Potato Crop Update from the Wisconsin Seed Potato Certification Program – Amy Charkowski, Administrative Director of Certification Program, Department of Plant Pathology, UW-Madison, Tel. No. 608-262-9711, email: amyc@plantpath.wisc.edu

We have seen the lowest level of virus (specifically Potato Virus Y, or PVY) over the summer that we have seen for at least 30 years. Widespread use of systemic insecticides has nearly eliminated Potato Leaf Roll Virus, or PLRV, in the potato seed supply. We see only a few (as in 2 or 3) plants per year of the several hundred thousand inspected.

The certification program will periodically contribute articles and updates to this newsletter. For those unfamiliar with the Wisconsin Seed Potato Certification Program, I offer the following as a brief introduction (from homepage of Amy Charkowski).

The Wisconsin Seed Potato Certification Program has been administered since inception by the Department of Plant Pathology, College of Agricultural and Life Sciences, University of Wisconsin - Madison. The program retains a full-time staff of experienced professionals to ensure thoroughness and impartially in inspection and certification procedures. The Fundamental goal of the Wisconsin seed program is to improve the quality and productivity of commercial potato plantings. A reliable source of high-quality, disease-free basic seed stocks is essential to the strength and growth of a certified seed potato program. The University of Wisconsin Lelah Starks Elite Foundation Seed Potato Farm in Rhinelander has been the Wisconsin seed potato growers' primary source of new and established disease-tested potato varieties since 1983. This 1,000 acre farm is named after Lelah Starks, a pioneer Wisconsin seed potato grower. Certification Program staff are integrally involved in the management of the State Seed Farm, providing not only a concentration of specific expertise in basic seed production, but also accountability to the industry to maintain the highest scientific standards in seed production.
Diseases and Late Blight: There were no further reports of late blight in WI this past week. Digging and vine-killing continues in most Wisconsin potato fields. While most of vines will die following the first kill treatment, lower stems may remain green especially in instances where potato vines were very hearty and green at time of vine kill. It is still important to continue to scout fields of this status and maintain preventative fungicide programs on a 7-day schedule.

If late blight has been present in a field, be sure that vines are killed well prior to digging (waiting 2-3 weeks after last vine kill treatment). This will limit potential risk of active late blight pathogen coming in contact with tubers. Take care to limit damage to tubers through the harvest and post-harvest processes. While the late blight pathogen does not need wound sites, they are an easy and ready entry point for late blight and other pathogens.

In North America, there were no new states reporting late blight this past week. Additional finds were reported in ME, NY, and PA. So far this production season, late blight detections have been made in NY, FL, VA, DE, WI, PA, WA, CA, ME, MN, CT, VT, ND, NH, OR, and Canada. The website: http://www.usablight.org/ indicates location of positive reports of late blight in the U.S. and provides further information on disease characteristics and management.

Cucurbit downy mildew: Cucurbit downy mildew has been confirmed on cucurbits in Waupaca, Waushara, Columbia, and Dane Counties, WI. No new reports of downy mildew in other WI counties this past week. It is important to keep a watchful eye for this disease as it can quickly appear and become hard to control after infection becomes severe. Fungicide recommendations can be found in a previous newsletter linked below. http://www.plantpath.wisc.edu/wivegdis/pdf/2011/July%208%202011%20Number%2013.pdf
Based on the disease forecast generated by the Cucurbit Downy Mildew PIPE forecasters at North Carolina State University, there is low risk for further spread to cucurbits in Wisconsin over the next day or two. The website: http://cdm.ipmpipe.org offers up to date reports of cucurbit downy mildew and disease forecasting information.

**A Review of Cucurbit Downy Mildew:** Cucurbit downy mildew caused by the fungus-like pathogen *Pseudoperonospora cubensis* has become more prevalent in the Great Lakes region and throughout the U.S. over the past 5 years. Growers of cucurbits (cucumber, squash, melon, pumpkin) in Wisconsin may recall rare occurrences of late season downy mildew on squash or watermelon crops over the last four decades. Why, since the mid-2000’s, has downy mildew become problematic on cucumbers mid-production season? Why has this disease revisited Wisconsin with greater regularity and aggressiveness?

Wisconsin is not alone in its battle with cucurbit downy mildew. In 2004, NC pickling cucumber growers experienced epidemic levels of downy mildew in their crops. One year later, MI also dealt with downy mildew on pickles. While cucumbers in the top 2 cucumber processing states have been severely affected by this disease, other cucurbits in the Great Lakes region, including Ontario Canada, have also been impacted.

Since 2005, the Great Lakes region has seen cucumber as the first cucurbit crop infected with downy mildew with symptoms detected as early as mid-June. In 2011, pumpkin, butternut squash, cantaloupe, watermelon, and yellow summer squash were also infected in several states, but symptoms were not detected until late-July. It is not known if Wisconsin has had two different strains of cucurbit downy mildew, an early-arriving strain aggressive on cucumber and a late-arriving strain aggressive on pumpkin, squash, and melon or if we have one strain that gets established on cucumber and spreads to other less susceptible cucurbits after inoculum has increased locally. We do know that once downy mildew is active on crops in a region, it can be a continual challenge until harvest or frost.

At this time it is not clear if Wisconsin’s cucurbit downy mildew comes from a single or multiple sources. Using national disease reports and forecasting data from the CDM ipmPIPE, NC researchers concluded that disease outbreaks in the Great Lakes region and mid-Atlantic regions may be due to spread of the pathogen from outbreaks near the Georgia/South Carolina/North Carolina border and not from South Florida. In recent work carried out in MI, the downy mildew on cucurbits from multiple states within the Great Lakes region was similar, based on results of molecular characterization studies. However, the Great Lakes downy mildew type was unique from the types collected from other U.S. vegetable production regions to our south.

Cucurbit crops in Wisconsin have typically not needed routine application of fungicides for downy mildew control. For approximately 40 years, varietal resistance in commercial cucumber and some melon varieties, conferred by the recessive *dm1* downy mildew resistance gene, was effective in controlling disease. Pumpkin, squash, and watermelon crops were without this resistance and would sporadically become infected with downy mildew late in the production season. It had been standard recommendation that pumpkins in northern states were to be planted and harvested early to avoid risk of downy mildew because the pathogen could make its way north on late season air currents. The strain(s) of the downy mildew pathogen that have recently made their way to the Great Lakes region are not adequately controlled by *dm1* resistance that held up for decades.
Whether there has been a change in the pathogen population by way of a genetic mutation or introduction of an invasive and aggressive cucumber strain, or if changes in environmental conditions have promoted increased virulence is unknown. North Carolina State Univ. researchers determined that recent eastern U.S. populations of cucurbit downy mildew were much more diverse in host range and pathogenicity than was previously known, with *Cucumis* species (cucumber, melon) having greater susceptibility to most pathogen isolates than *Cucurbita* species (squash, pumpkin).

Currently, with mid-season risk of spore movement and lack of commercially available and durable varietal resistance in cucurbits, fungicide applications are essential for protection of yield and quality. The selection of fungicides, timing of application, and thoroughness of application are critical for effective disease control. Fungicides should be applied prior to or at 1st sign of infection to best control cucurbit downy mildew. Based on field research in multiple states effective fungicides for downy mildew control include zoxamide+mancozeb, fluopicolide, propamocarb hydrochloride, cyazofamid, and famoxadone+cymoxanil. The effective control program for cucumber established at Michigan State Univ. by Dr. Mary Hausbeck, which I recommend to producers in WI, specifies a 7-day spray interval of the previously listed materials tank-mixed with either mancozeb or chlorothalonil when initiated before downy mildew is found in the field. Fungicides should be alternated so as to manage the potential development of fungicide resistance. Sprays are tightened up to a 5-day interval when initiated after disease is found in the field. For cucurbits other than cucumber, the program above is modified to expand the spray intervals from 7 to 10-day before disease, and 7-day after disease is found in the field. Downy mildew can be well controlled in cucurbit crops with use of effective fungicides, however, this adds a significant increase to the cost of production and success is contingent upon careful attention to regional extension vegetable disease reports and careful field scouting to appropriately time fungicide application.

To aid in tracking cucurbit downy mildew in your county and beyond, the website: [http://cdm.ipmPIPE.org/](http://cdm.ipmPIPE.org/) offers forecasting of the disease based on confirmed reports across the U.S. The ipmPIPE (or integrated pest management Pest Information Platform for Extension and Education) cucurbit downy mildew website provides a publicly accessible site for sharing of cucurbit downy mildew detections, as well as symptom descriptions and management recommendations by region. The site is maintained by researchers at North Carolina State University with collaboration from researchers across the U.S., including Wisconsin. With the multitude of tasks that growers have to manage in the field, office, and marketplace, I recommend use of the CDM ipmPIPE Alert System (link on left side bar of website) which sends you an email or text message when downy mildew is reported within a selected geographic radius around your farm.

Research is ongoing in the U.S. and worldwide to better understand the pathogenicity, host resistance, and spread of cucurbit downy mildew. Advances in resistance breeding will greatly aid in improved disease control and sustainability of cucurbit production in Wisconsin and worldwide.
**Details on the disease:** The causal agent of cucurbit downy mildew, *Pseudoperonospora cubensis*, is an oomycete or ‘water mold’ pathogen related to other infamous water mold diseases such as potato late blight. Downy mildew, like other members of the water molds, is favored by warm temperatures (65-85°F) and wet field conditions. In 2010, areas of Wisconsin received over 30 inches of rainfall from May to October, the highest quantity of precipitation recorded over the production season since 1895. Conducive weather coupled with presence of the pathogen resulted in downy mildew in multiple cucumber producing areas of the state.

While downy mildew does not cause direct fruit infection, the pathogen can rapidly defoliate plants leaving fruit at risk for sunscald and secondary infection. Foliar symptoms include pale green to yellow angular (squared off within veins) lesions on leaf surfaces with corresponding and distinctive fuzzy brown growth on leaf undersides. The fuzzy growth is the pathogen producing thousands of new sporangia, or spores, which can become airborne and further spread the pathogen within field and beyond at a rate of approximately 6 miles per day. Early infections can be tricky to identify, as they may mimic N deficiency, angular leaf spot, or even virus. The pathogen is an obligate parasite, requiring living cucurbit plants to remain viable. The pathogen cannot overwinter in the soil on its own, as production of persistent soilborne spores (oospores) have not been found here in WI.


For further information on any fungicides that may be mentioned in this newsletter, please see the 2011 Commercial Vegetable Production in Wisconsin Guide A3422. An online pdf can be found at the link below or a hard copy can be ordered through the UWEX Learning Store. [http://learningstore.uwex.edu/assets/pdfs/A3422.PDF](http://learningstore.uwex.edu/assets/pdfs/A3422.PDF)