



Virus and Virus-Like Diseases of Fruit Trees, Small Fruits, and Grapevines

This project effectively fostered collaborations that led to significant advancements in virus and virus-like disease management for perennial fruit crops that represent \$18 million annually in U.S. production.

Who cares and why?

Diseases caused by viruses and virus-like organisms are serious threats to the tree fruit, berry, and grapevine industries in the U.S. and Canada. Plum pox virus is the most economically devastating disease of stone fruits globally; the effects of this disease alone on tree fruit and nursery industries has led to \$80 million spent in the United States and \$65 million spent in Canada on attempts to detect, eradicate, and manage the virus. WERA-020 facilitates a reduction in the impact of these kinds of diseases by providing a unique network that encourages interaction among regulatory agencies, researchers, and extension specialists.



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Plum pox virus symptoms. Photo courtesy of European and Mediterranean Plant Protection Organization, France.

What has the project done so far?

WERA-020's research and education activities have addressed two fundamental levels of disease control: 1) understanding disease characteristics and developing early detection methods that limit economic damage; 2) supporting quarantines and programs that exclude diseases from commercial production areas. In particular, WERA-020 provided much of the expertise for early research and strategies for the plum pox virus when it was first diagnosed in 1999. This research has continued to inform proactive testing in major fruit producing states, as well as the disease eradication program currently in progress in New York. WERA-020 scientists have also revealed the causes of diseases that limit blackberry production. With funding from a Specialty Crops Research Initiative grant, researchers from Arkansas, North Carolina, South Carolina, Mississippi, and Oregon have identified and studied the viruses involved in yellow vein disease, crumbly fruit, and decline of blackberry. WERA-020 has become the primary scientific forum for the exchange of technical information between the centers across the U.S. that are part of the newly formed National



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Leaf roll virus causes wine grape leaves to yellow and curl at the edges. Photo by William M. Brown, Jr., Bugwood.org.

Clean Plant Network. Better information flow has improved testing methods and operations management, increasing the availability of virus-tested living tissues that provide genetic resources for breeding programs as well as cultivated plant varieties for commercial use. In addition, WERA-020 scientists have developed and distributed virus-free plantings and other propagation sources for nurseries and growers.

Impact Statements

Reduced economic losses by collaboratively advancing virus disease management for new and emerging pathogens. For example, the California strawberry industry lost \$25M to strawberry pallidosis during the 2003-2004 season, but since the pest was identified and aggressively managed, the disease has been almost eliminated in the state.

Played a central role for the National Clean Plant Network by providing a forum for discussion of regional testing requirements based on regional differences in viruses and their vectors.

Provided regulatory agencies with easier access to up-to-date scientific information, helping them make regulations and decisions that have major effects on crops. Regulatory agencies used WERA-020 data and advice for acquiring propagation material that is free of pathogens, creating a more effective quarantine program that encourages compliance with federal regulations regarding the movement of propagation material.

Helped nurseries and growers access new, virus-tested plantings from foreign sources through clean plant programs, giving growers the opportunity to initiate new plantings with the highest quality plants available and maximize potential crop yield.

Created the national grape registry, providing a single comprehensive site listing all grape plant material available within the U.S. and identifying which material has been certified as free of grapevine diseases. This registry has made it easier for growers to find plant stock in the U.S. that meets quarantine regulations and is cheaper than foreign sources.

What research is needed?

As global movement of plant material accelerates, regulators and scientists must coordinate to identify and respond quickly to new pathogens and disease situations in new environments. Better information and tools for diagnosing pathogens and sharing key signs of threats are needed. New technologies must be evaluated and adapted to new environments.

Want to know more?

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Edited and designed by Sara Delheimer



More than 10 viruses of blackberries (top, photo by Julie Falk) have been identified. Diagnosis of strawberry pallidosis (bottom, photo courtesy of UC IPM) has led to aggressive pest management that has nearly eliminated the pest in California.