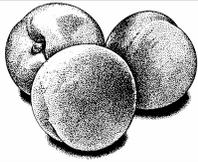


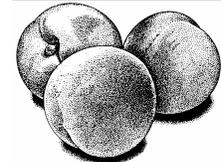


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PLUM POX: A NEW THREAT TO STONE FRUIT PRODUCTION IN THE UNITED STATES



Plum Pox, also known as “Sharka”, was first reported in the United States in a small area of Pennsylvania in October 1999. Although this disease is new to North America, it has been considered the most devastating disease of stone fruits throughout Europe for many years. The USDA (APHIS) and the Pennsylvania Department of Agriculture have been working together to minimize the spread of this disease to other areas by imposing strict quarantines and by destroying all infected trees.

Although Plum Pox usually doesn’t kill trees, it can result in serious crop losses by rendering fruit unmarketable due to poor taste and deformities and by causing extensive premature fruit-drop. Plum Pox is important not only to orchardists but is also a disease of concern for the woody ornamentals industry since it can infect ornamental *Prunus* species in production and in the landscape. This disease does not affect humans or animals.

HISTORY

Plum Pox (PPV) was first discovered in Bulgaria in 1915 and gradually spread throughout most of Europe by the 1970’s. It is now found in Europe, Egypt, Turkey, Syria, India, and Africa. Until the discovery of PPV in Pennsylvania, the most recent report of PPV in a new geographical area was in 1992 in Chile.

Confirmation of the presence of PPV in the United States was initiated by a grower who observed some unusual symptoms on Encore peaches in Adams County, PA. After PPV was positively identified as the cause of the problem by the USDA, 218 orchard blocks in that region were surveyed. Of the 218 blocks sampled, 18 blocks tested positive for PPV. However, only two of those 18 contained trees with visible symptoms of disease.

CAUSAL AGENT

Plum Pox is caused by the Plum Pox Virus (PPV). This virus is a member of the potyvirus (potato virus Y) group. Four distinct strains of PPV have been reported. PPV-D is the strain

reported in Pennsylvania and Chile and is also found in western Europe. Strains PPV-M, PPV-C, and PPV-EA are found throughout Europe, Eurasia, and Africa. PPV is transmitted by aphids.

INSECT VECTORS

PPV is spread by at least 12-14 species of aphids. The aphid acquires the virus as it punctures plant cells using its piercing and sucking mouthparts and feeds on the cell contents. The virus is transmitted in a non-persistent manner and aphids only remain infectious for a few minutes to an hour after they acquire the virus. Aphids do not pass PPV to their progeny. One of the most efficient vectors is the Green Peach Aphid, *Myzus persicae*, an aphid that is commonly found throughout Connecticut.

HOSTS

The host range of PPV depends upon the particular strain of the virus.

- **Primary Economic Hosts:** plum, peach, nectarine, apricot, almond, and cherry. Cherry is very resistant and doesn't often show symptoms, esp. when infected with PPV-D strain.
- **Ornamental Hosts:** many *Prunus* species commonly found in production nurseries and in the landscape.
- **Potential Reservoir Hosts:** PPV has been experimentally transmitted to many herbaceous plants (e.g., tomato, pea, petunia) as well as many weeds (e.g., white clover, lamb's quarters, buttercup).

SPREAD

In natural settings such as orchards, PPV is spread short distances by aphids. Long distance spread of PPV occurs primarily through infected plant material. PPV is readily spread in budwood and nursery stock. This means of spread probably accounts for the majority of spread to different geographical regions since infected plant material is often symptomless. Long distance spread by aphids is unlikely.

SYMPTOMS

The symptoms of PPV vary with many factors including host species and cultivar, age, nutrient status, and environmental conditions. General symptoms of infection include the presence of spots or "pox" on fruit, leaves, stems, and seeds. Some infected plants don't show any clear symptoms or may not develop symptoms until several years after infection.

On plums, foliar symptoms consist of pale green chlorotic spots, rings, lines, and yellowing of the veins. These are often not visible until early-summer and these markings can become necrotic as they age. Symptoms can sometimes only be found on a few leaves per shoot and infected trees may not have any other obvious symptoms. Fruit of red or dark-colored plums develop rings or blotches when they are fully expanded but not fully ripe. These markings may disappear as the fruit reach maturity. Red rings and spots can also occur on the stones and are visible when fruit are cut open. PPV infection may cause plum trees to drop substantial amounts of fruit prematurely (reports claim 80-100% premature drop on some cultivars) and this can sometimes be an indication of infection in the absence of other obvious symptoms.

On peach and apricot, foliar symptoms may develop on the first leaves to expand and consist of yellow or banding pattern along the veins. Some twisting or distortion may also develop on the infected leaves. Peach fruit develop pale yellow or dark rings, lines, and spots when they are immature but these may disappear upon maturity. Infected fruit can also be deformed and have irregular shapes.

In addition to the symptoms described above, PPV infections can mimic symptoms associated with other problems such as nutritional deficiencies. PPV also reduces total fruit quantity and quality of symptomatic and symptomless fruit, resulting in lower numbers and grades. PPV infections can reduce the productive life of trees and may also result in many abnormal physiological and metabolic changes.

DISEASE MANAGEMENT

- **Prevention (Exclusion):** The most effective control is preventing the introduction of the disease into a particular geographical region. This involves purchase of disease-free, virus certified stock as well as attention to international movement of plant material.
- **Eradication of Infected Trees and Reservoir Hosts:** Prompt and complete removal and destruction of symptomatic as well as symptomless trees that are suspected of infection is critical. Since trees cannot be cured of the virus once infected, removal (and destruction of infected trees) is the only effective way to limit the spread of disease. PPV can survive overwinter in various parts of infected trees and even in infected roots. Rapidly growing suckers from infected root stocks are well documented sources of the virus. Once trees are removed, it is important to make certain that aphids do not have the opportunity to feed on the leaves since they can still acquire and spread the virus before the tree is destroyed. Since the role of reservoir hosts is still poorly understood, weeds or plant with “unusual” symptoms in or near the vicinity of trees suspected of infection can be removed and destroyed (e.g., burned) as a precautionary measure.
- **Vector Management and Control (?):** At present, there are no effective ways that fruit trees can be completely protected from aphid feeding activities. Applications of insecticides can reduce the total aphid populations in an orchard block and on individuals trees but it only takes one or a few aphids carrying PPV to effectively inoculate a tree.

INFORMATIVE WEB SITES

- The American Phytopathological Society (APS) has an excellent feature on Plum Pox; access is free to all; the address is: <http://www.apsnet.org>
- The Pennsylvania State University also has an excellent information site on PPV; the address is: <http://sharka.cas.psu.edu>
- The Pennsylvania Department of Agriculture has an information site; the address is: www.state.pa.us/PA_Exec/Agriculture/plum_pox/pda_press_release.html

- The USDA Web site has information on PPV and a photo gallery of symptoms at:
www.aphis.usda.gov

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