

# CUCURBITS

## Cucumber mosaic

Affects most cucurbits but rarely affects watermelon.

Etiology: *Cucumber mosaic virus (CMV)*.

The virus particle is isometric.

Symptom:

- New growth is cupped downward, and leaves are severely mottled with alternating light green and dark green patches.
- Plants are stunted, reduction in internode length reduction in leaf size and petiole. Such plants seldom produce fruit.
- Fruits are covered with wart like projections and distorted.
- Severely affected cucumber fruit may be almost entirely white (white pickle).









## Mode of spread and survival:

The virus is transmitted through sap and rarely through seeds. Aphids and cucumber beetles (spotted and striped) transmit the virus. The reservoir hosts are banana, corn, passion fruit, safflower, spinach, sugar beet, wild cucumber...etc.

## Management:

🍌 Eliminate the reservoir hosts as possible by avoiding double cropping.

🍌 Eradication of weed hosts.

🍌 Infected plants should be pulled out and destroyed.

🍌 Use aluminum mulch to repels aphid vectors.

🍌 Vectors should be controlled by spraying with suitable insecticides.

🍌 Use resistant varieties.

## Other virus diseases

1. Watermelon mosaic : *Watermelon mosaic virus*
2. Squash mosaic : *Squash mosaic virus*
3. Ring spot virus : *Tobacco ring spot virus*
4. Bitter gourd mosaic : Virus
5. Bottle gourd mosaic : *Cucumber green mottle virus*
6. Ripped gourd mosaic : *Cucumis virus 3*
7. Snake gourd mosaic : *Cucumber mosaic virus*
8. Yellow mosaic : *Yellow mosaic virus*
9. Cucumber green mottle mosaic : *Tobacco mosaic virus*
10. Yellow vein mosaic of pumpkin : Virus
11. Vein banding of watermelon : *Vein banding virus*



## Watermelon Mosaic

It affects watermelon, muskmelon and cucumber.

Causal agent: *Watermelon mosaic virus* (WMV).





Symptoms:

- All parts of the plants are affected.
- Symptoms depend on the host and plant age.
- On **watermelon and muskmelon** plants, symptom includes stunting, leaf malformation, blistering, yellow or light green mottling and marginal chlorosis.
- When young plants infected, the yield will be reduced. Watermelon fruits on infected vines are dwarfed, mottled or spotted.
- On **cucumbers**, a fine uniform green to dark green mosaic symptoms appear on leaves. Fruits produced are small, curled and sometimes knobby.

## Mode of spread and survival:

Various reservoir hosts serve as a source of the virus for primary disease cycles. *Water Melon Mosaic Virus* is mostly transmitted through aphids in a non-persistent manner. It is transmitted by mechanical inoculation and is not transmitted by seeds.

## Management:

-  Avoid reservoir host.
-  Removal and destruction of infected plants.
-  Reduce the spread by aphids by using aphid-repellant mulch and oil sprays.
-  Aluminum foil repels aphids and reduce the spread of aphid-borne viruses.

## Squash Mosaic:

This affects watermelon, muskmelon, squash, cucumber and pumpkin.

Causal agent: *Squash mosaic virus*

Symptoms:

- Symptoms of vein clearing and chlorotic spotting of younger leaves will be seen.
- Then leaves tend to cup upward and develop a mottling of light and dark green areas.
- A characteristic symptom on squash plants is the presence of filiform leaves with regular marginal projections from the veins.
- The leaves become severely distorted. In advanced stages enations develop on the lower leaf surface. Fruit are malformed with raised dome-like swellings.



**Figure 10. Distorted squash leaf infected with a mosaic-type virus.**

## Mode of spread and survival:

Can survive in infected seed, in cucurbit weed hosts and in beetles. It is transmitted by cucumber beetle in a non-persistent manner. It is not transmitted by pollen.

## Management:

🍈 Minimize seed transmission, eliminate the reservoir virus hosts and control beetle vectors before they transmit the virus.

🍈 Seed should be produced where Squash Mosaic Virus is not prevalent.

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## Ring Spot

It affects muskmelon, watermelon, squash and cucumber.

Causal agent: *Tobacco ring spot virus* (TRSV).

Symptoms:

- **Muskmelon** – Stunting, yellowing, mosaic mottling and malformation.
- The spots have definite pin-point centre that appear to be water soaked.
- Definite rings often develop. Fruit set and size are limited. Symptoms become masked after plants have been infected for several weeks.
- **Watermelon** – Severe stunting and chlorosis. Vine tips frequently assume an upright position.

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- Leaves display a coarse mottle. Infected leaves and stems are brittle. Do not produce marketable fruit.
- Fruit may be warty and may exude viscous liquid at affected areas.
- **Squash** - Severe stunting, distorted leaves, vein-clearing and blistering.
- Ring spots and yellow patches are associated with veins.
- In **Cucumber** leaves, the first symptom is appearance of yellow spots about the size of a pinhead.
- The spots remain unchanged for 4 to 5 weeks.
- New leaves are mottled, which may be indistinguishable from the mottle caused by CMV.
- But the fruit becomes mottled.

## Mode of spread and survival:

Tobacco Ring Spot Virus survives in cucurbit plants, weed host plants, in infected seed and possibly in the nematode vector, *Xiphinema americanum*.

Other vectors are mites, tobacco thrips, grass hoppers and tobacco flea beetles.

Mechanical transmission also takes place.

In squash, transmitted by infected pollen during pollination.

## Management:

🥒 Reservoir hosts around the crop field are to be destroyed by herbicide treatment.

🥒 The disease spread can be reduced by soil fumigation to control the nematode vectors.



## Bitter gourd mosaic

Causal agent: Virus.

- Scattered, small, irregular yellowish patches are seen on the leaves. Leaves show vein clearing.
- Severely infected plants show reduction in their size and elongation and/or suppression of one or two lobes.
- Young developing leaves are completely distorted, filiform and malformed with considerable reduction in their size.
- Some of the leaves show shoe-string effect. The virus is not sap transmissible.
- Transmitted by Aphids.

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- Spraying the crop with Monocrotophos 0.05 % or Phosphamidon 0.05 % at 10 days interval kills aphid vectors and reduce the disease incidence.
- Spraying with mineral oil (Krishi oil) 5.0 % minimizes the disease spread.



### **Bottle gourd mosaic:**

Causal agent: *Cucumber green mottle mosaic virus* (CGMMV). The symptoms are irregular light green or dark green mottling, occasionally with pale, yellow chlorotic areas on the leaves. It is sap transmissible. It attacks bitter gourd and cucumber.

### **Ribbed gourd mosaic:**

Causal agent: *Cucumis virus 3*. It occurs in India. The disease is characterised by light and dark green mosaic mottling, downward curling of leaf margins and general stunting in plant growth. Affected plants bear only few flowers and fruits; The virus is found to be transmissible by sap.

# BOTTLE GOURD





## **Snakegourd mosaic:**

Causal agent: *Cucumber mosaic virus*.

It occurs in India. The disease is characterised by a mosaic pattern of irregular dark green and yellow chlorotic patches on the lamina. The affected plants are stunted, produce few flowers and show leaf crinkling. Disease is transmitted by mechanical inoculation and by insect vectors, *Aphis gossypii* and *Myzus persicae*. It infects *Cucurbita pepo* (summer squash) also.

## **Yellow mosaic:**

Infected plants exhibit a striking yellow vein mosaic in leaves. It has been reported from India. *Bemisia tabaci* transmits the disease. It infects pumpkin and ribbed gourd.



## **Cucumber green mottle mosaic:**

The virus infects bottle gourd, cucumber, pumpkin, ridge gourd, snake gourd, squash and watermelon.

A strain of *Tobacco mosaic virus* (TMV).

Slight clearing of veins and crumpling of young leaves, followed by a dark or light green mottle, together with blistering and distortion of the leaves and stunting of the plant. Yellow flecks on leaves showing green mottle is a prominent symptom on fully developed leaves. The fruit is slightly mottled. Easily sap transmissible and is also transmitted through seeds. Seeds from healthy plants should be used for sowing. Sanitation is necessary.



## **Yellow vein mosaic of pumpkin:**

The virus infects Cucumber and Snakegourd.

The characteristic symptoms of this disease are yellowing of the veins and mosaic. Initially the virus causes vein clearing on the young leaves. Later on, mosaic symptoms are produced on the leaves. Leaves become smaller. Fruits are small and deformed.

The disease is transmitted by sap and by whitefly.

Straw mulching delays the onset of infection.

The disease spread can be reduced by spraying with Monocrotophos 0.05 %.

## Mycoplasma diseases

1. Phyllody of chow chow : MLO
2. Cucurbit phyllody : MLO
3. Bitter gourd witches' broom : MLO

## Phyllody of chow chow:

- Mycoplasma-like organism.
- The disease is characterised by shortening of internodes and reduction in floral pedicels.
- The flowers develop abnormality.
- Floral parts are transformed into green leaf-like structures.
- The ovary turns into long petiole-like outgrowth. Stamens and stigma become thick and leaf-like.
- Infected plants do not bear fruits.
- The disease is only transmitted by grafting.
- No insect vector is known.

## Cucurbit phyllody:

- Mycoplasma-like organism.
- Phyllody is observed in bitter gourd, bottle gourd, cucumber, ridge gourd and snake gourd
- The symptoms are shortening of internodes and phyllody of normal flowers. Transformed into green leaf-like structures.
- Infected plants become dull pale and stunted.
- The disease is transmissible by grafting and leaf hopper.
- Infected plants should be removed from the field as and when noticed.
- Spraying with systemic insecticides at 10 days interval to control the insect vector.

## **Bittergourd witches' broom:**

- Mycoplasma-like organism.
- Malformation and proliferation of axillary buds.
- Many abnormal little leaves.
- Many flowers are produced and they blossom earlier.
- Internode bud sprouts and give many bud-like chlorotic leaves arising from internodes.
- Flowers are green and phylloid.
- Fruits are small, cylindrical and deformed and have no seeds.
- The causal agent of the disease is not transmitted through sap.
- Leaf hopper has been suspected as insect vector.
- The disease is easily transmissible by grafting.

- Application of carbofuran @ 1.5 kg/ha at the time of sowing followed by 5 or 6 foliar sprays of Phosphamidon or Monochrotophos or Methyl demeton at 10 days interval controls the vector.
- Spraying of Oxytetracycline hydrochloride solution at 500 ppm at weekly interval to suppress the symptoms.

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