**The plant virus symptoms**

Most of the plant virus names that are commonly used today include terms that describe an important symptom in a major host or the host from which the virus was first described Some viruses, under appropriate conditions may infect a plant,

Without producing any obvious signs of disease. Others may lead to rapid death of the whole plant.

Virus infection does not necessarily cause disease at all times in all parts of an infected plant. We can distinguish six situations in which obvious disease may be absent:

1. Infection with a very mild strain of the virus

2. A tolerant host

3 .Recovery” from disease symptoms in newly formed leaves

4. Leaves that escape infection because of their age and position on the plant

5. Dark green areas in a mosaic pattern.

6. Plants that are infected with cryptic viruses.

**Plant virus symptoms importance**

1. Important for virus identification.

 2- Used to name the disease.

1. Solely can not be used to characterize the virus as affected by many factors
2. Environment, virus strain/ mixed infections, host varieties, nutrition, age, stage of infection.

**Types of Symptoms**

 Macroscopic symptoms

Microscopic/ Histological changes

Macroscopic Symptoms

1. Local symptoms

 Develops near the site of entry of the virus, Important in biological assay Size vary from small pinpoint spots to large necrotic areas generally produced in mechanical inoculaions:

 Chlorotic lesions,

Necrotic lesions,

Ring spots

Systematic symptoms :

Appear in different patterns depending upon virus-host combinations

Appear in sequential patterns and

May comprise of different symptoms



|  |  |
| --- | --- |
| Systematic symptoms  | Local symptoms  |
| 1. Mosaic | 1.Phyllody |
| 2. Mottle | 2.Enation |
| 3. Yellowing | 3.Witches broom |
| 4. Chlorosis | 4.Proliferations |
| 5. Vein clearing | 5.Stunting |
| 6. Vein banding1. Green vein banding 2.Yellow vein banding | 6.Ringspot |
| 7.Leaf roll | 7.Wilt |
| 8.Leaf curl | 8.Tumors/ galls |
| 9.Streak | Rosette |
| 10.Blistering  | Shoe stringing  |

1. **Effect on plant size**

**Stunting**

Occurs due to reduction in leaf size and inter-nodal length of the infected plant.

Depend upon stage of infection of the host. And severity of the symptoms

Stunting may affect all parts of plants

Type of host e.g. in perennial plants – takes more time; in vegetative plants effects are evident over years.

**2. Mosaic patterns and related symptoms**

The most common effect of virus infection is in the form of color patterns on leaves

1-Various colour patterns like green & dark green; green& yellow and green & golden etc.

Generally depends on different host-virus combinations

Borders between green and dark green areas may be distinct or diffused

 the patterns appear in systematic sequences.

Mosaic appears at very early stages or sometimes chlorosis also occurs.

Other patterns include

vein banding along with vein banding.

Stripes

Streaks

Variegation or breaking in petal color (consist of flecks, streaks, or diff. colors segments. In petals genearlly due to loss of anthocyanin

Patterns on fruits e.g cucumber –CMV (mottle)

**Chlorosis**:

The loss of chlorophyll from the tissues of a plant, resulting from microbial infection, e.g. viral infection, the action of certain phytotoxins, the lack of light, to magnesium or iron deficiency, etc.

**3. Yellows**

Induced by some viruses e.g. sugar beet, peach yellow, May be sight or severe; covers the whole leaf, or sometimes sectors of yellow and normal color are formed.

Yellowing:

A symptom characterized by the turning yellow of plant tissues that were once green

**4. Leaf rolling**

Downward leaf roll & leaf malformation. e.g BCMV

**5 . Ring Spot Diseases**

Ring spots are a pattern of concentric rings and irregular lines on the leaves and sometimes also on the fruit (Tobacco ring spot virus)

**6-Necrotic Diseases**

The death of tissues, organs, or the whole plant is the main feature of some diseases. Necrotic patterns may follow the veins as the virus moves into the leaf

7. Abnormalities of plants

Besides being generally smaller than normal, virus-infected plants may show a wide range of developmental abnormalities. Such changes may be the major feature of the disease or may accompany other symptoms. For example, uneven growth of the leaf lamina is often found in mosaic diseases.

8- **Witches‘ broom**

An abnormal form of plant growth characterized by profuse outgrowth of lateral buds to give a broom like appearance

1. **Rosette**: An abnormal condition in which the leaves form a radial cluster on the stem.