harvest, tubers may be covered with superficial tan to brown corky lesions. **Pitted scab**—Tubers may have numerous depressions of varying diameter and depth beneath the surface.	Powdery scab affects potato tubers as well as roots, stolons, and young shoots before they break through the soil surface. Infection of tuber lenticels and eyes first appears as purplish-brown slightly sunken lesions. Tuber lesions begin to swell and, at maturity, the tuber periderm ruptures, releasing masses of powdery spore balls. Infection of roots leads to the development of milky white to tan galls up to 1 cm in diameter that eventually turn brown and release masses of powdery spore balls into the soil. Root galls may be confused with the symptoms caused by the root-knot nematode.

	Acid scab—Symptoms are similar to russet scab but occur at soil pH levels below 5.0.	
Ideal conditions for infection	Young, rapidly growing potato tubers are most susceptible to infection. The primary route of infection is through young lenticels. Warm, dry soil conditions with soil temperatures above 72°F during tuber set and during rapid tuber development favor the disease.	The pathogen enters the epidermal cells of roots, root hairs, stolons, young shoots, and tubers, where further development occurs. Cool, moist conditions (52–65°F) and poorly drained soils favor infection.
Longevity in soil	The pathogen can survive indefinitely in soil and can be an important production problem at soil pH 5.5 and above, although acid scab can cause symptoms in soils with pH levels below 5.0.	Powdery scab can survive as resting spores in the soil for up to 6 years. Under ideal conditions, multiple generations of infection and zoospore release can occur during a single growing season.
Disease spread	The common scab pathogen is both soil-borne and tuber-borne. It can be transported over long distances and introduced into new sites on infected seed pieces, equipment, and through human activity.	The pathogen is spread on seed tubers, and resting spores are moved to new sites in infested soil by equipment and human activity. The resting spores can also survive passage through animal digestive tracts.

Control

- To prevent both common and powdery scab, practice rotation with non-susceptible crops. A 3–4 year rotation is usually sufficient for common scab, but a rotation of at least 6 years is advised for management of powdery scab under Wisconsin conditions. It's important to avoid rotating with other root crops for control of common scab and to avoid using tomato in rotation with potato to control powdery scab.
- Control of weeds in the nightshade family is important for control of powdery scab.
- Grow scab-resistant varieties. Potato varieties vary in their reaction to these two pathogens. None are immune.
- **Avoid planting potato seed pieces with symptoms of either common or powdery scab.** *Carefully inspect seed potatoes for symptoms of powdery scab – we can help you diagnose this disease in the UW-Vegetable Pathology Lab or in the UWEX Plant Disease Diagnostic Clinic. The best way to manage powdery scab is to keep inoculum out of your fields.*
- Manage soil moisture through irrigation. Make sure the crop receives sufficient moisture during tuber initiation to prevent common scab, but be sure not to over-irrigate if powdery scab has been a problem in the past.
- To reduce the incidence of common scab, do not raise the pH level above 5.5 when liming the soil.
- Do not plant potatoes within two years of a manure application.
- If powdery scab–infected tubers are fed to livestock, do not use the resulting manure in potato fields because resting spores are not destroyed by their passage through the digestive tract.
- Cull infected potatoes at harvest and do not put culled potato debris back on land where potatoes will be planted in subsequent years.
- Fluazinam (Omega 500F) can help suppress powdery scab when applied in-furrow at time of planting. WI has a special registration (24c) for this in-furrow application (expires 2020).
    - Further information on cultivar resistance to powdery scab and to Potato Mop Top Virus, as well as performance of chloropicrin for powdery scab can be found at link below
    - https://www.ag.ndsu.edu/publications/crops/potato-tuber-viruses-mop-top-management

	
Superficial lesions of common scab on a red-skinned potato variety.	**Symptoms of powdery scab on a red-skinned potato tuber. Note the slightly raised circular lesions and papery margins of lesions.**
	
A close-up view of common scab symptoms on a potato tuber. Note the corky appearance of common scab lesions.	**A close-up view of galls formed on potato roots, caused by the powdery scab pathogen.**

The 2018 A3422 Commercial Vegetable Production in Wisconsin Guide is now available for 2017. As in past years, the guide can be downloaded for free (link below) or a hard copy can be purchased from UWEX Learning Store for $10.

http://learningstore.uwex.edu/assets/pdfs/A3422.PDF

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The first two days of this week were fantastic for planting potatoes, but then more than two inches of rainfall between Tuesday evening and Thursday evening held everybody back for fieldwork from Wednesday to Friday. Some growers will resume on Saturday to catch up, and forecast for the coming week looks promising so far.

For processing vegetable crops, early peas and snap beans have been already in the ground, and carrot planting just got started.