FACT SHEET

National Clean Plant Network

Start clean, stay clean.

Apple Mosaic Virus

Apple mosaic virus is a common pathogen in hop yards around the world and significantly reduces the success in establishing new hop yards. The virus has a wide host range, being reported in 65 plant species from 19 different families, though there is no evidence of natural transmission into hop from other crops.

Symptoms

Symptoms of apple mosaic virus infection in hop can range from chlorotic ringspots (which may become necrotic) to oak-leaf patterns (Figs. 1-3). Symptom expression and severity is cultivar specific, with many hop lines maintaining asymptomatic infections through their lives, or symptoms may only appear several seasons after infection. The severity of symptoms is dramatically affected by environmental conditions. Symptoms are usually most severe when a period of cool weather with temperatures below 80°F is followed by higher temperatures. Disease effects include lower yields of alpha and beta acids, decrease in cone yield, and increase in softwood cutting mortality following propagation. In addition, a mixed infection of apple mosaic virus and hop mosaic virus may result in enhanced disease severity and crop damage (Fig. 3).

Transmission & Spread

Propagation of apple mosaic virus infected plants is the primary mode of introduction into hop plantings. Mechanical transmission can occur in the hop yard by transferring virus-containing sap from plant to plant on cutting tools, and through plant-to-plant contact by hop shoot intertwining, or root grafting between neighboring plants in a hop yard. There is no conclusive evidence of seed, pollen, or vector transmission of apple mosaic virus in hops.

Management

Selection and propagation of planting materials free of apple mosaic virus are essential for disease management. Symptomatic bines should be removed, and any cuttings tools cleaned between plants. Where possible bines should be spaced and propagated to prevent plant-to-plant contact, and using contact herbicides rather than mechanical pruning to control basal growth may reduce mechanical transmission of apple mosaic virus to adjacent plants.

At a Glance

- Use only virus-tested planting stock when establishing new yards.
- Remove symptomatic bines.
- Use of contact herbicides rather than mechanical pruning to control basal growth may reduce mechanical transmission of apple mosaic virus to adjacent plants.

Reference:

Eastwell, K.C., & Barbara, D.J. (2015). Apple mosaic virus. In D.B. Walsh, D.H. Gent, J.D. Barbour, R.A. Boydston, A.E. George, D.G. James, & J.R. Sirrine (Eds.), Field Guide for Integrated Pest Management in Hops (3th ed., p. 39). Hop Growers of America, Yakima, WA.

Necrotic ringspots and oak-leaf line on Nugget due to Apple mosaic virus. (Fig. 1)

Oak-leaf line pattern caused by Apple mosaic virus, without the development of ringspot symptoms. (Fig. 2)

Necrotic ringspot due to Apple mosaic virus. (Fig. 3)

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December 2021