2009 Report to WERA-20 Meeting: Fruit Virology Activities in Michigan.

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1) Virus survey in blueberries (A. Schilder and J. Gillett; MSU).
A survey of 50 Michigan blueberry fields is being during the 2009 growing season using ELISA kits purchased from Agdia. Tobacco ringspot virus, tomato ringspot virus, blueberry shoestring virus, and blueberry leaf mottle virus were detected in multiple fields. Blueberry mosaic (a viruslike disease) was also present in many fields but no test is available as the suspected virus has not yet been characterized. Peach rosette mosaic virus, although included in the testing protocol, was not detected anywhere. Blueberry shock virus was detected in a 'Rubel' field in June 2009 at one of the research stations, which is the first report for Michigan. The virus likely came in with plant material but the source is still being investigated. Infected bushes will be removed as part of the eradication and quarantine program administered by the Michigan Department of Agriculture. The other objectives of the survey are to establish a positive control of blueberry leaf mottle virus to complete the Agdia test kit; validate a PCR protocol for detection of blueberry stunt phytoplasma; and establish the cause of a new virus-like disorder, tentatively called "blueberry bronze leaf curl". Bob Martin of USDA-ARS (Oregon) is assisting in diagnosis of this disorder.

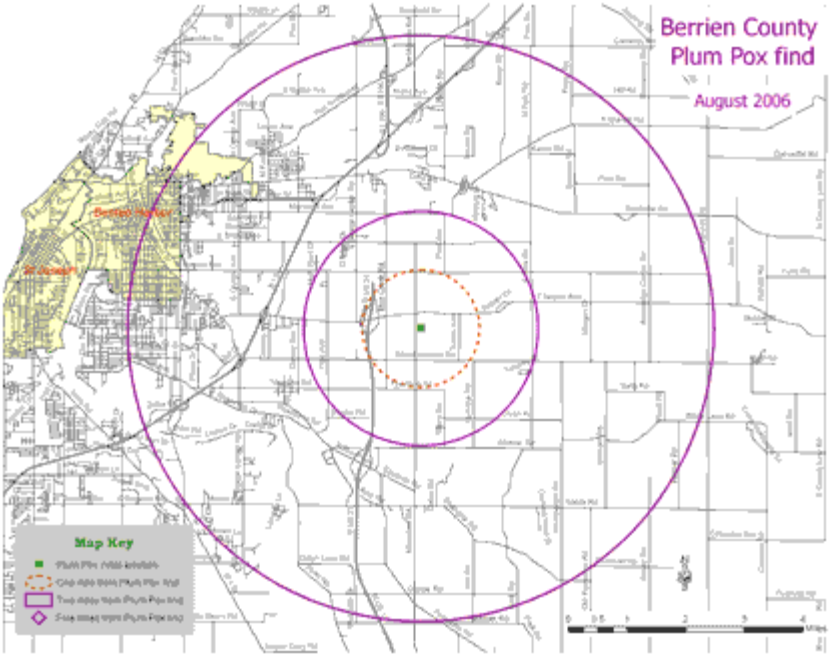
2) Publication of blueberry virus fact sheets and IPM Pocket Scouting Guides for Blueberries and Grapes (A. Schilder, T. Miles, and R. Isaacs).
Two factsheets were recently published by MSU: "Virus and Viruslike Diseases of Blueberries" and "Blueberry Aphids and Blueberry Shoestring Virus". In addition, pocket scouting guides for blueberries and for grapes have been published and images of virus diseases are included among others. Further more, these pocket guides have been translated into Spanish. Images of virus diseases of blueberries and grapes are also available on the following websites, respectively: www.blueberries.msu.edu, and www.grapes.msu.edu. All printed extension publications are available through the MSU Extension Bulletin Office.

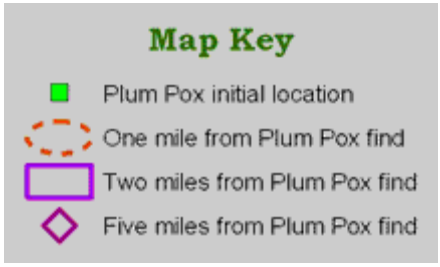
3) Virus-tested Blueberry and Tree Fruit Certification Programs (R. Kaitany, E. Dorman, M. Bryan; Michigan Department of Agriculture).
Three blueberry nurseries in Michigan are participating in the virus-free certification program for blueberries. Under this program, mother blocks are screened by ELISA for five viruses (blueberry shoestring virus, blueberry leaf mottle virus, tomato ringspot virus, tobacco ringspot virus, peach rosette mosaic virus, blueberry scorch virus, and blueberry shock virus). While most samples have been negative, blueberry scorch was confirmed in 2009 in a symptomless variety ('Legacy') planting at one of the nurseries. The original planting material came from New Jersey. The MDA is also involved in improving the quality of pome and stone fruit trees in Michigan through indexing of nursery stock at Hilltop Nurseries, Inc. in Hartford, MI. Sample trees were indexed or ELISA-tested or both for apple chlorotic leaf mottle virus, apple stem grooving, and apple stem pitting, green ring mottle, prune dwarf, and prunus necrotic spot viruses. In addition, MDA screens fruit tree production nurseries for nematodes such as

Xiphinema and soybean cyst (SCN) to enable Hilltop Nurseries meet specific export requirements.

4) Eradication of blueberry shock and blueberry scorch viruses (Michigan Department of Agriculture, Michigan State University)
In 2009, blueberry scorch virus and blueberry shock virus were confirmed in Michigan for the first time, despite a quarantine which has been in place since 2002. The "Blueberry Shock and Scorch Virus Response Team" comprising specialists from MDA and MSU has developed an emergency response plan to protect Michigan's blueberry industry. This plan includes destruction of infected plantings and monitoring of nearby blueberry plantings to assure that the disease has been eradicated. The monitoring and eradication program will continue for the next three years. Pest Alert factsheets will be produced for each virus.

5) Plum pox virus detection and diagnostics (R. Kaitany, E. Dorman, M. Hansen; Michigan Department of Agriculture; Bill Shane, MSU)
Governmental workers have been sampling intensely in Michigan for plum pox virus (PPV) since the report of the disease from Pennsylvania in 1999. In July 2006, one PPV-infected plum tree was detected in a research planting in southwest Michigan. The infected tree and all susceptible trees within a 500 meter radius of it were destroyed. The Michigan Department of Agriculture (MDA) and the USDA have worked very intensively since that time to test the *Prunus* trees at risk at this and other Michigan locations. This work has revealed no more infected trees in Michigan beyond the single tree found in 2006.





PPV is a serious disease of stone fruit that can cause significant yield and quality loss. PPV has been the most significant disease of stone fruit in Europe for many decades. The strain found in Michigan is the PPV Dideron strain (strain D) which is a problem on peaches, nectarines, all species of plums: European (*P. domestica*), American wild plum (*P. americana*), Japanese plum (*P. salicina*), Myrobalan or cherry plum (*P. cerasifera*), apricot and almond. Sweet and tart cherry are not susceptible to PPV strain D.

Berrien County in southwest Michigan, including parts of Benton, Bainbridge, Sodus and Pipestone townships fell under the PPV Quarantine. The quarantine area consists of an inner

quarantine zone of approximately 2-mile radius and a larger nursery stock regulated area of 7.15-mile (11.5-km) radius around the positive PPV-site. Movement of restricted *Prunus* material within or to outside the quarantine zone is prohibited. Regulated material may not be planted in the Quarantine area. Regulated species of nursery stock originating from or growing within the quarantine zone or nursery stock regulated area cannot be used as a source of propagative material (either rootstock or scion or seed) unless it is grown under a compliance agreement issued by the Director of the MDA. There is no restriction on the harvest and sale of fruit.

Comprehensive surveys were conducted using USDA sampling protocols for three years (2007, 2008, 2009). The 2008 survey for Michigan included approximately 35,000 samples for the state. The survey targeted both commercial fruit plantings and homeowner properties. In 2007 and 2008, effort intensified to find susceptible *Prunus* species in backyards and wild areas in the 5-mile wide buffer zone surrounding the site where the infected tree was found. In 2008, more than 5,000 homeowner properties had been surveyed. After three years of comprehensive sampling in commercial and homeowner plantings in southwest Michigan, no additional plants material testing positive for PPV had been found. On September 2, 2009, MDA director Donald Koivisto declared Michigan to be plum pox-free and rescinded the state quarantine. Growers within the quarantine zone will receive an official letter from the MDA releasing them from the Emergency Action.

IMPACT:
Research and monitoring activities of fruit viruses have safeguarded Michigan fruit production. Virus-free certification of blueberry and tree fruit planting stock helps reduce losses from potentially infected planting material. Approximately 200,000 certified plants were sold to growers across the USA and abroad in 2001. In addition, almost a million certified fruit trees were sold from Michigan's Hilltop Nursery. Diagnostic support for viruses in small fruit crops helped small fruit growers them make better disease management decisions. WERA-20 has been instrumental in improving diagnostic capability at MSU and aids on-going collaboration in research of new and uncharacterized blueberry viruses, and in the publication of extension bulletins.

PUBLICATIONS:

1. Schilder, A. C., and Miles, T. D. 2008. Virus and Viruslike Diseases of Blueberries. Michigan Blueberry Facts. Michigan State University Extension Bulletin E-3048.

2. Isaacs, R., Schilder, A., Miles, T., and Longstroth, M. 2008. Blueberry Aphid and Blueberry Shoestring Virus. Michigan Blueberry Facts. Michigan State University Extension Bulletin E-3050.

3. Schilder, A. M. C., Isaacs, R., Hanson, E., Cline, B. 2008. A Pocket Guide to IPM Scouting in Highbush Blueberries, 2nd edition. Michigan State University Extension Bulletin E-2928.

4. Schilder, A. M. C., Isaacs, R., Hanson, E., Cline, B., Wise, J., Garcia Salazar, C., and France, A. 2008. Guía de Bolsillo para la Inspección de Plagas en Arandanos "Highbush" bajo Manejo Integrado de Plagas. Michigan State University Extension Bulletin E-2928SP.

5. Isaacs, R., Schilder, A., Zabadal, T., and Weigle. T. 2007. A pocket guide for grape IPM scouting in the North Central and Eastern U.S. Michigan State University Extension Bulletin E-2889. 3rd Edition.

6. Isaacs, R., Schilder, A., Zabadal, T., and Weigle. T. 2008. Guía de Bolsillo para la Inspección de la Vid bajo Manejo Integrado de Plagas en el Centro Norte y el Este de los EEUU. Michigan State University Extension Bulletin E-2889SP.

7. Schilder, A., Wharton, P., Cline, W., Isaacs, R., Hanson, E., Longstroth, M., Svoboda, D., Thompson, R., Landis, J., and Duynslager, L. 2005 (updated 2009). MSU blueberry website (www.blueberries.msu.edu).