SURVEY FOR VIRUSES ON IMPORTED PERENNIALS

Michigan Department of Agriculture and Rural Development
Pesticide and Plant Pest Management Division
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OVERVIEW

In response to growing concern over virus-infected herbaceous perennial imports, in 2011 the Michigan Department of Agriculture and Rural Development (MDARD) continued its program to systematically document the prevalence of viruses in perennials imported under the USDA Preclearance Program. This project was funded through the 2011 appropriation of the 2008 Farm Bill.

In 2006, this survey was restricted to two viruses of *Hosta*. In 2007, it was expanded to include 15 perennial genera and a suite of 12 viruses and in 2009 it was repeated and expanded slightly to include 16 perennial genera and 13 viruses. In 2011, eighteen different genera were represented in the survey from five exporters in three different countries (the Netherlands, Japan and Poland.)

METHODS

Plants were sampled directly from shipments from the importing countries at several nurseries in Michigan during winter and early spring. From each shipment, five to ten bare-root plants of each target genus present were collected and forwarded to the MDARD Plant Pathology Laboratory. Plants were potted and greenhouse grown until sufficient leaf tissue was available for testing. Plants were grown under a strict vector control pesticide application regimen.

All but one test was performed by MDARD using ELISA test kits or immunostrips from Agdia, Inc. Tobacco rattle virus (TRV) testing on *Dicentra* and *Paeonia* was either performed by Agdia, Inc. or MDARD using PCR because ELISA is not available for this virus. Greenhouse-grown plants displaying virus-like symptoms but testing negative using the above methods were forwarded to the University of Minnesota for analysis using electronic microscopy (EM) to confirm the presence of unidentified virus(es).

RESULTS

In 2006, a total of 22 out of 55 varieties of *Hosta* tested positive for virus of which three varieties tested positive for both Hosta virus X (HVX) and Arabis mosaic virus (ArMV). More plants were found to be infected with HVX (46/665) than ArMV (35/665). In 2009 and 2011 samples were found with 25% and 13% virus (ArMV and HVX) infection rate, respectively.

Figure 1. Hosta virus X on var. 'Gold Standand.

Unknown Viruses Found

An unknown Tombus virus was detected by EM and polymerase chain reaction (PCR) technology on many of the Clematis samples received from Poland. However, as with many of these viruses, there were no symptoms to document.

An unknown spherical virus was found by EM on an Anemone plant (see below).

A previously unknown Poty-virus was later found to be identified as Iris mild mosaic virus by PCR methods (see below).

In 2007, 12% of the plants tested and 6 out of the 15 genera were found to be infected with a virus. In 2009, 26% of the plants tested and 10 out of the 16 genera tested were positive for virus.

Figure 2. Poty-virus found on *Freesia* sp.

The results in 2011 for particular genera suggest continued higher-than-acceptable virus rates such as in *Iris* and *Freesia* with a virus incidence over 40% for Poty-viruses (Figure 2.). From 2007 to 2011, Tobacco rattle virus (TRV), a nematode transmitted disease of potatoes, was found to have an increase in virus incidence from 7% to 35% in *Paeonia* and *Dicentra* samples (Figures 3 & 4).

Figure 3. *Dicentra* sp. infected with Tobacco rattle virus (TRV).

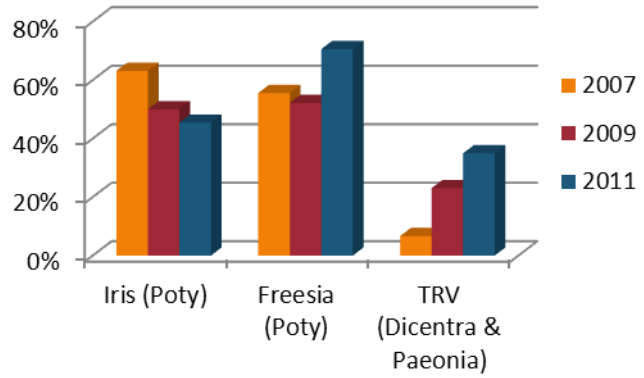

Figure 4. Percent virus incidence in 2007, 2009 and 2011 in Iris, Freesia and Tobacco rattle virus plant samples.

SUMMARY

A comparison of virus tests performed in 2007, 2009, and 2011 indicates that the overall rate of virus infection in imported perennials has increased during this period (Figure 5).

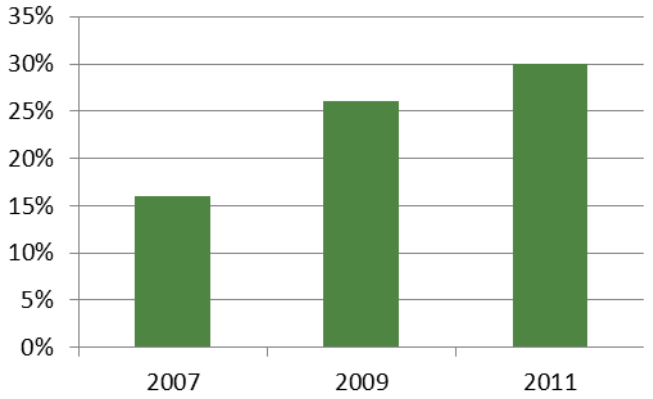

Figure 5. Summary of 2007, 2009, and 2011 virus testing for genus-virus combinations tested in all three years (not including ArMV and HVX on *Hosta*.)

Because the plants sampled were not propagated at the facilities from which they were collected, it is evident that bare root plants arriving under the USDA-APHIS Pre-Clearance Program are already infected with viruses.

The primary goal of this survey is the exclusion of pests of regulatory and economic significance from the nursery production chain by providing data to USDA that will allow for the continued improvement of preclearance program procedures and accountability. By reducing the rate of viral infection of imported plant material, we will reduce the risk of introduction of unknown or unidentified pathogens that could affect both the nursery and agriculture industries.

FARM BILL 2012-2013

This is a multi-state effort involving the Departments of Agriculture in Michigan, Ohio, Wisconsin and Minnesota and the University of Minnesota Plant Disease Clinic, an NPDN laboratory. In addition to conducting virus survey work as described in their Farm Bill survey work-plans, Wisconsin will facilitate the publication of plant virus symptom photographs at the www.bugwood.org website. The Minnesota Plant Disease Clinic will be contracted for EM and PCR sequencing to identify undetectable viruses. These collaborations will assist furthering the diagnostic techniques and capabilities while enhancing communication of the virus detections already found in these surveys.

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