Plum Pox

Plum pox, also known as sharka, is the most devastating viral disease worldwide of stone fruit including peaches, apricots, plums, nectarines, almonds, and sweet and tart cherries. The disease significantly limits stone fruit production in areas where it is established. More than 100 million stone fruit trees in Europe are infected.

First described on plums in Bulgaria in 1915, plum pox has spread to a large part of Europe, the Mediterranean, the Middle East (Egypt and Syria), India, and Chile. In 1999, for the first time in North America, plum pox was detected in a Pennsylvania orchard.

The virus causing the disease is plum pox potyvirus (PPV). PPV infects various members of the genus Prunus, such as the stone fruit trees mentioned above. Wild and ornamental species of this genus may also become infected by some strains of the virus. Some weed hosts identified in the field and numerous hosts tested in laboratory settings have also been known to become infected with PPV.

Economic Importance of Plum Pox

Plum pox is economically important because it can cause fruit to be unmarketable and can decrease the yield of infected trees. The severity of the disease depends on the strain of the virus present and the susceptibility of Prunus cultivars (cultivated varieties of plants). The presence of PPV can enhance the effects of other endemic viruses infecting various species of the genus Prunus, such as prune dwarf virus, Prunus necrotic ringspot virus (causes browning), and apple chlorotic leaf spot virus (causes yellowing), resulting in still greater economic losses. In southeastern France, a newly identified strain of PPV induces severe necrosis, resulting in early leaf drop and tree decline, even in the absence of endemic Prunus viruses.

Spread of Plum Pox

Several aphid species can transmit plum pox within an orchard and from other trees to nearby orchards. Long-distance spread usually occurs as a result of the movement of infected nursery stock or propagative materials.

Plum pox is spread from plant to plant by several aphid vectors (insects that suck sap from plants then carry the virus to other plants). Aphids spread plum pox by carrying the virus in a nonpersistent manner. The length of time the virus remains on the stylet (part of the aphid's mouthpart) depends on how soon the aphid probes a new plant after acquiring the virus from an infected plant. This means that the virus remains on the stylet from minutes to perhaps a few hours. Studies indicate that at least 14 aphid species can transmit PPV. These species include Myzus persicae, Aphis spiraecola, A. gossypii, and A. fabae. Some PPV strains have been identified that are not transmissible by aphids.

Control

Control and prevention measures for PPV include field surveys, use of certified nursery materials, use of resistant plants (when available), control of aphids, and elimination of infected trees in nurseries and orchards.

Sources of resistance exist in Prunus but are not abundant. A team of scientists from the United States and France has genetically engineered a PPV-resistant in plum (otherwise known as C5), and the resistance can by transferred through hybridization to other plum trees. This provides a unique source of germplasm for future breeding programs worldwide. Similar success has not yet occurred in attempts to genetically modify other Prunus species.

Types of Plum Pox Virus

Four PPV groups have been described to date: PPV–D in apricot trees from southeastern France, PPV–M in peach trees from Greece, PPV–EA in apricot trees from El Amar, Egypt, and PPV–C in sour cherry trees from Moldova.

PPV–M isolates are more aggressive in peach, are aphid vectored more efficiently, and spread more rapidly in an orchard. PPV–M has been reported to be seed transmitted, while other PPV strains are known not to be transmitted through seeds. Both PPV strains M and D infest peach, plum, and apricot. The strain present in Pennsylvania has been determined to be PPV–D.

PPV–C infects sweet and tart cherry naturally and has infected other Prunus hosts experimentally. To date, no other PPV strains have been reported to infect cherry naturally. Scientists use several techniques to distinguish PPV strains. They monitor the behavior of host trees. They conduct serological tests such as ELISA and molecular tests such as polymerase chain reactions (PCR). They also sequence the PCR products or cut the PCR products with enzymes at locations in the DNA sequence that are unique to each strain.

Indications and Appearances

In peach, PPV-infected trees may exhibit color-breaking symptoms in the blossoms. This appears as darker pink stripes on the flower petals and can be useful for early season surveys. PPV symptoms can be present in young leaves in the spring and/or on developing fruit. Some trees show no symptoms on leaves or fruit. In Chile, several of the infections have been asymptomatic, and infections were discovered only through rigorous testing of trees.

Not all PPV infection in Prunus are characterized by a ring symptom on leaves. Several cultivars show yellowing line patterns and blotches, or necrotic ring symptoms on expanded leaves. Leaf distortion has also been observed. As mentioned above, the leaves of some peach trees in France infected with PPV–M produce a yellowing vein clearing that turns necrotic and causes leaf drop. PPV-infected fruit can develop yellow rings or blotches, or brown rings, and some plum and apricot fruit can be severely deformed and bumpy. The pits of many infected apricots and some plums show rings.

Because infected Prunus trees exhibit such a wide range of leaf, flower, and fruit symptoms, educating survey crews, diagnosticians, growers, and nurserymen to the range of possible PPV symptoms is crucial to detecting plum pox.

Report Infestations

For more information or to report trees and fruit displaying signs of plum pox, contact one of the following government agencies:

USDA–APHIS–PPQ
Plum Pox Program Coordinator
Invasive Species and Pest Management
4700 River Road, Unit 134
Riverdale, MD 20737–1236
(301) 734–8899

Pennsylvania Department of Agriculture
2301 North Cameron Street
Harrisburg, PA 17110–9408
(717) 787–4737