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Class: Deg.-I (Hons.)
Paper: I, Group-'B'
Topic: Tobacco Mosaic Virus (contd.)
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Structure of Tobacco Mosaic Virus (contd.):

2. Symptoms of Tobacco Mosaic Virus:

The symptom is systemic mosaic type. The primary symptom on young leaves is faint circular chlorotic lesions appear with gradual vein clearing.

This is followed by the development of characteristic systemic mosaic. With the maturity of the leaves, abnormally dark-green spots appear which develop into ir-regular crumpled blister-like areas while the rest of the tissue becoming more or less chlorotic (Fig. 392). Various degrees of leaf malformation like enations follow and some leaves exhibit only a mild diffuse mottle.

The development of symptoms is governed by many variable factors of which the most important is the difference in virulence of the virus strains.

For example, one strain of tobacco mosaic virus may cause yellow mottling on the leaves, a second may cause necrosis only, whilst a third induces a gross malformation. Another variable factor is the variety of plant affected. In flowers, petals show mosaic symptoms. Severe strains cause streaking of stem. The disease is seldom fatal to the host.

Fig. 392. Tobacco Mosaic Virus. Disease symptoms on tobacco leaves induced by ordinary or field strain.

3. Causal Organism of Tobacco Mosaic Virus:

The typical tobacco mosaic virus is Tobacco mosaic virus 1, Marmor tabaci Holmes.

The virus remains active in extracted host plant juice even up to 25 years. It is a very resistant virus, can stand desiccation for 25 years or more. It occurs in very high concentration in plant and its dilution end point is 10^{-6}. The thermal inactivation point of virus is 90^0.

The virus particles are rod-shaped measuring 280 μ in length by 15 μ, in width.

The X-ray studies reveal that the virus particle consists of a number of protein subunits set in helical array with 49 subunits to one turn of helix and 2130 subunits in one rod. The ribonucleic acid thread intertwines more or less centrally between the protein subunits.

The cells of tobacco plants infected with tobacco mosaic virus are characterized by the presence of certain cell inclusions. They are: (i) two types of intracellular inclusions, and (ii) intra-nuclear inclusion. The intracellular inclusions are: (a) X-bodies and (b) striate material of crystalline plates (Fig.).

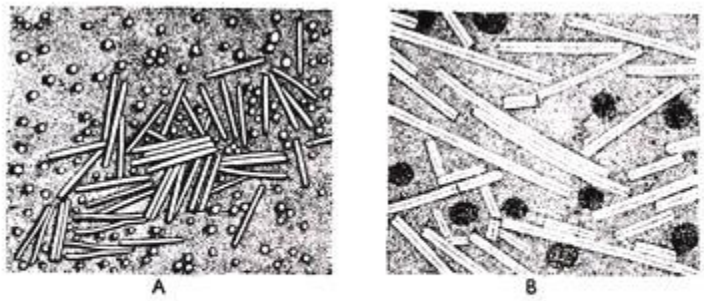

Fig. 393. Tobacco Mosaic Virus. A—B. Virus particles. A. Shadowed with palladium-gold. B. Stained with phosphotungstic acid.

The X-bodies are amorphous, protoplasmic more or less vacuolated inclusions. Whereas striate material of crystalline plates gives protein reaction. These crystals resemble the purified virus-protein crystals. The intra-nuclear fibrous and crystalline inclusions are produced by a yellow-mottling strain of tobacco mosaic virus.

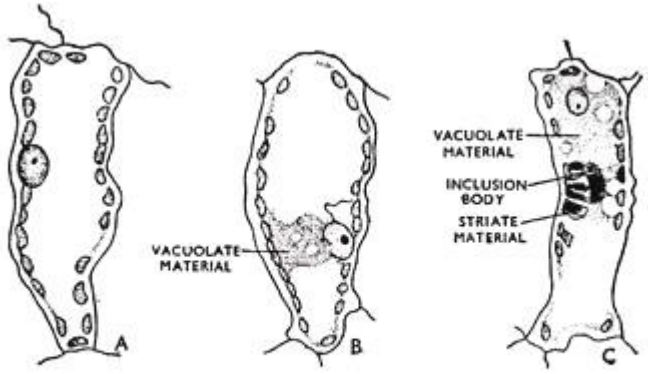

Fig. 340. Intracellular inclusions. A. Virus-free palisade cell of potato. B. Mild mosaic virus-infected palisade cell of potato showing vacuolate material close to the nucleus. C. Common tobacco mosaic virus-infected palisade cell of potato showing inclusion body (X-body).