TREE FRUIT

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IPM Integrated Pest Management

Apple stem pitting virus

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Introduction

Apple stem pitting virus (ASPV) is a latent virus of pome fruits with worldwide distribution. In addition to apple, ASPV can affect pear and quince. Similarly to other latent viruses of pome fruits, infections with ASPV are often symptomless and therefore go mostly undetected.

Disease and causal agent

Although ASPV is frequently found in apple, no symptom is associated with infection on most scion/rootstock combinations. However, in susceptible cultivars, extensive pitting of the woody cylinder can impair functions of the vascular system. Fruit yield can be reduced, particularly when ASPV is co-infecting with other latent viruses such as *Apple chlorotic leaf spot virus* (ACLSV) and *Apple stem grooving virus. Apple stem pitting virus* is the type species of the genus *Foveavirus* and has a positive-sense single strand RNA genome encapsulated in flexuous, filamentous particles.

Symptoms and impact

Apple stem pitting virus does not cause observable symptoms on most cultivars although pits can develop on the woody cylinder (Figure 1). When elicited, symptoms vary depending on viral isolate and cultivar. In susceptible apple cultivars 'Charden' and 'Spy 227', symptoms may include xylem pitting, leaf epinasty or downward growth, and tree decline. In symptomatic trees, ASPV is often detected in mixed infection with other latent viruses of apple, particularly with ACLSV in 'Red Delicious' (Figure 2). In susceptible pear cultivars 'Beurre Hardy', 'Nouveau Poiteau', and 'Jules d'Airroles', ASPV infection is often accompanied by vein yellowing, red mottling, black or necrotic spotting, and pitted and deformed fruit or "stony fruit". Symptomatic fruits are unmarketable.

Figure 1. Depressions on the woody cylinder of the trunk of a declining Red Delicious/G.935 tree infected with *Apple stem pitting virus* and *Apple chlorotic leaf spot virus* observed after bark removal. Photo: D. I. Breth and E. M. Tee.

Spread

Apple stem pitting virus occurs worldwide, wherever apple, pear and quince are cultivated. There is no reported insect vector and the virus is not seed transmitted. The major means of dispersal is via vegetative propagation, grafting and top working. Therefore, the presence of ASPV in infected trees results from the unintentional, careless use of scion budwood collected from infected trees for propagation or top working, and from infected rootstock liners. The absence of obvious symptoms of ASPV on most trees increases the risk of its unintentional distribution. Transmission, to some extent, of ASPV by root contact has been reported, highlighting the need to distance nursery material from infected trees.

Management

Like other viruses of woody crops, there is no cure for ASPV in an established orchard and there is no direct measure to combat the virus besides removing infected trees. The best way to control the virus is to prevent its introduction in new orchards.

Since there is no vector that will introduce the virus to new plantings and ASPV is transmitted to new trees via grafting, sourcing budwood from clean trees is paramount to mitigate its impact on tree performance. To ensure a healthy, long-lived orchard producing good yields and high quality fruit, only trees derived from clean, virus-tested buds and rootstock liners should be planted.

Propagation material should be selected and collected only from clean, virus-tested trees to prevent the dissemination of ASPV. To eliminate ASPV from elite scion cultivars and rootstock genotypes, therapeutics based on heat therapy at 37°C for 60-80 days can be used in the laboratory to regenerate clean trees.

Figure 2. A declining Red Delicious/G.935 tree infected by *Apple stem pitting virus* and *Apple chlorotic leaf spot virus* (foreground) compared to healthy trees (background) in a nursery in fall 2015. Photo: D. I. Breth and E. M. Tee.

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