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 – May 1, 2015

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Calendar of Events

July 15 – UW-Hancock ARS Field Day, 1:00PM, Hancock, WI
July 17 – Rhinelander State Farm Field Day, Lelah Starks Elite Found. Seed Farm, Rhinelander, WI
August 20 – UWEX Langlade County Airport Field Day, Antigo, WI
August 25-27 – Wisconsin Farm Technology Days, Statz Bros., Inc. Farm, Sun Prairie, WI

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Late blight updates: The Wisconsin Administrative Code (ATCP 21.15(2)) requires potato cull piles to be fed, disked in or otherwise removed by **May 20**, to prevent late blight. Nationally, in the past week, there were no new late blight diagnoses reported at www.usablight.org. So far in 2015, there have been confirmation of potato and tomato late blight (US-23) in FL and tomato late blight in CA (US-11). Additionally, there were a few potato fields in Frio County Texas that have had late blight. To date, the strain has not yet been identified.

Potato early season disease considerations: 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. While not comprehensive, the table at the end of this newsletter provided lists alphabetically by trade name, commonly used and currently registered fungicides for use on potato seed in Wisconsin.

With the recent presence of the late blight pathogen in Wisconsin, and the uncertainty of disease-favorable weather conditions in 2015, it is critical that all growers of tomatoes and potatoes be on alert and prepared for late blight control. Key components of late blight control in potato are:

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.

The 2015 A3422 Commercial Vegetable Production in Wisconsin guide is available for purchase ($10) through the University of Wisconsin Extension Learning Store website:
http://learningstore.uwex.edu/Commercial-Vegetable-Production-in-Wisconsin2015-P540.aspx

A pdf of the document can be downloaded for free at the following direct link:
http://learningstore.uwex.edu/Assets/pdfs/A3422.pdf

I will begin posting Blitecast disease severity values (DSVs) for Wisconsin once we have potato fields established.

Vegetable Insect Update – Russell L. Groves, Ass. Professor and Applied Insect Ecologist, UW-Madison, Department of Entomology, 608-262-3229 (office), (608) 698-2434 (cell), or e-mail: groves@entomology.wisc.edu.
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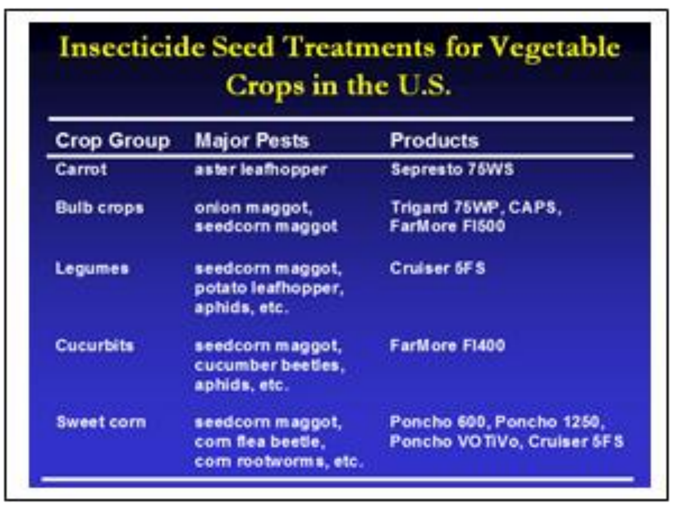
Aster Leafhoppers – Migratory populations of the Aster leafhopper (ALH) have been quite rare, to date, in much of southern and central Wisconsin. Recent sweeps in southern Wisconsin have revealed very few adults (N=2) over as many as 500 sweeps/field sample. Infectivity levels of the Aster Yellows phytoplasma (AYp) within these insects has yet to be determined within these migratory populations, but do recall that spring levels can be problematic in these dispersing adults. Infective adults do pose an early season risk for newly emerged and highly susceptible crops such as lettuce, celery, susceptible carrot varieties, and newly emerged onions growing within monocot, cover crops. The leafhopper acquires the phytoplasma by feeding on infected plants and may carry and transmit the bacterium over great distances. Once the phytoplasma is acquired, leafhoppers remain infected and may transmit AY for the remainder of their adult life. Migrant leafhoppers could become more prevalent in southern Wisconsin over the next weeks as weather systems are forecast in the coming week which ‘could’ bring more of the insects northward.


Insecticide Seed Treatments for Vegetable Crops in the U.S.

Crop Group	Major Pests	Products
Carrot	aster leafhopper	Sepresto 75WS
Bulb crops	onion maggot, seedcorn maggot	Trigard 75WP, CAPS, FarMore FI500
Legumes	seedcorn maggot, potato leafhopper, aphids, etc.	Cruiser 5FS
Cucurbits	seedcorn maggot, cucumber beetles, aphids, etc.	FarMore FI400
Sweet corn	seedcorn maggot, corn flea beetle, corn rootworms, etc.	Poncho 600, Poncho 1250, Poncho VOTiVo, Cruiser 5FS

Seed Corn Maggot - With the prevailing warmer conditions over the past week and forecasted warmer temperatures into next week, we will have reached the peak emergence of adult flights of seed corn maggot in southern Wisconsin. By this weekend and into early next week, we will likely reach and surpass an adult peak in central Wisconsin as well. As such, the potential exists for increased damage to early season, direct seeded vegetable crops caused by infestations of seed maggots (*Delia* spp.). Early season transplants, and directed seeded crops that are slow to emerge and begin rapid growth can be most severely damaged. The adult maggots are often dusky gray, bristly flies that resemble a housefly. The damaging larval stages are legless, white or opaque in color, and are typically around ⅓ to ½ inch in length with the body tapering slightly towards the head (**Fig. 1**). Maggots feed internally as well as on the root surfaces and these tunnels may provide an entry point for other plant pathogens such as soft rot. Affected plants appear stunted and stand emergence can be uneven. Direct seeded crops are often available with insecticide pretreatments on the coated seeds as a means of protecting against these early season pests (**Table Inset**). Incorporation of green manures or direct amendments of animal manure should be applied at least two weeks in advance of transplanting or seeding to reduce the potential for infestation by seed maggots. Specifically, adult flies are attracted to the volatile emissions of decomposing organic matter in the soil following the incorporation of green manure cover crops or other organic amendments. We forecast the appearance of successive generations by accumulating degree days after the frost has left the ground. For seed corn maggots (SCM), degree days (DD) are accumulated each day using the formula ((minimum temperature + maximum temperature)/2)-39. Peak emergence of the first three generations of adult SCM flies will occur after totals of 360, 1080 and 1800 DD (^{o}F), respectively, have been reached. The first generation of SCM flies have now emerged and this zone of emergence extends along a NW to SE line extending from Menominee to Plover and along to almost Racine, WI. Points south of this line are currently experiencing increased risk from adult SCM. Planting at intervals between generations ('fly-free periods'), or in between first and second generation flights will help reduce damage.

Colorado potato beetle – The first few overwintering Colorado potato beetle (CPB) adults would only have just begun to emerge during the warmer afternoons in the last week. The adult CPB will over winter in the soil along field margins near windbreaks and other wooded areas surrounding potato fields. A portion of the population will also attempt to over winter inside fields previously planted to potato. Similar to recent years, snow arrived early enough in the year at many locations to protect adult beetles in areas around grower's fields. Areas surrounding crop fields in the Central Sands production area experienced little frost throughout the winter period and this provides a good overwintering refuge for populations of CPB.

Potato leafhopper – Similar to the aster leafhopper, this insect is a long-distance migrant that arrives into Wisconsin from southern states when weather systems are conducive for their flights. Adults are the first stages to arrive and only a few have been collected in early stands of alfalfa at the Arlington Agricultural Research Station. As noted previously, forecast weather could bring more adults into the southern part of the state over the next week, however these early migrants often persist on alfalfa early before they find susceptible vegetable crops later in May and into early June.

Figure 1. Images of adult and immature (maggot) seed corn maggot.

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Can SWD survive our brutal Wisconsin winters? Invasive insects cause major damage to fruit and vegetable crops all over the world. In 2008, the invasive vinegar fly, spotted wing drosophila (SWD), *Drosophila suzukii*, was detected in California and has since spread to 41 U.S. states in just 7 years. In 2010, SWD was detected in Racine County, Wisconsin and has become well established throughout the state (Figure 2). This pest is especially concerning due its serrated ovipositor, unique to female SWD (Figure 1;

Figure 1. Male (left) and female (right) spotted wing drosophila. Photo credit: Keith Phelps

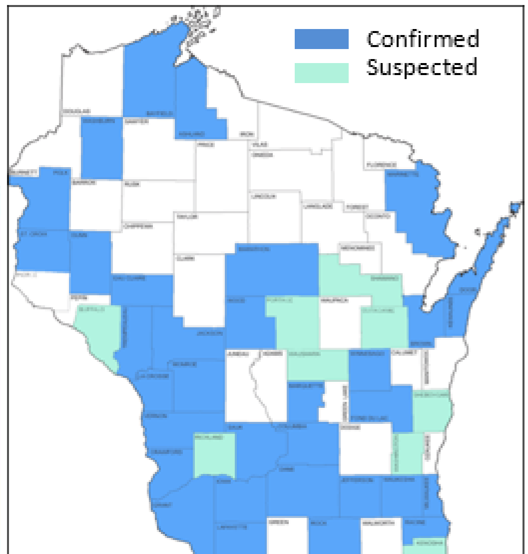

Figure 2. As of 2014, SWD was confirmed in 33 WI counties and suspected in 9.

white arrow). With this saw-like ovipositor, females are able to cut the skin of the fruit and lay eggs in ripening and ripe fruit. After females oviposit eggs under the skin of the fruit, larvae mature in the fruit corrupting intact marketable fruit and reducing yield. In Wisconsin, raspberry crops have been reported as the most commonly infested crops; however SWD has been documented to infest various fruit crops, including blackberries, blueberries, strawberries, cherries, and grapes.

Since this is a fairly new and quickly spreading invasive pest, continued monitoring and research is essential to gain a better understanding of its impact. Monitoring has taken place since 2012 and will continue into 2015 (Figure 2). In 2014, SWD was first detected in Wisconsin in mid-July and the population continued to build until mid-September. The last flies of the season were caught on November 11th! In addition to monitoring, several research projects are ongoing and designed to better understand SWD biology and seasonal phenology, including overwintering strategies, as these vary across different U.S. regions.

Previous work from Oregon has identified a darker winter morph and that SWD overwinters on the west coast. However, since Midwest winters reach colder temperatures it is unclear whether SWD overwinters in Wisconsin or if new populations are introduced each year. Preliminary data suggests that SWD can overwinter in Wisconsin and that a darker winter morph starts appearing in September and becomes more prevalent in October and November as the days get shorter and colder (Figure 3). Research will continue this summer to further clarify the implications the winter morph may have on SWD's ability to overwinter.

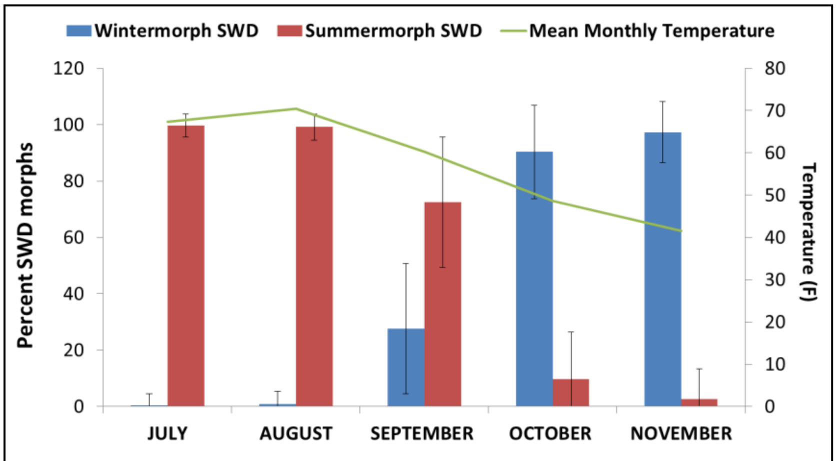

Figure 3. Monthly presence of SWD seasonal morphs throughout the 2014 growing season in Dane county

Although SWD is a challenging pest, effective management plans can be implemented with a better understanding of the biology and phenology. Current and continuing research is occurring throughout the state to continue to monitor new infestations and provide information on how to suppress infestations. For more information on SWD check out our web site: http://labs.russell.wisc.edu/swd/