

A Note on *Tobacco Mosaic Virus*

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EDITORIAL NOTE

Tobacco Mosaic Virus (TMV) is a single-stranded RNA virus that infects a diverse range of species, most notably tobacco and other Solanaceae families. The Solanaceae are a flowering plant family that comprises a variety of agricultural crops, medicinal plants, spices, weeds, and ornamentals, ranging from annual and perennial herbs to vines, lianas, epiphytes, shrubs, and trees. It reaches neighboring cells through plasmodesmata after proliferation. TMV creates a 30 kDa movement protein called P30, which enlarges the plasmodesmata, allowing the infection to spread via direct contact with neighboring cells. TMV is thought to spread from cell to cell as a complex of RNA, P30, and replication proteins. It can also spread through the plant's phloem for longer distance transport. TMV can also be passed from one plant to another by direct touch. Despite the lack of recognized transmission vectors for TMV, the virus may easily move from sick hosts to healthy plants via human contact.

TMV, like other plant pathogenic viruses, infects a wide range of hosts and has various consequences depending on the host. In North Carolina, the *tobacco mosaic virus* has been documented to cause a two percent reduction in flue-cured tobacco production. Tobacco, tomato, and pepper (all members of the beneficial Solanaceae family), cucumbers, a number of decorative flowers, and beans such as *Phaseolus vulgaris* and *Vigna unguiculata* are known to be infected. There are numerous strains to choose from. A bright green color between the veins of young leaves is

the earliest indication of this virus disease. The creation of a "mosaic" or mottled pattern of bright and dark green patches in the leaves follows swiftly. Rugosity can also be noticed on infected plant leaves in the form of little random wrinkles. These symptoms appear quickly on younger leaves and are more prominent. Plants are not killed by its infection, although they are stunted if it occurs early in the season.

Sanitation, which involves removing sick plants and washing hands between each planting, is one of the most frequent TMV management techniques. Crop rotation should be used for at least two years to avoid contaminated soil/seed beds. Looking for TMV resistant strains, like with any other plant disease, may be a good idea. In addition, the cross protection technique can be used, in which the stronger strain of TMV infection is suppressed by infecting the host plant with a weak strain of TMV, much like a vaccination. The use of genetic engineering on a host plant genome has been established in the last 10 years to allow the host plant to manufacture the TMV coat protein within its cells. The TMV genome is thought to be quickly re-coated upon entering the host cell, preventing TMV reproduction. Gene silencing was later discovered to be the mechanism that shields the host against viral genome insertion. The control of gene expression in a cell to inhibit the expression of a specific gene is known as gene silencing. Silencing of genes can happen during transcription or translation, and it's commonly utilized in research.

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