

PAPAYA RINGSPOT

Papaya ringspot, caused by *Papaya ringspot virus*, is an important virus disease of cucurbits. In 1949, the name “papaya ringspot” was used to describe a disease of papaya in Hawaii, which was caused by *Papaya ringspot virus* (PRSV). PRSV is economically important in cucumber, melon, squash, and other cultivated cucurbits. It is most prevalent in tropical and subtropical regions. PRSV is reported to occur throughout much of the world, affecting cucurbit production in Asia, Australia, Europe, Africa, and North and South Americas.

The host range of PRSV is relatively narrow and is limited to the Cucurbitaceae family. *Chenopodium* species are infected with PRSV.

Symptoms

Cucurbit plants infected with PRSV are stunted and growth is distorted. Leaves exhibit striking green mosaic or mottling, blistering, distortion, and puckering (Figure 1). In some cases, leaves also may have a narrowing of laminae, which can lead to the development of “shoestring” symptoms. Newly emerged apical leaves are frequently narrowed and may even be reduced to only the main veins.

Plants infected early in development may not develop fruit and may cause 100% yield loss. Plants infected later in development form fruits that are deformed and have knoblike overgrowth



Figure 1. Folia symptoms caused by *Papaya ringspot virus* (PRSV) on summer squash. (Courtesy T. A. Zitter)



Figure 2. *Papaya ringspot* (PRSV) on squash fruit.

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and green-yellow discoloration (Figure 2).

Symptoms alone are inadequate for identification of PRSV because symptoms resemble those of other viruses and mixed infections are common. PRSV can be identified by serological methods, such as ELISA, or by molecular methods including RT-PCR and sequencing.

Disease Cycle

PRSV is usually acquired from wild reservoir hosts by aphid vectors. In tropical and subtropical regions, cucurbit crops planted adjacent to existing crops containing PRSV-infected plants provide an ever-present source of inoculum. In temperate regions, the virus likely overwinters in association with perennial cucurbits or possibly other yet-to-be-identified reservoir hosts.

Infected cucurbit plants serve as a secondary inoculum source for in-field and field-to-field spread. When aphid populations are large, the virus can spread quickly, causing high disease incidences. Because acquisition and inoculation of PRSV occurs within seconds, both migratory and resident aphids can spread the virus. However, because the virus does not persist very long on the aphid stylet (1-2 h), long-distance spread via aphids is limited. Long-distance spread can occur through the movement of infected transplants or possibly via infected fruits.

Disease Management

Management of PRSV requires an integrated approach. Following practices are recommended for preventing/minimizing losses by PRSV.

- New cucurbit fields should not be adjacent to or near established fields with PRSV-infected plants. Also, new fields should be placed upward from such fields to prevent viruliferous aphids from being blown into nearby established fields.
- If transplants are used, plant virus- and aphid-free plants.
- Plant resistant cultivars to PRSV wherever available. In many regions, multiple viruses inducing similar symptoms may infect cucurbits, including PRSV, CMV, WMV, and ZYMV. Therefore, planting cultivars resistant to combinations of these viruses can be more effective in minimizing losses to virus diseases.
- Applications of mineral oils and insecticides can slow the spread of viruses in cucurbit fields. The application of chemicals may be combined with a program of roguing infected plants early in the growing season. Application of systemic insecticides are more effective than contact insecticides for management of virus diseases.
- After the crop is harvested, old plants should be removed and destroyed to prevent old plants serving as sources of inoculum for other plants.