



AVRDC - The World Vegetable Center

Fact Sheet

Tomato Diseases

Tomato Mosaic Virus (ToMV)

Found worldwide



Symptoms

Symptoms can be found during any growth stage and all plant parts are affected. Generally, infected plants have a light or dark green mottling or mosaic with distortion of younger leaves, and stunting to varying degrees. Severely affected leaves may have a “fern-like” appearance and may show raised dark green areas. Fruit set may be severely reduced in affected plants.

There may be internal browning of the fruit wall, yellow blotches and necrotic spots may occur on green

or ripe fruit. Some strains can cause yellow mottling of leaves, others cause dark necrotic streaks in stems, petioles, leaves or fruit, or other symptoms to occur.

Symptoms are influenced by environmental conditions such as daylength, temperature, and light intensity as well as by variety, plant age at infection, and virulence of tomato mosaic virus (ToMV) strain. On susceptible cultivars, symptoms may range from severe to none.

Occasionally, dual infection with potato virus X in tomato causes severe symptom development known

How to Identify Tomato Mosaic Virus



On leaves, look for green and yellow mottling and fern-like foliage (left); be careful not to confuse with herbicide damage (which will affect all broadleaf plants nearby) or cucumber mosaic virus (which causes shoestring-like foliage). On fruit, look for brown spotting (center) or gray blotches (right) on walls.

as “double streak”. Some symptoms caused by ToMV resemble symptoms induced by hormones such as 2,4-D. To distinguish these symptoms, herbicidal damage will occur shortly after herbicidal applications and affect all broadleaf plants, not just tomato plants.

Conditions for Disease Development

The virus is seed-borne. Infested tomato seeds can be the source of infection and the means by which the virus can be disseminated over large distances. Only a few seedlings need to be infected for the virus to spread rapidly.

The virus can be spread by horticultural workers on contaminated hands, clothing, and tools during routine horticultural operations such as transplanting, tying, pruning, grafting, pollinating, cultivating, spraying, watering, and picking. The presence of virus in the guttation fluid of tomato plants facilitates spread by workers during horticultural operations.

ToMV can also enter a tomato field through infected weed, pepper, or potato plants. Also, ToMV is spread to a lesser extent by feeding grasshoppers, small mammals, and birds.

ToMV is a closely related strain of tobacco mosaic virus (TMV). The virus is quite stable under adverse environmental conditions and can persist in plant debris in dry soil for 2 years or in moist soil for 1 month or in root debris in fallow soil for 22 months. It can also persist in greenhouse structures for long periods of time.

Healthy seedlings planted into contaminated soil can be infected through minor wounds caused by damage to roots. The virus may also be present in water used for irrigation. Dissemination of tiny particles of contaminated soil by wind is also possible.

Control

Consult with your extension agent regarding infection by ToMV since other plant viruses and even plant hormones such as 2,4-D may cause similar symptoms. Resistant varieties are available. Check with your extension agent for resistant varieties that are available in your region.

Use seed from healthy plants only. Dry heating seed at 70°C for 4 days or at 82-85°C for 24 hr will help to

eliminate surface-borne virus. ToMV on the seed coat can be eliminated by soaking seed for 15 min in 100 g/l of tri-sodium phosphate solution (TSP), rinsing thoroughly, and spreading seeds out to dry. Do not re-contaminate seed by placing them in used containers.

Use a minimum 2-year rotation. Avoid following tomato crops with susceptible crops such as tobacco, pepper, eggplant, or cucurbits. Keep production areas and seedbeds free of weeds and other plants that can serve as hosts for the virus.

If growing transplants in a greenhouse, then use steam-pasteurized soil. Avoid touching or handling plants prior to setting them in the field. Remove diseased seedlings that show leaf twisting, mosaic or unusual growth. Do not touch other seedlings while discarding them. Dip hands in milk while handling plants every 5 minutes (more often if different lots of plants are handled). Rubber gloves will protect hands. Do not clip young seedlings since this increases the possibility of mechanical transmission of the virus from contaminated tools or hands.

Remove diseased plants from the field as soon as virus symptoms are noticed. This will reduce the spread of the virus by direct contact between plants.

Disinfect tools, stakes, and equipment before moving from diseased areas to healthy areas. This can be done by: (1) heating or steaming at 150°C for 30 minutes; (2) soaking 10 minutes in 1% formaldehyde or a 1:10 dilution of a 5.25% sodium hypochlorite, do not rinse; or (3) by washing in detergent at the concentrations recommended for washing clothes or dishes. Keep all solutions fresh. Alternatively, tools should be washed thoroughly, dipped for 30 minutes in 3% (w/v) TSP, and not rinsed before use. Hands should be washed and scrubbed well with 3% TSP, then rinsed thoroughly with water. Alternatively, hands and tools may be washed with soap or milk.

Work in diseased areas last after working in unaffected parts of a field. Wash clothing that comes into contact with ToMV-infected plants with hot water and a detergent.

For more information on the production of tomato and other vegetables, go to <www.avrdc.org>.