



**University of Wisconsin Department of Plant Pathology**  
**Potato & Vegetable Pathology Research and Extension Program**  
 Amanda J. Gevens, Associate Professor & Extension Plant Pathologist  
 Phone: 608-890-3072, E-mail: [gevens@wisc.edu](mailto:gevens@wisc.edu)

**Hancock Agricultural Research Station - Potato Field Day – July 28, 2016**

**2016 – Ongoing field research at Hancock Station & surrounding areas – Evaluation of Disease Management Strategies in Potato & Vegetable Crops:** S.A. Jordan, J. Hammel, B. Gumz, H. Higgins, S. Meyer, K. Meinholz, S. Machiavelli Giron, S. Ding, M. Marks, K. Morey Gold, Y. Chen, A. J. Gevens

**Potato:** Early blight foliar fungicide trial, Early blight foliar disease evaluation variety trial, Rhizoctonia & Silver scurf seed trt/in-furrow fungicide trial, Root lesion nematode control (conventional non-fumigant standards and novel biopesticides); weather station for PDay and DSV generation

**Pumpkin:** Powdery mildew fungicide evaluation, characterization of myclobutanil resistance; cucurbit downy mildew sentinel plot

**Peas:** Fusarium/Root rot seed treatment study

**Snap beans:** DelMonte collaboration – Plover – white mold fungicide evaluation

**Carrot:** Grower collaboration – Hancock - nematicide control (conventional and novel biopesticides)

**Onion:** Grower collaboration – Montello - Stemphylium foliar disease fungicide trial

**Late Blight Updates:** Unconfirmed late blight detected in WI as of 7/25/16 (lesions not sporulating, positive for *Phytophthora* but not yet for *Phytophthora infestans*, no genotype info yet). Closest confirmed *P. infestans* detection on potato was in south central MI July 27, 2016 (genotype not yet determined). US-23 was previously detected on volunteers in south central MI on July 11, 2016. US-23 has predominated cases of this disease in the US so far this year. West coast has had US-8 and US-11 as well. Disease has been confirmed on both potato and tomato. Careful monitoring for and management of volunteers and solanaceous weeds is critical – along with preventive management of the main potato crop with use of effective fungicides. Summary table of recent pathogen strains and their character is provided below.

<i>Phytophthora infestans</i> genotype/strain (from recent detections in the US)	Mefenoxam/metalaxyl resistance status	Mating type and other comments on character (* indicates host preference)
US-8	Resistant	A2; infects tomato and potato*
US-11	Resistant	A1; infects tomato and potato
US-23	Sensitive (some insensitivity)	A1; infects tomato* and potato
US-24	Resistant	A1; infects tomato and potato*

**Potato Blackleg Updates (contributions from Dr. Amy Charkowski, Professor of Plant Pathology, UW-Madison, Dept. of Plant Pathology):**

The primary bacterial pathogens that cause potato blackleg and tuber soft rot are *Pectobacterium atrosepticum*, *P. carotovorum*, *P. wasabiae*, and more recently in the U.S., *Dickeya* spp. Previously, all of these pathogens were grouped in the same genus *Erwinia*. *Dickeya* and *Pectobacterium* affect many host species including potato, carrot, broccoli, corn, sunflower and parsnip; legumes and small grains are not known hosts. *Dickeya dianthicola* was confirmed in the eastern U.S. in just 2015, causing significant potato losses in some areas; *D. dianthicola* seems to be the predominant species detected from potato samples in this past year, but species can vary by unique location and/or system (*D. dedantii*, *D. chrysanthami* also detected in some samples). *Dickeya* appears to spread rapidly over long distances via seed potatoes, was first reported in the Netherlands in the 1970s, and has since been detected in many European countries, and now the U.S. Under the right environmental conditions, infection of seed with blackleg pathogens can result in symptoms including poor emergence, chlorosis, wilting, tuber and stem rot, and darkened or black stems which are slimy, and death. These symptoms result from the cell-wall-degrading enzyme activity of the bacteria within the plant.

Blackleg bacterial diseases are promoted by cool, wet conditions at planting and high temperatures after emergence. While the pathogens can be spread in infested seed, other sources of inoculum include soil, irrigation water, and insects. Levels of infection are dependent upon seed-handling/cutting techniques, soil moisture and temperature at planting and emergence, cultivar susceptibility, severity of infection of seed, and potentially, amount of bacteria in irrigation water, cull piles, or other external sources. Sanitation and disinfecting of potato cutting equipment and proper handling reduces spread and aids in control of the pathogen. Treating seed to prevent seed piece decay by fungi can also contribute to blackleg control. Since the pathogen does well in cool, wet soils, avoid planting in overly wet soil. Crop rotation away from potato for 2-3 years for *Pectobacterium* and just 9 months-2 years for *Dickeya* species will help control this disease as the bacteria do not survive well in soil.

Wisconsin growers are concerned about *Dickeya* as this genus is new to our state and represents a more aggressive and problematic pathogen than experienced before. Yield losses of up to 35% or more have been reported due to this pathogen in other regions. If you are having potatoes tested, it is most critical to test your earliest generation of potato and consider the approach of flushing out your production system to get rid of the pathogen as quickly as possible – much like the approach historically taken by producers in response to ring rot. Ring rot epidemiology and is very similar to that of *Dickeya*. Don't assume that any source of potato is clean. There have been seed and production farms in WI and other states/systems that have had positives for *Dickeya*. Amy advocates sampling/testing through UWEX Plant Disease Diagnostic Clinic for confirmations. Testing capacity is limited nationally,

so give warning to provide a heads up to the lab you choose. There are 3 labs in the US performing this testing: WI, ME, and ND (Gary Secor). Agdia is ramping up to test but is not prepared to as of right now.

It is likely that this pathogen was present and spreading in seed potatoes and on farms in the affected states for a few years (2013-2014) without causing significant disease damage due to cool temperatures. In 2015, however, temperatures were warmer and the presence of *Dickeya* resulted in significant disease outbreaks on commercial potato farms. Increased detection and recognition of this rapidly spread disease problem has prompted additional sampling and monitoring efforts from within numerous seed certification and regulatory agencies. There are no national tolerances established for *Dickeya* in seed certification processes at this time. Maine has adopted a tolerance based on seed generation, with an up to 2% allowance. Wisconsin does not have an established tolerance. Based on Dr. Amy Charkowski's experience with this pathogen, 1% tolerance is even too high. Many affected states are proposing a 0 tolerance to most rapidly flush this pathogen out of the seed/production potato systems of the US. To find a 1% tolerance level, a 400 tuber sample is needed; for a .3-.5% tolerance, a 1200 tuber seed sample is needed. These are tough, impactful decision.

Field control of aerial stem rot is challenging. Copper containing fungicides such as Kocide can provide some control of aerial stem rot, and can aid in managing bacterial infection after the crop has suffered hail or driving rain/wind damage. However, note that results of these approaches have had varied success throughout the U.S. In work by Dr. Dennis Johnson of Washington State University, the famoxadone+cymoxanil (Tanos) plus mancozeb tank-mix alternated with mancozeb+copper hydroxide (ie: Kocide) was an effective chemical tool in reducing aerial stem rot in potato. Irrigation management to reduce excess water also greatly enhanced control of aerial stem rot. Copper hydroxide applications alone did not have as effective of control as Tanos+copper hydroxide. As Tanos is also an excellent late blight control material, its use as we approach DSVs of 18 at this time offers an appropriate program for control of both diseases. Remember that seedborne or vascular blackleg cannot be reversed with bactericide treatment, but aerial spread from infected to healthy plants may be mitigated. Remember that pathogen, in a seedborne case, is inside of the plant (until severe symptoms develop) and copper treatments are not internalized by the plant.

Additional information on *Dickeya* as well as cultural management information is provided below, from an excerpt of a previously published Spudsmart article. **Dickeya: A New Threat to Potato Production in North America, By [Khalil Al-Mughrabi](http://spudsmart.com/dickeya-new-threat-potato-production-north-america/) on May 19, 2016** <http://spudsmart.com/dickeya-new-threat-potato-production-north-america/>

#### **Grower Checklist for Preventing *Dickeya***

1. Plant certified, disease-free tubers, into well-drained soil with temperature under 10°C.
2. Plant whole seed tubers if possible. Suberize cut seed before planting.
3. Plant seed tubers during conditions that favor fast emergence.
4. Clean and disinfect tools and equipment used for cutting and planting seed.
5. Avoid wounding during seed cutting, planting and harvest.
6. Fungicidal seed treatment to prevent seed piece decay can indirectly prevent seed contamination, esp. during cutting.
7. Utilize crop rotation of two or more years with a non-host crop.
8. Avoid over-irrigation.
9. Avoid excessive fertilization, which may impact plant and tuber maturity.
10. Consider copper fungicides, which are partially effective against disease and dry out existing lesions.
11. Delay harvest until skin set is complete (up to 21 days after top-kill).
12. Avoid wet conditions during harvest to prevent soil from sticking to tuber skins.
13. Store contaminated potato lots separately.
14. Provide adequate ventilation in storage.
15. Check storages regularly for temperature increase and odors. If problems are detected, hot-spot fans can be used to cool pile.
16. Dry potatoes before storage or shipping.