Photo provided by Steven B. Johnson, University of Maine, Orono, ME

Wisconsin Department of Agriculture, Trade and Consumer Protection

Wisconsin Pest Survey Fact Sheet

POTATO MOP TOP VIRUS

http://pestsurvey.wi.gov/

POTATO MOP-TOP VIRUS

Potato mop-top virus (PMTV) is a viral pathogen of potatoes that affects tuber quality. Similar to other plant viruses, PMTV needs a vector to be transmitted from plant to plant. The vector of PMTV is the organism that causes another potato disease called powdery scab. As of spring 2009, the known North American distribution of PMTV included Canada, Idaho, Oregon, Washington, and Maine. PMTV has not been found in Wisconsin, although the organism which transmits PMTV and causes powdery scab (*Spongospora subterranea* f. sp. *subterannea*) was discovered in Wisconsin in August of 2003. So far powdery scab has limited distribution in the state. Significant PMTV damage rarely occurs without the presence of this vector, the powdery scab disease organism. The combination of the two disease organisms can cause significant tuber defects, often leading to crop rejection by commercial processors.

LIFE CYCLE

PMTV is a viral plant pathogen. In the field it is transmitted by powdery scab, *Spongospora subterranea* f. sp. *subterannea*. This organism is a type of slime mold (similar in some respects to fungi), that causes scabby lesions on the surface of potatoes. The initial field infection by PMTV usually originates from seed potatoes infected by PMTV, or by transport of soil on machinery that is contaminated with the virus-carrying vector. PMTV causes disease in many plant species, including a great number of common weed species. Both PMTV and powdery scab disease development are associated with cool (50-65°F) and wet soil conditions.

FOLIAR SYMPTOMS

The disease name, potato mop-top virus, originates from the shortened internodes and the bunching, extraneous stems that can be caused by the virus. In North America, however, these symptoms are not common, and when present, are mild and non-distinctive. Yellow blotches, rings, or lines in the form of a v-shape may also be present on the leaves, especially on the leaflets of young upper leaves.

TUBER SYMPTOMS

Most tuber symptoms are internal, where patterns of dark brown necrotic (decayed) arcs discolor the tuber flesh (Figure 1, next page). These internal symptoms are called spraing in Europe. External symptoms are less common but can appear as raised rings. Other potato virus diseases, including corky ringspot disease (CRS), potato virus Y (PVY-N), and alfalfa mosaic virus (AMV) cause similar tuber defects.

OTHER HOSTS

Common weeds and vegetable plants can also host PMTV, increasing the difficulty of ridding a field of PMTV once it is present. These hosts include lambsquarters, tomato, black nightshade, and ground cherry.

PREVENTION

Planting certified seed potatoes reduces the risk of all potato diseases, including PMTV and powdery scab. However, potatoes from locations with a history of PMTV and powdery scab may have a higher risk of carrying the disease. Good weed management minimizes the possibility of wild hosts acting as a reservoir for the virus. Once both vector and virus are established in a field, PMTV is difficult to eradicate since the virus can remain viable in the dormant spores of the powdery scab vector for up to 18 years.

DIAGNOSIS

The virus particles that cause PMTV are so small that they cannot be seen under standard laboratory microscopes. Molecular tests, such as the polymerase chain reaction (commonly called PCR) and the enzyme-linked immunosorbent assay (abbreviated as ELISA), which utilize unique genomic or virus particle characteristics, are the only reliable way to diagnose PMTV, as other plant viruses can cause potato tuber damage very similar to PMTV.

Figure 1. Necrotic arcs caused by PMTV discolor potato tuber flesh.

Photo provided by Steven B. Johnson, University of Maine, Orono, ME

MANAGEMENT

No potato varieties are completely resistant to PMTV or the powdery scab vector. The potato cultivars Saturna and Pentland Marble have partial resistance to PTMV; russet-skinned cultivars show partial resistance to powdery scab. Rotations with brassicas may reduce the vector load in the soil, but cannot eliminate it completely. Fungicides containing fluazinam have shown variable efficacy in controlling the powdery scab vector. For more information see the UW-Extension Powdery Scab factsheet http://pddc.wisc.edu/veggie.html .The best management option is to prevent the introduction of the disease by planting certified seed potatoes from seed production areas with no history of PMTV or powdery scab. Good sanitation of machinery by washing off all soil and plant debris also reduces the risk of disease introduction.

REGULATION

Wisconsin potato seed certification standards do not specifically address PMTV. However, the virus does contribute to total virus load and causes both external and internal necrosis; both virus load and necrosis are subject to standards described in Wisconsin administrative code chapter ATCP 156 (see below).
Wisconsin administrative code chapter ATCP 156 describes the Wisconsin certified seed potato program:
http://www.legis.state.wi.us/rsb/code/atcp/atcp156.pdf
For phytosanitary certification guidelines, contact the Wisconsin Department of Agriculture, Trade and Consumer Protection at (608)224-4596.

FOR MORE INFORMATION

If you have questions, please contact:
Anette Phibbs, phone: (608) 266-7132, email: Anette.Phibbs@wi.gov. *Information in this fact sheet provided by R. Leisso and Anette Phibbs, Wisconsin Department of Agriculture, Trade, and Consumer Protection.*
Additional information about PMTV can be accessed at <http://www.umext.maine.edu/onlinepubs/htmpubs/2437.htm>.

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