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
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Calendar of Events

July 18, 2019 – UW-Hancock Agricultural Research Station Field Day, Hancock, WI
July 25, 2019 – UWEX Langlade County Airport Research Station Field Day, Antigo, WI
August 2, 2019 – UW-Lelah Starks Elite Foundation Seed Potato Farm Field Day, Rhinelander, WI
February 4-6, 2020 – UWEX & WPVGA Grower Education Conference, Stevens Point, WI

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Potato and vegetable planting – crop updates: Potato and vegetable planting has been well underway in Wisconsin this week, with Mother Nature being cooperative most of the time. The forecasted couple of inches of snow on April 27th should melt pretty fast under the current warm soil temperature and will likely not affect the progress of planting too much. However, weather next week looks to be wet and cloudy, which might slow things down especially in fields with raised water table and low elevations.

The Potato Seed Calculation is a good tool published by Dr. Andy Robinson on the NDSU potato extension website: https://www.ag.ndsu.edu/potatoextension/tables-for-potato-seed-and-plant-population. Formulas are available in the Excel tables to calculate the amount of potato seed needed to plant at different row widths, within-row spacing, and by seed piece size.

Potato tuber black heart: In the past several weeks, Amanda and I received some questions about a dark black discoloration issue in or around the center of tubers (picture below).

This is a physiological condition referred to as black heart, caused by insufficient oxygen to support tuber respiration. Varieties can respond variably to low oxygen especially when stored for extended periods of time. Usually there is no cavity in black heart tissues. Affected tissue is firm, not soft or leaky, but when temperature rises to higher than 65°F, it can turn soft and inky. Black heart can develop in field, at harvest, in storage, and during transportation inside trucks.

In the field, black heart is more commonly seen in waterlogged soils particularly in low areas. Saturated or nearly saturated soils can promote anaerobic conditions and reducing gas exchange within the tuber. Long exposure to high field temperatures (>90°F) before harvest can also lead to black heart. During storage, it can occur when proper ventilation is not supplied to the tubers. Warmer storage temperatures

can increase tuber respiration rates and oxygen demands, which will facilitate black heart development especially when ventilation is not enough. Tubers used as seeds with black heart issues will have lower vigor and may not support emergence.

Therefore, management practices to avoid or reduce black heart include:

- Appropriate irrigation scheduling to minimize soil moisture accumulation, especially in the low areas of the field
- Maintenance of sufficient ventilation and proper temperature during storage
- Avoid deep pile and closed bins
- Minimize the amount of dirt and debris in storage that might prevent good airflow
- Proper distribution of air ducts in the storage facility
- Avoid poorly aerated trucks during transportation

Potato early season disease considerations: Amanda Gevens, Associate Professor & Extension Specialist, UW-Madison Plant Pathology, gevens@wisc.edu, 608-575-3029

Wet and cool soils delay germination and emergence. Such conditions also promote activity of plant pathogens, such as *Rhizoctonia solani*, a potentially seed-, soil-, or debris-borne fungal pathogen which causes stem or stolon cankers resulting in reduced stands, stunted plants, and/or reduction in tuber number, size, or quality. Later in the season, **Rhizoctonia** can also cause black scurf on tubers. Cultural management approaches such as planting when soil temperatures are more consistently above 46°F, planting into well-drained soils, avoiding planting too deep, and avoiding hilling prior to adequate emergence can limit early season stem and stolon canker.

Several other seed-, soil-, and/or debris-borne diseases can also impact the potato crop, including **Fusarium seed piece decay** caused by the fungus *Fusarium sambucinum*, **Silver scurf** caused by the fungus *Helminthosporium solani*, and **Late blight** caused by the oomycete *Phytophthora infestans*. While optimum temperatures for promoting each of these diseases vary, all require high soil moisture levels.

Fusarium, as a dry rotting pathogen which requires wounds for entry, can affect quality of seed potatoes in storage and lead to further disease concerns when potatoes are moved and warmed for planting. As a seed piece decay pathogen, Fusarium can affect seed immediately after cutting and through to sprouting. If initial and subsequent sprouts continue to be affected by Fusarium, the seed piece loses vigor and stand is reduced.

The **Silver scurf** pathogen is favored by warmer conditions and is recognized as a weak soil-borne and a stronger seed-borne pathogen. Typically, symptoms are not evident on tubers at harvest, but develop over time in storage. The longer the tubers remain in the ground after vine kill, the greater the risk for development silver scurf. Blemishes on tubers are restricted to the periderm. However, damage to the periderm causes increased water loss and shrink. The pathogen is not known to cause above ground plant symptoms.

Fungicide seed treatments have a place in an integrated pest management (IPM) plan which includes cultural practices such as i) planting certified potato, ii) proper handling and sanitation of storage/cutting/curing facilities prior to planting, iii) cultivar resistance, iv) biological control, and v) chemical control. In combination, IPM practices minimize economic losses to disease, minimize environmental effects, limit risk of pesticide residues in the food supply, limit development of fungicide-resistant pathogen strains, and limit development of pathogen strains which may overcome host disease resistance.

Seed cutting and planting events provide opportunities for application of fungicides to reduce negative effects of diseases such as Rhizoctonia, Fusarium, silver scurf, and late blight. While this article specifically addresses seed treatments in potato disease control, several potato fungicides are registered for in-furrow application and are also effective in managing seed- and soil-borne diseases. While seed-applied fungicides can enhance disease control and crop success, be mindful that some of the fungicides are contact only (ie: mancozeb and fludioxonil) and are active by limiting direct infection to the protected seed piece. Systemic fungicides (ie: flutolanil and cymoxanil) are xylem mobilized, moving the fungicide upward and outward (acropetally) for protection beyond the point of contact. Generally, seed-applied fungicides provide, at most, 10-14 days of disease protection. However, some active ingredients can protect seedlings considerably longer when applied at the highest labeled rate.

Typically, seed treatments are applied right after cutting with either a liquid or powder formulation. Taking care to avoid clumping or thick coating of the treatment is important as you can cut off oxygen to the seed piece and limit suberization (and promote soft rot). Good suberization of cut seed pieces is a critical component of potato disease management and should include a 3-4 day, 50-55°F, 90-95% relative humidity period with cut seed piled no deeper than approximately 6 ft to maximize airflow throughout the pile.

Seed treatments in potato have received increased interest and use in recent years due to improvements in active ingredients available, and the return on the investment of early season disease control. As there are no true rescue treatments for underground diseases post-planting, seed treatments provide a most effective use pattern with added benefits of relative ease of application, small volumes of fungicide necessary, no spray drift, and no waste or negative impact on non-target sites.

Several fungicides with effective control of multiple diseases are available with registration for application to seed pieces prior to planting. Always read and follow the pesticide label prior to use.

In special consideration of late blight control in potato, key components of management include:

1) Destroy all potato cull piles (May 20 deadline by DATCP)

2) Manage potato volunteers in all fields -*volunteers pose great risk for late blight introduction*

3) Acquire disease free seed from a reputable certified source –*infected seed poses great risk for introduction*

4) If there is a risk of disease associated with seed, use seed treatment or in-furrow application of effective late blight controlling fungicides (seed treatment is best)

5) Apply **only proven effective fungicides** for control of late blight when disease forecast tool indicates environmental risk and stay on a fungicide spray program (DSVs reach 18)

    a. For conventional systems, a current list of registered late blight-specific materials can be found in the Commercial Vegetable Production in Wisconsin A3422 publication (further information below)

    b. For organic systems, copper-containing fungicides have been long-standing effective materials for preventing late blight in susceptible crops. Some newer organic fungicides are also available with promising late blight control (ie: Zonix, EF400).

6) Scout regularly and thoroughly for disease in all potato fields

7) Re-apply effective fungicides for disease control on a 7 day schedule (recommendation adjusts to a 5 day schedule when late blight is in the area and weather favors disease; recommendation adjusts to a 10 day schedule when late blight is not found in area and weather is hot and very dry)

8) If late blight is identified in a field, have a mitigation plan in place for specific site. Depending on days to vine kill, environmental conditions, and extent of infection – plan may vary from complete crop destruction to early vine kill with continued maintenance fungicide sprays. Mitigation plan should limit disease spread within field and from field-to-field.

We will continue to provide Blitecast information via this newsletter and through the vegetable pathology website: https://wivegdis.plantpath.wisc.edu/. We will have in-potato-field weather stations in Grand Marsh, Hancock, Plover, and Antigo as in past years, with access to the station data (with DSV and PDay values at: https://wivegdis.plantpath.wisc.edu/dsv/#hancock). New in recent years, is the Vegetable Disease and Insect Forecasting Network (VDIFNet) site which provides information on DSVs from NOAA weather data across the state of WI, as well as insect phenological data (Dr. Russell Groves, UW-Madison Entomology). The link to the VDIFNet site is: https://agweather.cals.wisc.edu/vdifn/maps.

Accessing the 2019 University of Wisconsin Madison Extension Commercial Vegetable Crop Production Management Guide: Our production guide is updated every October with release of a new guide in January. The book can be downloaded for free as a pdf at the link below, or can be purchased online for $12.50. **https://learningstore.uwex.edu/Assets/pdfs/A3422.pdf**