

Tobacco mosaic virus (TMV)

Tobacco mosaic virus is the type member of the genus *Tobamovirus*, family *Virgaviridae*: consisting of rigid rods with single-stranded positive-sense RNA, and monomeric coat protein.

Symptoms: TMV can cause symptoms including: stunting, mosaic, malformation of leaves and growing points, rugosity, yellow streaking (especially in monocots), yellow spotting, vein-clearing, and necrotic leaf spots. Many hosts are symptomless. TMV is systemic in many hosts, with particles found in roots as well as aerial portions of plant, often at very high titres.

Host Range: Over 200 plant species in 11 families known to be hosts. Hosts include: tobacco, tomato, potato, pepper, other *Solanaceae*, *Chenopodium*, beet, melon, cucumber, squash, lettuce, horseradish, *Anemone*, *Begonia*, *Calibrachoa*, *Chrysanthemum*, *Coleus*, *Delphinium*, *Geranium*, *Impatiens*, *Lobelia*, marigold, *Petunia*, plantain, poppy and *Verbena*. Many hosts (including several *Petunia* varieties) are symptomless.

Epidemiology: TMV is transmitted mechanically by handling plants, as well as by tools (as many as 20 plants after cutting an infected one). Historically, tobacco products often contained TMV particles, less in flue-cured products; workers were thought to introduce and spread throughout plantings on contaminated hands. Though not considered transmissible by insects, chewing insects such as grasshoppers or flea beetles may very rarely spread by contaminated mouthparts. Is not seed transmitted, but can infect from contaminated seed coats or soil. Root fragments left in soil and leaf litter can serve as an inoculum source. TMV is graft transmissible. Virus particles are very stable, even in unpurified sap. There are records of dried leaf material remaining infectious for 30 to 50 years at room temperature.

Management: Like most systemic viruses, hosts remain infected for life. Plant virus-free materials, rogue out suspected infections and discard all plants they may have touched. Remove as much root mass and soil as possible. Remember that many species and varieties are symptomless. Encourage tobacco users to wash hands when returning from breaks and encourage all workers to wear disposable gloves. Proper sanitation includes disposal of all dead plant materials away from live plantings, avoid touching plants when watering, and not allowing water wands to touch the ground or plant contact surfaces.

Several chemicals are available for treatment of tools, pots, and other contact surfaces, these are all listed as 1 minute contact time. A 20% (w/v) non-fat dry milk solution with or without 0.1% (v/v) Tween-20 can be used to block virus transmission, but it must remain wet. 10% household bleach (v/v) (0.6% NaOCl, final) is effective, but corrosive to steel and has a short half-life (about 2 hours before it needs changing). A 1% Virkon-S (w/v) (0.204% potassium peroxydisulfate, final) solution is very effective. Trisodium phosphate may not be as efficacious as previously thought. Quaternary ammonium may not be practical for tool disinfection (often 10 minute soak required). It is worth noting that organic materials and soil can interfere with disinfectants, items should be washed prior to disinfection.