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B.Sc. PART- I
(BOTANY SUBSIDIARY).
[GROUP- A]

(i) VIRUS INDUCED SYMPTOMS.

Group- 'A'Virus Induced Symptoms

Viruses are similar to obligate parasites in that they cannot be grown on non-living media. They are intimately associated with the host cell and few kill the infected plants although some cause distortion and dwarfing. The changes brought about by virus are treated as symptoms which may be-

① External Symptoms →

(i) Chlorosis → The disturbance of normal development of chlorophyll leading to yellowing or formation of shades of green without pattern in chlorosis.

(ii) Mosaic → The interspersion of various degrees of chlorosis with the normal green colour of the leaf resulting in a mosaic pattern of yellow and green, breaks the mosaic system.

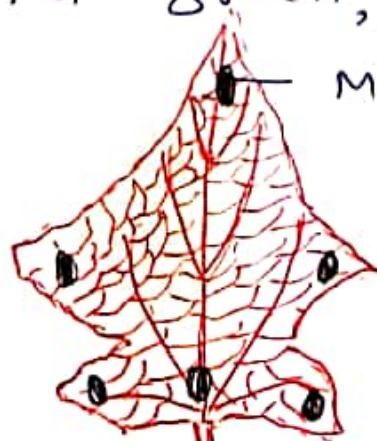


Figure - Mosaic on cucumber leaf

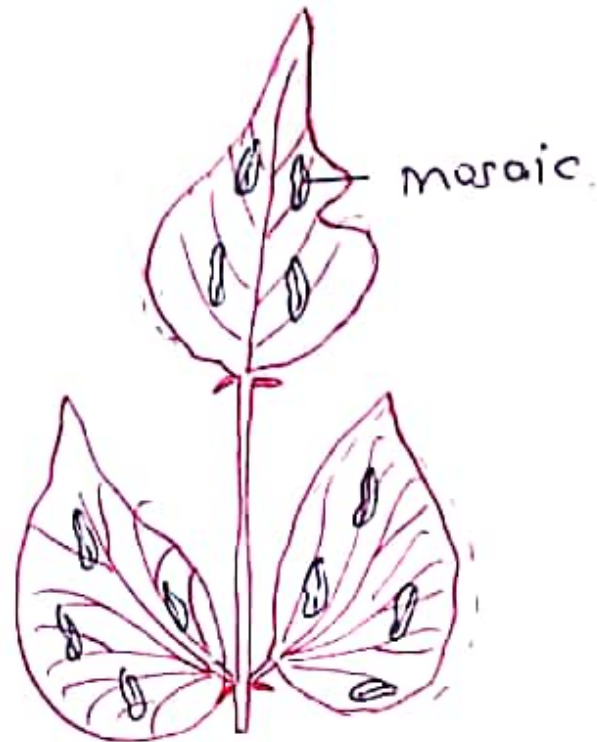


Figure- Mosaic on peon leaf

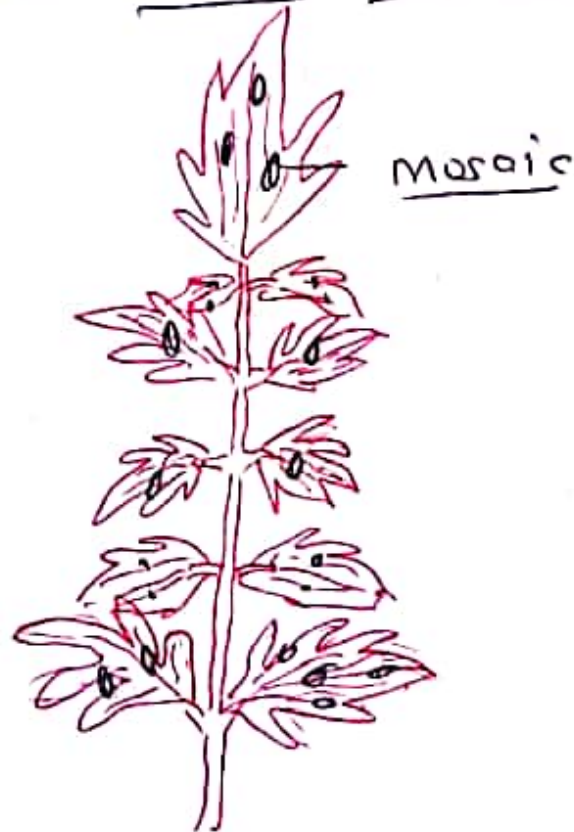


Figure- mosaic on tomato leaf

(iii) Mosaic mottling → When a leaf shows a mottling of light or dark green yellow or even white, it is known as mosaic mottling.

(iv) Necrosis → Death of the host cells (3)

or necrosis is a symptom of many virus diseases and may consist of small areas on the leaves, streaks on the stem or large areas of dead tissues which ultimately cause the death of the host tissues. The necrosis may spread causing various patterns as it develops. A relatively rapid killing of a bud, branch or the entire top of plant is top necrosis. The necrosis of phloem elements is known as phloem necrosis.

(v) Ring spots → These spots consist of various types of chlorosis and necrosis. In each ring spot numerous concentric rings develop on the leaves with a central spot. Spots of circular chlorotic areas are known as "chlorotic ring spots". Whereas in cases where necrosis appears in rings alternating with normal green are the necrotic ring spots.

(vi) Vein clearing and vein banding → In infected leaves, when a clearing or chlorosis of the tissue in or immediately adjacent to the veins takes place, is referred to as vein clearing.

The symptom consisting of a broad-

band of chlorotic tissue along the veins or bands of green tissue in that position, set off by chlorosis or necrosis in the interveinal parenchyma is called vein banding. (4)

(vii) Yellowing → Leaves and other green parts instead of developing green colour turn yellow, this is known as yellowing.

(viii) Distortion and overgrowth → Distortion of leaves is a common symptom of virus disease and may take the form of 'crinkling' and 'curling' or upward rolling of margins. Some virus induce the formation of outgrowths known as 'enations'; masses of hypertrophied tissue developing on the surface of leaf or stem. Virus attack may also induce proliferation of stem buds or cause distinct tumours or galls on roots or stems. Often virus infection results in stimulation of dormant buds and hyperplastic tissue leading to unusual differentiation. Virus infection may also cause distortion and sterility of flower, such as carrot and onion.

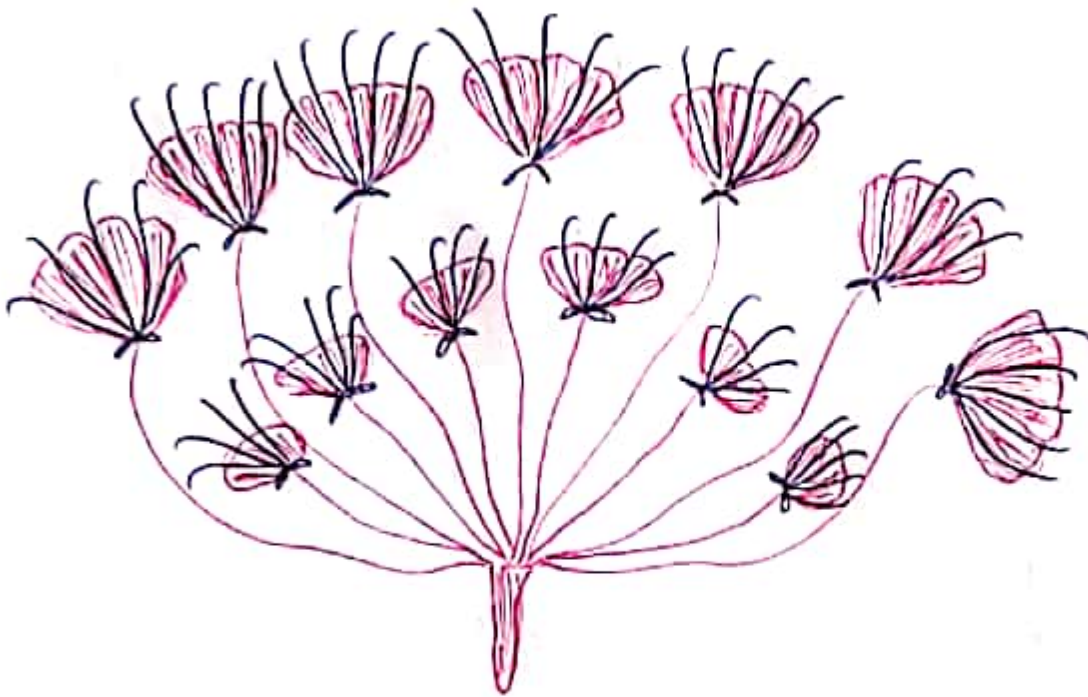


Figure → flower distortion and sterility,
in carrot

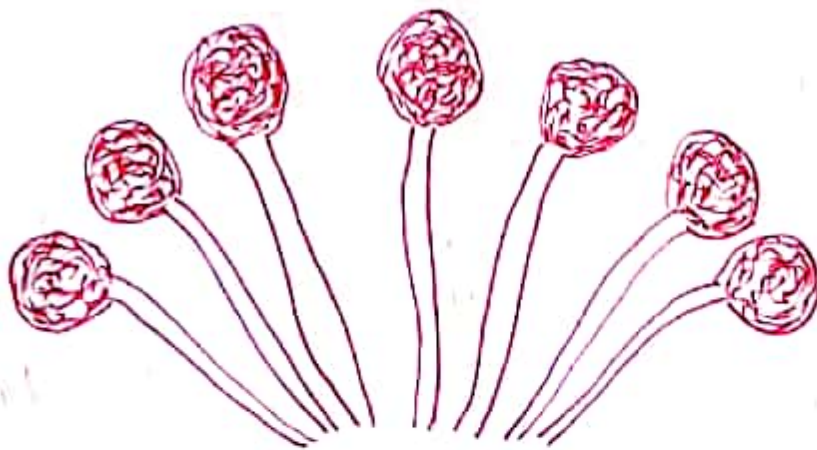


Figure → flower distortion and sterility
in onion.

(ix) Stunting → This is shown by reduction in size of leaves or other organs or of the entire plant. Stunting is frequently accompanied with rosetting. This is shown by shorter internodes

Smaller leaves and fruits. Stunting (6) with more or less resetting is characteristic of bumpy top of banana. Resulting in size also results in dwarfing.

(*) Premature defoliation and death →

Premature dropping of leaves is also a symptom of virus disease. This may also lead to premature death of the affected plant.

(2) Internal Symptoms → They include

intracellular inclusions. certain abnormal intracellular inclusions are characteristics of viral infections.

There are several different kinds of intracellular inclusions -

i) Crystalline inclusions
or
striate materials } - These occur

mainly in the cells of plants infected with tobacco mosaic virus and are usually in the form of plates of varying sizes.

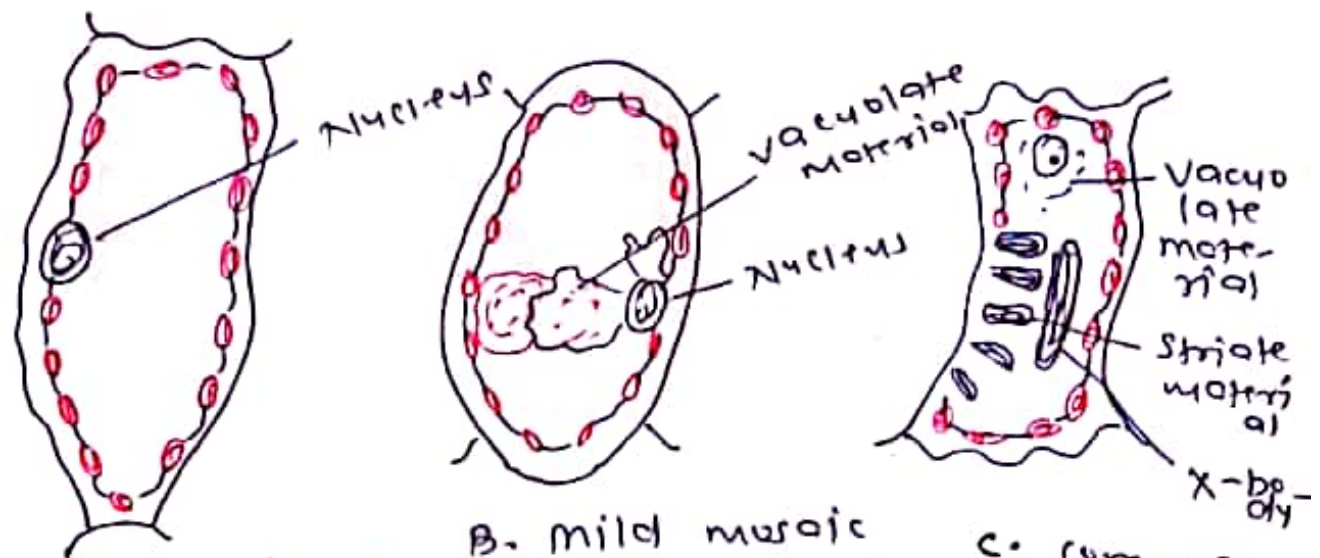
ii) Amorphous inclusion bodies → The
or
X-bodies

amorphous bodies are protoplasmic, more or less about 10 μ m in length.

They may be several in one cell. (7)

They often resemble the nucleus of the cell. In addition to the tobacco mosaic virus, these inclusions occur in all tissues of plants infected with Hyoscyamus mosaic virus.

(iii) Intranuclear inclusions → These inclusions may consist of thin rectangular plates and usually several in each nucleus or of isomeric crystals. They are common in nuclei of leguminous plants with the virus of pea mosaic and yellow bean mosaic.



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).

Figure → Intracellular inclusions

Other types of inclusions

(8)

A number of miscellaneous inclusions occur in the cell cytoplasm of virus infected plants. Some of them are: (i) Spherical hyaline and homogenous body called a spherule, present in the wound tumour virus-infected root tumour cells of *Rumex acetosa*. (ii) spindle shaped bodies in the virus-infected cells of *Epiphyllum*. (iii) Fusiform and variably shaped protein bodies in the cytoplasm of the virus infected epidermal cells of the leaves of *Opuntia brasiliensis*.

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