Tobacco Mosaic Virus (Tmv) Encyclopedia Article

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Tobacco Mosaic Virus (Tmv)

Tobacco mosaic virus (TMV), also known as tobamovirus, is a rod-shaped virus with **ribonucleic acid** (**RNA**) surrounded by a coat of protein that causes mosaic-like symptoms in plants. Mosaic-like symptoms are characterized by mottled patches of green or yellow color on the leaves of infected plants. The virus causes abnormal cellular function that usually does not kill the plant but stunts growth. Infected plants may have brittle stems, abnormally small, curled leaves, and unripened fruit.

Tobacco mosaic virus is capable of infecting many kinds of plants, not just tobacco plants. TMV is spread through small wounds caused by handling, insects, or broken leaf hairs that result from leaves rubbing together. The virus attaches to the cell wall, injects its RNA into the host cell, and forces the host cell to produce new viral RNA and proteins. Finally, the viral RNA and proteins assemble into new **viruses** and infect other cells by passing through small openings called plasmodesmata that connect adjacent plant cells. This process allows the virus to take over metabolic processes without killing cells.

Tobacco mosaic virus is highly infectious and can survive for many years in dried plant parts. Currently, there is no **vaccine** to protect plants from TMV, nor is there any treatment to eliminate the virus from infected plants. However, seeds that carry TMV externally can be treated by acid extraction or trisodium phosphate and seeds that carry the virus internally can receive dry heat treatments.

The discovery of viruses came about in the late 1800's when scientists were looking for the **bacteria** responsible for damaging tobacco plants. During one experiment in 1892, Russian biologist Dimitri Ivanovsky concluded that the disease in tobacco plants could not be caused by bacteria because it passed through a fine-pored filter that is too small for bacteria to pass through. In 1933, American biologist Wendell Stanley of the Rockefeller Institute discovered that the infectious agent formed crystals when purified. The purified extract continued to cause infection when applied to healthy tobacco plants and therefore, could not be a living organism. Soon after, scientists were able to break down the virus into its constituent parts. Today, it is known that the infectious agent that causes the disease in tobacco plants is a virus, not bacteria.