Potato wart disease *Synchytrium endobioticum*

This is a federally-quarantined pathogen of potatoes that has been previously confirmed in the eastern United States. The detection of this disease in Michigan is likely to prompt quarantine and containment actions. Such regulatory measures may last for many years because of the pathogen's potential to survive in the soil for decades.

Michigan risk maps for exotic plant pests.

Other common name

black scab

Systematic position

Fungi > Chytridiomycetes > Chytridiales > *Synchytrium endobioticum* (Schilbersky) Percival

Global distribution

Originated from the Andean region of South America, the pathogen now has worldwide distribution where potatoes are cultivated. The disease has been detected from most European countries while it has more limited distribution in other regions (Asia, Africa, Americas and New Zealand).

Quarantine status

This is the most important worldwide quarantine pathogen of potato (USDA 2007). The infection has been previously confirmed in the United States (Maryland, Pennsylvania, West Virginia) and Canada (Newfoundland, Prince Edward Island,) but these detections have been largely limited to small isolated areas such as home gardens (Franc 2007) and all U.S. cases have been declared eradicated.

Plant host

Cultivated potato (*Solanum tuberosum*) is the primary host.

Biology

S. endobioticum is a soil-borne pathogen that thrives in wet conditions. In the spring, winter sporangium (a dormant structure containing numerous motile zoospores) of *S. endobioticum* in the soil germinates and releases zoospores into soil water. Zoospores move in soil water and invade potato plant cells. The fungus typically proliferates in underground plant parts, leading to tumorous outgrowths from the tuber eyes, stolon buds, and stem bases (but not roots) that develop into galls resembling a head of cauliflower. The galls that eventually decay and disintegrate, harbor fungal inocula for future infection.

Potato wart disease symptom on potato tubers. (Photo: Central Science Laboratory, Harpenden Archive, British Crown, Bugwood.org)

Potato tuber with gall. (Photo: M. Hampson)

Resting spores may remain viable in the soil for 40 years (USDA 2007). With a limited ability to disperse naturally, the pathogen spreads into new areas primarily via movement of seed potatoes by humans.

Symptoms

Only the below ground symptoms are apparent – warty, cauliflower-like outgrowths from potato tuber eyes, stolon buds and the base of the stems. Warts are initially white or green, and darken and decay as they age. They vary in shape and size (1-8 cm diameter) and large masses may cover the entire tuber.

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Stem galling on potato. (Photo: Michael Hampson)

Management notes

Each state land grant university diagnostic laboratory has a protocol for preliminary identification of *S endobioticum* and instructions for sending suspicious samples to the USDA national lab for confirmation and species identification (USDA 2007).

Economic significance to Michigan

Since the potato wart disease is regarded as zero-tolerant, quarantine organism internationally, detection of the disease in Michigan is likely to prompt quarantine and containment actions. Such regulatory measures may last for many years because of the pathogen's potential to survive in the soil for decades and limited control options available, and may adversely impact local economies for restricted plant production and exports. For example, detection of potato wart disease on Prince Edward Island, Canada in 2000 led to subsequent regulatory actions that resulted in an estimated $30 million loss to the island's economy in the first year alone (Franc 2007). In the United States, persistent nature of the potato wart disease is reflected by the reported time periods between the initial detection and the declaration of eradication in Pennsylvania (1918-1950s), West Virginia (1918-1960s), and Maryland (1920-1994) (NPDRS 2007).

Likely pathways of entry to Michigan

The disease can spread by infected seed potatoes, or infected soil attached to tubers, machinery, and implements used in cultivation.

If you find something suspicious on a susceptible host plant, please contact MSU Diagnostic Services (517-355-4536), your county extension office, or the Michigan Department of Agriculture (1-800-292-3939).

References

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