Vegetable Crop Update

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

No. 14 – July 18, 2014

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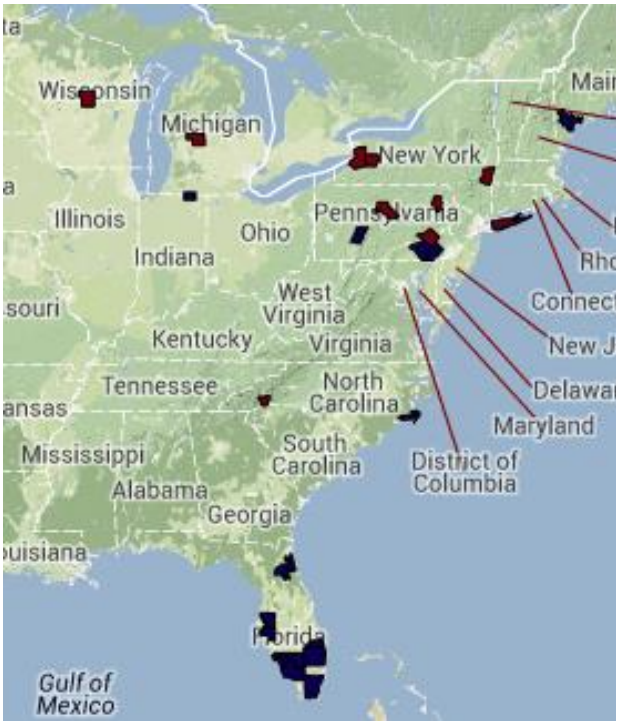
Calendar of Events

July 22– UW-Hancock Agricultural Research Station Field Day, Hancock, WI
August 5 – Crops Diagnostic Workshop, Arlington Ag Research Station, Arlington, WI
August 12-14 – Farm Technology Days, Stevens Point, WI
August 21 – 1:00PM Antigo Field Day, Antigo, WI

Vegetable Disease Update – Amanda J. Gevens, Assistant Professor & Extension Vegetable Plant Pathologist, UW-Madison, Dept. of Plant Pathology, 608-890-3072 (office), Email: gevens@wisc.edu. Veg Pathology Webpage: http://www.plantpath.wisc.edu/wivegdis/



Late blight updates: Late blight was detected in Portage County, WI earlier today (Jul 18). We do not yet know the strain/genotype of the late blight pathogen, but I will send updates with this information as soon as available. Nationally, in the past week, there have been several new late blight reports from MI (Montcalm Co. on potato), NY (4 counties on potato and tomato), PA (3 counties all on tomato), and NC (Henderson Co. on tomato). New/recent reports are indicated on map to the left in red, from usablight.org. All *P. infestans* isolates that have been genotyped from field samples in 2014, thus far, have been of the US-23 genotype/strain (mefenoxam/metalaxyl sensitive). Reports from greater than one week ago are colored blue on the map, and include FL, IN, ME, NC, NY, and PA. Details can be found at http://www.usablight.org/. The website provides location (by county) of positive reports of late blight in the U.S. and further information on disease characteristics and management.

Current P-Day (Early Blight) and Severity Value (Late Blight) Accumulations (R.V. James, UW-Plant Pathology/R.V. James Designs): 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 below indicates threshold has been met/surpassed. NA indicates that information is not yet

available as emergence has yet to occur. Blitecast and P-Day values for actual potato field weather from Grand Marsh, Hancock, Plover, and Antigo are now posted at the UW Veg Path website at the tab "P-Days and Severity Values."
http://www.plantpath.wisc.edu/wivegdis/contents_pages/pday_sevval_2014.html

Location	Planting Date	50% Emergence	P-Day Cumulative	Disease Severity Value	Date of DSV Generation	Increase in DSV from last week (7/11)
Antigo	Early 5/20	6/9	**303**	**42***	7/18	2
	Mid 5/27	6/16	255	**42***	7/18	2
	Late 6/6	7/2	119	11	7/18	2
Grand Marsh	Early 4/20	5/19	**378**	**62***	7/6 station not working	NA
	Mid 5/4	6/1	290	**54***	7/6	NA
	Late 6/3	6/23	113	**19***	7/6	NA
Hancock	Early 4/24	5/20	**493**	**40***	7/18	3
	Mid 5/8	6/2	**394**	**37***	7/18	3
	Late 6/3	6/24	205	**19**	7/18	3
Plover	Early 4/21	5/20	**442**	**69***	7/18	6
	Mid 5/5	6/1	**358**	**66***	7/18	6
	Late 6/5	6/24	181	**37***	7/18	7

Please note that we have surpassed the threshold for DSVs (18) in all monitored areas for all plantings of potatoes, with the exception of late planted potatoes in the Antigo area. This indicates that temperature and humidity have been favorable for the promotion of late blight. Please note: asterisks on the DSVs indicate that I have revised the value as displayed in the SureHarvest Blitecast daily output that is found at the UW-Vegetable Pathology website. In some cases, the number of hours of relative humidity above 90% was being issued as a value greater than 24 - giving unusually high DSVs for the individual day. I assigned a maximum DSV of 4 to such dates. We continue to have some problems with data communication at our Grand Marsh station.

Preventive fungicide application for late blight control may include base protectants such as chlorothalonil or mancozeb, or include a base protectant tank-mixed with one of the reduced risk fungicides with specific activity in controlling late blight. For further information on specific fungicide rates and activities, please find the 2014 updated list of potato fungicides for WI at the link below.
http://www.plantpath.wisc.edu/wivegdis/pdf/2014/June%206%202014.pdf

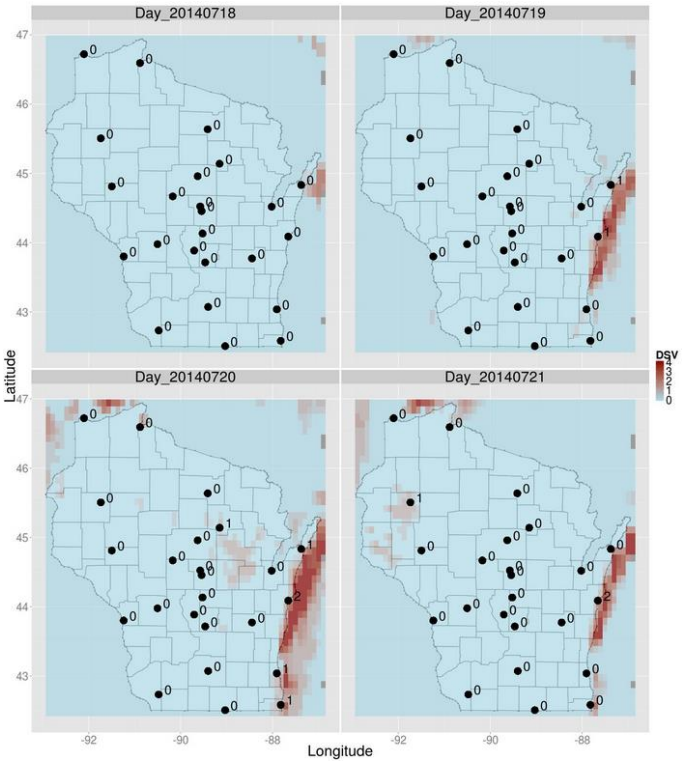
Below, I've offered a table which indicates comparative benefits of late blight fungicides based on research conducted by Dr. Steve Johnson at the Univ. of ME. Additionally, in the Disease Supplement #2 issued earlier today, I included further information regarding fungicide selection for late blight control:
http://www.plantpath.wisc.edu/wivegdis/pdf/2014/July%2018%202014%20Dis%20Supplement%202.pdf

Comparison of Late Blight Fungicides (highest rates registered)
Provided by Dr. Steve Johnson, University of Maine Cooperative Extension

Product	Effectiveness				Mode of action			Rainfastness	Mobility in the plant	FRAC #	REI	PHI
	Leaf blight	New growth	Stem blight	Tuber blight	Protectant	Curative	Anti-sporulant					
Bravo etc	G	No	P	No	G	No	No	G	contact	M5	12 hrs	7 days
Curzate + Dithane etc	G	?	F	No	G	E	P	G	translaminar + contact	27 + M3	24 hrs	14 days
Dithane etc	G	No	P	No	G	No	No	F	contact	M3	24 hrs	3 days
Forum + Dithane	G	?	F	F	G	P	G	G	translaminar + contact	40 + M3	24 hrs	4 days
Gavel	E	No	P	F	E	No	No	G	contact + contact	22	48 hrs	3 days
Kocide etc	P	No	P	No	F	No	No	P	contact	M1	24 hrs	0 days
Omega	E	No	P	G	E	No	No	G	contact	29	48 hrs	14 days
Previcur Flex + Dithane etc	G	G	G	No	G	G	G	E	systemic + contact	28 + M3	24 hrs	14 days
Ranman	E	No	P	E	E	No	No	E	contact	21	12 hrs	7 days
Tanos	G	?	F	No	G	E	P	G	translaminar + contact	11	12 hrs	14 days
Revus Top	E	?	F	G	E	P	F	E	translaminar + contact	40 + 3	12 hrs	14 days
Tin	E	No	E	E	G	No	E	F	contact	M1	48 hrs	7 days

No=No effect; P=Poor; F=Fair; G=Good; E=Excellent; ?=Unknown.

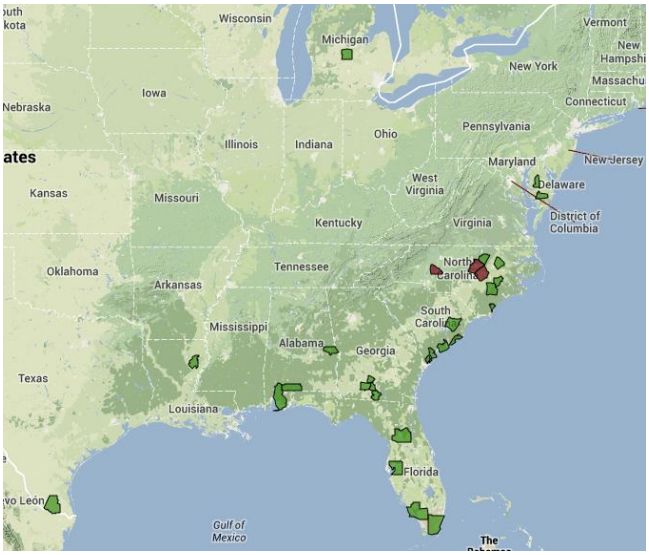
Further details on registered fungicides for WI vegetables can be found in the Univ. of WI Commercial Vegetable Production in WI Guide A3422, http://learningstore.uwex.edu/assets/pdfs/A3422.PDF.



Late blight risk predictions based on forecasted weather for WI (K.E. Frost, UW-Plant Pathology): Maps to the left depict DSV accumulations from forecasted weather data (NOAA). Top left is 7/18; Top right is 7/19; Bottom left is 7/20; and Bottom right is 7/21. Based on forecasted weather, DSV accumulations will be none to minimal in the next 24 hours across the entire state, with moderate accumulations in just pockets in the Shawano, Outagamie, and Waupaca Co. areas in 48 hours. Barron, Dunn, St. Croix, and Pierce Co. areas are expected to have moderate DSV accumulations in 72 hours. Blue tone indicates no accumulation; pink tones indicate accumulation of 1-3; red tone indicates maximum accumulation of 4 DSVs on the given day. Emergence dates do not drive the accumulations in this set of graphs. The graphs are depicting DSVs for a single 24-hour period by location.

P-Days and early blight management: P-Days are over the 300 threshold for early planted potatoes in the Grand Marsh, Hancock, Plover, and Antigo areas. And, we have surpassed the threshold in mid-planted potatoes in Hancock and Plover areas. Recall, the P-Day 300 threshold is an indicator for timing the initial fungicide application for management of early blight. Early blight lesions are active now in lower canopies of earliest and some mid-planted potatoes in southern and central Wisconsin. We plan to offer our Potato Early Blight foliar fungicide trial up for visitors on Aug 18 (Mon) and Aug 19 (Tues) at the Hancock Agricultural Research Station. Please contact me if you're interested in visiting to view efficacy of new programs (gevens@wisc.edu).

Cucurbit downy mildew updates: No downy mildew has been identified on cucurbit crops in Wisconsin, to date. **In the past week, NC reported cucurbit downy mildew in several counties - as depicted in red on the map below.** In summary this year, AL, FL, GA, LA, MD, MI, NC, SC, and TX have reported cucurbit downy mildew across multiple cucurbit hosts. I will be keeping tabs on disease reports in the region and will provide updates in this newsletter. Based on the disease forecast system, there is no likelihood of spore movement from current sites of confirmation to WI. The website: http://cdm.ipmpipe.org/ offers up to date reports of cucurbit downy mildew and disease forecasting information.



Map sourced from http://cdm.ipmpipe.org/scripts/map.php (from 3:31PM July 18, 2014)

Management information for cucurbit downy mildew can be found in UW Vegetable Crop Updates – Disease Supplemental #8 from 2013: http://www.plantpath.wisc.edu/wivegdis/pdf/2013/Disease%20Supplement%208%20Aug%2013%202013.pdf

Basil downy mildew detected in Wisconsin: Dr. Brian Hudelson, director and diagnostician in the UWEX Plant Disease Diagnostic Clinic in Madison has confirmed the diagnosis of downy mildew on a basil sample from a small garden in Dane County this past week. Recall that in mid-June, several greenhouse cases of basil downy mildew were reported. Weather conditions are often very favorable for 'water mold' pathogens in greenhouse settings (high humidity, warm temperatures, limited airflow) and we know basil downy mildew to be seedborne. *Peronospora belbahrii*, the fungus-like causal agent of basil downy mildew (picture below from 2011 case),

causes yellowing of leaves, often some dark brown irregular spotting, and cupping/gnarling of leaves often downward. The undersides of leaves may be covered with dark brown-gray pathogen sporulation.

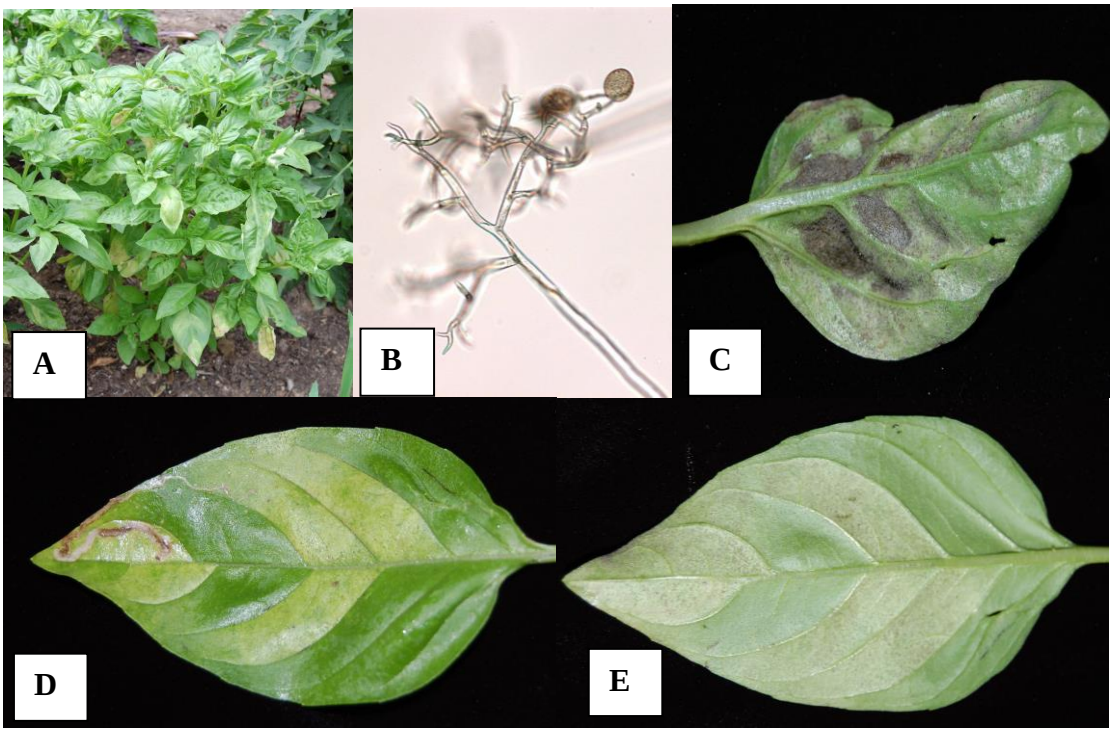
Basil downy mildew has made recent headlines nationally as a new disease in North America as well as Europe. First reported in FL in 2007, basil downy mildew was later found in field and greenhouse in Canada, Argentina, and in over a dozen US states as of 2011. The disease was first confirmed in Wisconsin in 2010 and in each subsequent year since. The basil downy mildew pathogen can be transmitted on seed, infected plant parts, and the wind. This particular downy mildew can infect both ornamental and basil varieties grown as herbs. It is suspected that basil downy mildew has moved geographically on contaminated seed or leaves. The spores are produced on leaf underside prolifically and can be aerially dispersed long distances.

The management of basil downy mildew includes planting uninfested or 'clean' basil seed, selecting resistant or tolerant varieties, planting transplants at greater distances apart, and applying fungicides when environmental conditions favor disease. Minimizing leaf wetness and humidity aid in management as the pathogen is favored by moist conditions. Increasing plant spacing and encouraging air flow between rows can greatly limit disease development. It is known that sweet basil varieties are more susceptible than other types. The table below indicated relative susceptibility of typical varieties (from Dr. Meg McGrath, Cornell).

Basil varieties susceptible to downy mildew		
Aroma 2	Italian Large Leaf	Superbo
Genovese	Magical Micheal	Queenette
Genoveser Martina	Mariden	Poppy Joe's
Nufar	Opal Purple Variegated	
Basil varieties tolerant to downy mildew		
Amethyst Imp	Mrs. Burns Lemon	Lemona
Red Rubin	Red Leaf	Lime
Sweet Adin	Lemon	
Lemon standard	Lemon Mrs. Burns	
Basil varieties resistant to downy mildew		
Spice	Blue Spice	Blue Spice Fil

While not a preferred approach for home gardeners that may have just one or a few basil plants, fungicides can limit basil downy mildew. Applying fungicides frequently and starting before first symptoms are considered necessary to control downy mildew effectively. Few fungicides are currently labeled for this new disease. Actinovate AG and OxiDate are OMRI-listed fungicide labeled for use on herbs and for suppressing foliar diseases including downy mildew. OxiDate is labeled for use outdoors and in greenhouses. The Actinovate label does not have a statement prohibiting use in greenhouses. There are two phosphorous acid fungicides, ProPhyt and K-Phite, that have downy mildew under herbs on the current label. These fungicides were effective in fungicide efficacy experiments with applications started before or after initial symptoms were found. Greenhouse use is not prohibited. Quadris is labeled for use on basil but not specifically for downy mildew; but has been shown to be effective for this downy mildew. Greenhouse use is not permitted with Quadris. Ranman is now labelled for basil downy mildew in open field and the greenhouse. Other fungicides are expected to be labeled for basil downy mildew in the future.

To determine when to initiate a fungicide program and also when it is warranted to consider harvesting early to avoid losses to downy mildew, growers should regularly inspect their plants for symptoms. The cucurbit downy mildew forecasting web site (http://cdm.ipmpipe.org) might be useful for predicting when conditions are favorable for basil downy mildew since both pathogens have similar requirements for wind dispersal long distances (e.g. overcast skies) and subsequent infection (e.g. wet leaves). Summer is not a time to forget about this disease: unlike most other downy mildew pathogens, e.g. the ones affecting lettuce and cruciferous crops, which stop developing in summer, the basil downy mildew pathogen seems to develop best under moderate to warm temperatures while also tolerating cool temperatures. Basil crops should be disked under or otherwise destroyed as soon as possible after last harvest, or when abandoned because of disease, to eliminate this source of inoculum.



Basil downy mildew symptoms and signs. **A**. Basil plant exhibiting symptoms of leaf yellowing consistent with downy mildew (2011). **B.** Branched sporangiophores (spore tree) and sporangia (spore) of basil downy mildew under 200X magnification. **C.** Underside of leaf exhibiting signs (dark gray, 'dirty' spores) and symptoms (brown, dead sections of leaf) of basil downy mildew**. D.** Topside of leaf (note yellowing or chlorosis) with angular (vein confined) lesions. **E**. Underside of leaf (note patches of gray-purple fuzzy pathogen sporulation) with angular pattern.

Cucurbit powdery mildew: Powdery mildew is beginning to show up in southern Wisconsin squash and pumpkin fields. In average years, cucurbits can tolerate some powdery mildew without need for fungicides. However, when powdery mildew comes early, as it has been doing in recent years, some cucurbits, particularly pumpkins, may need a fungicide to maintain health and quality of vines and fruit. The use of fungicides for controlling this disease may be necessary to maintain fruit quality, quantity, and storability if disease level becomes high and you're raising a susceptible variety. While there is good varietal resistance in cucumber and watermelon, many pumpkin and squash varieties are susceptible to powdery mildew. Symptoms

seen below in Figure 2 begin on lower, older leaves and can rapidly spread to petioles and 'handles' affected vigor and function of leaves. Infected stems can be very dry and brittle and often appear bleached out. Bleached and shattered or missing handles can impact marketability as well as storability of pumpkin fruit as the broken stem often leaves a wound site into which secondary and saprophytic microorganisms can enter and cause storage break down.

The timing of fungicide control measures is important, as some of the registered materials have reduced efficacy if applied after infection is well established. Among conventional fungicides labeled for squash and pumpkin powdery mildew, the following list includes those with good performance: Rally (myclobutanil), Procure (triflumizol), Pristine (pyraclostrobin + boscalid), Quintec (quinoxyfen), Cabrio (pyraclostrobin), Topsin (thiophanate methyl), Torino (cyflufenamid), and Sovran (kresoxim methyl). It is recommended that the above-listed materials be tank-mixed and alternated with broad spectrum fungicides such as mancozeb or chlorothalonil to limit the development of pathogen resistance and to provide a fungicide program with a broad disease management scope. In organic production, there are products with some efficacy against powdery mildew: oils, bicarbonates, sulfur, and copper. We are currently conducting trials in Hancock and Cashton, WI to identify best fungicide selections for cucurbit powdery mildew in both organic and conventional systems.

Figure 2. Powdery mildew on pumpkin. A. White powdery pathogen growth on pumpkin stem. B. Powdery mildew signs (white powdery spores) and symptoms (yellow/dying leaves). C. The spores of the powdery mildew pathogen that can be wind dispersed.

UW-Extension/Madison Plant Disease Diagnostic Clinic (PDDC) Update: *Brian Hudelson, Ann Joy, Joyce Wu, Tom Hinsenkamp, and Catherine Wendt, Plant Disease Diagnostics Clinic*

The PDDC receives samples of many plant and soil samples from around the state. The following diseases/disorders have been identified at the PDDC from July 12, 2014 through July 18, 2014.

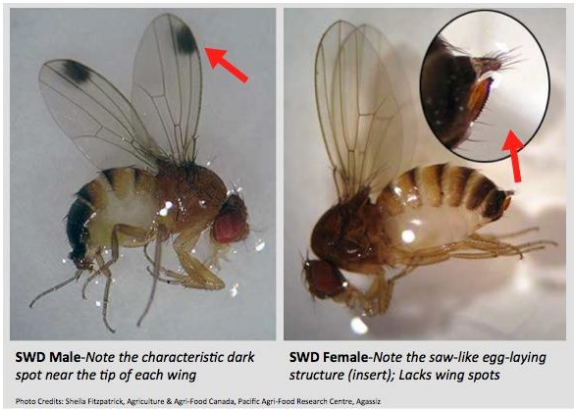
PLANT/SAMPLE TYPE	DISEASE/DISORDER	PATHOGEN	COUNTY
VEGETABLES			
Basil	Downy Mildew	*Peronospora belbahrii*	Dane
Broccoli	Root/Crown Rot	*Pythium* sp.	Vernon
Cucumber	Anthracnose	*Colletotrichum orbiculare*	Rock
Garlic	Fusarium Basal Plate Rot	*Fusarium* spp.	Waukesha
	Soft Rot	*Pectobacterium carotovorum*	Waukesha
	Stem and Bulb/Bloat	*Ditylenchus* sp.	Waukesha

	Nematode		
Mustard Greens	Black Rot White Rust	*Xanthomonas campestris* *Albugo candida*	Racine Racine
Squash	Phytophthora Crown/Root Rot	*Phytophthora capsici*	Green Lake
Tomato	Bacterial Canker	*Clavibacter michiganensis* subsp. *michiganensis*	Portage

For additional information on plant diseases and their control, visit the PDDC website at pddc.wisc.edu.

Fruit Entomology Update - Christelle Guédot, Assistant Professor and Extension Entomologist, UW-Madison, Department of Entomology; (608) 262-0899; guedot@wisc.edu

Update on Spotted Wing Drosophila: The 2014 field season has begun!



Spotted Wing Drosophila (SWD) has recently been detected in Wisconsin this season. The first detection was a single female caught in yeast and sugar traps checked on June 30 in Vernon County. Last week (June 8th), SWD were confirmed in Door, La Crosse, Rock, Dane, and Iowa counties with males and females trapped at these locations in similarly baited traps. In addition, we have reports of larvae found in raspberry fruit in Washington, Monroe, and St Croix counties. These larvae have not been confirmed to be SWD, but considering the timing and phenological stage of the fruit, we strongly suspect that these are SWD.
For more information and updates, check the SWD website at http://labs.russell.wisc.edu/swd/.
For any question, contact Christelle Guédot at guedot@wisc.edu or at (608) 262-0899.