

Tomato



Important diseases in Tomato

1. Damping off : *Pythium aphanidermatum*,
P.debaryanum, *P.ultimum*
Phytophthora nicotianae var.
parasitica
Rhizoctonia solani
2. *Fusarium* wilt : *Fusarium oxysporum* f.sp. *lycopersici*
3. *Verticillium* wilt : *Verticillium dahliae*, *V. albo-atrum* &
V.tricorpus
4. Root rot and fruit rot : *Corticium solani*
5. Early blight : *Alternaria solani*
6. Late blight : *Phytophthora infestans*
7. Buck-eye rot : *Phytophthora nicotianae* var. *parasitica*
8. Grey mould : *Fulvia fulva* (*Cladosporium fulvum*)

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9. ***Septoria* leaf spot : *Septoria lycopersici***
10. **Bacterial wilt : *Burkholderia solanacearum***
11. **Bacterial canker : *Clavibacter michiganense* subsp.
*michiganense***
12. **Bacterial leaf spot : *Xanthomonas vesicatoria***
13. **Tomato mosaic : *Tomato mosaic virus***
14. **Tomato spotted wilt : *Tomato spotted wilt virus***
15. **Leaf curl : *Tobacco leaf curl virus***
16. **Tomato big bud : Mycoplasma - like organism**
17. **Marginal flavescence : Mycoplasma - like organism**

1. Damping off

Etiology: *Pythium aphanidermatum*, *P.debaryanum*,
P.ultimum, *Phytophthora nicotianae* var. *parasitica*
Rhizoctonia solani

Symptoms:

- The disease attacks the seedlings **before or after** the seedlings' emergence from the soil.
- The affected seedlings become **pale and suddenly collapse.**
- The basal **cortical region** begins to rot, resulting in **toppling** of the seedlings.
- **Dark brown lesions are** found on stem and the affected tissues soon become **rotten.**





Mode of spread and survival:

Causal organisms are **soil inhabitants** and they build up in soil with the available hosts.

Generally these pathogens **have wide host** range.

Epidemiology:

***Pythium* spp.** are active at fairly cool temperatures while ***Rhizoctonia* sp.** is more severe at slightly higher temperature. **Moist soil** is more favourable than **dry soil**.

Management:

🍅 Seed treatment with **Thiram or Captan** at 2g / kg or ***T. viride*** 4g / kg prevents the **pre-emergence** damping off.

🍅 For **post-emergence** damping off, the **nursery** and the **young plants** should be drenched with **Bordeaux mixture** 1.0 % or **Copper oxychloride** 2.5g / l or **Captan** at 2g / l of water.

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🍅 Nursery beds should be raised with adequate drainage facilities should be provided.

🍅 Soil application of *T. viride* or *Pseudomonas fluorescens* 2.5 kg / ha also reduce the population of all these pathogens in the soil.

🍅 Soil sterilization with Formaldehyde dust or spraying with Formalin 2.5 % was found to be effective in checking the disease.

🍅 Soil of seed beds should be treated with Methyl bromide.

🍅 Seeds should be sown in such seed beds only after three weeks of treatment.

2. Fusarium wilt

Etiology: *Fusarium oxysporum* f.sp. *lycopersici*

Mycelium is septate, hyaline, cream coloured, finally showing **ochraceous strands** throughout colony in cultures.

Microconidia are one-celled, hyaline and ovoid to ellipsoid.

Symptoms :

➤ **Yellowing of lower leaves** in initial stages and discolouration of younger leaves soon follows.

➤ The leaves **droop, wilt and die**.

➤ The disease may affect a few branches in a plant or the entire plant may **wilt** irreversibly. **Plants or branches dries up**.

➤ The **vascular bundles** become **brown**.

➤ Plants are usually **stunted in growth** and **fruits** ripen **prematurely**.







Mode of spread and survival:

- The fungus is **soil-borne and seed-borne**.
- The fungus survives in the soil as **Chlamydo spores** or as **saprophytically** growing mycelium in infected crop debris for more than 10 years.
- One of the chief methods of its **distribution** is by seedlings raised in **infested** soil.
- Drainage water and agricultural **implements** also help in distribution of the pathogen from field to field.

Epidemiology:

Favoured by alternating **high and low soil temperatures** and **high humidity** levels.

Light **sandy soil**, **low soil moisture level**, **low pH level** and **a low RH** also favours the disease.

Root-knot nematodes increases the infection in resistant varieties also.

Management:

- 🍅 **Healthy seeds** should be planted in disease and nematode-free soil.
- 🍅 Seed treatment with **Carbendazim** 2g/kg.
- 🍅 Soil application of ***T. viride*** @ 2.5 kg/ha.
- 🍅 Application of **Carbendazim** 0.1 %, **Benomyl** 0.2 % as soil drench.
- 🍅 The infected plants should be **removed and destroyed**.
- 🍅 Resistant varieties can be grown.
- 🍅 **Crop rotation** helps in reduction of the inoculum.

3. Verticillium wilt

Etiology: *Verticillium dahliae*, *V. albo-atrum* & *V. tricorpus*

Conidiophores are erect, hyaline, verticillately branched, 2 to 4 phialides at each node.

Conidia arise singly at the apices of the phialides, ellipsoid to irregularly sub-cylindrical, hyaline, mainly aseptate

Symptoms:

- Affected plants are **stunted** in growth and leaves develop dark green patches followed by **inter-veinal** and **marginal** yellowing.
- Leaves **wilt ,dry** and eventually fall.
- A **brown discolouration** can be seen in the **xylem vessels** on cutting through the **stem or roots**.

- Many **adventitious roots** develop at the base of the stem of diseased plants.
- ***Verticillium*** infected plants can be identified by the **lighter brown colour of the infected vascular** tissue.
- ***Verticillium*** spp. prefer **heavy soils**.
- The **nematode** incidence may increase the disease.
- Tomato plants can be infected by both ***Fusarium*** and ***Verticillium*** pathogens at the same time.





Mode of spread and survival:

The fungi survive in the soil on **diseased plant debris** and infect healthy plants by **contact with roots**.

Furrow irrigation, organic manure and tillage spread the pathogens.

Epidemiology:

Disease development is favoured by **alkaline soil**.

Infection is favoured initially **by low soil and air temperatures**.

Low nitrogen nutrition reduces disease severity.

Management:

- 🍅 Soil fumigation with 1:1 mixture of Methyl bromide and Chloropicrin lowers the disease incidence.
- 🍅 Crop residues should be ploughed deep and clean seeds are to be sown.
- 🍅 Highly susceptible crops like potato, cotton and egg plant should not be included in the rotation.
- 🍅 Polyethylene mulching reduces wilt effectively.

4. Root rot and fruit rot

Etiology: *Corticium solani*

Symptoms:

- Infection starts at soil level and a brown rot extends a little above and below the soil.
- The infected area is covered with cottony white mycelial strands in which sclerotia are embedded.
- A soft rot with white mycelia and brown sclerotia form on fruits
- Affected plants wilt and die but do not shed their leaves.

Mode of spread and survival:

The **sclerotia** are spread by **wind, irrigation water, farm tools, implements, rain and various cultural practices** and they can survive on the soil surface for about **12 to 16** months in crop residues and on weed hosts.

Epidemiology:

Development of disease is favoured by **high to moderate temperature and humidity** and light **sandy wet soils**.

Disease incidence increases when **wet weather** follows a long dry period.

Shaded and crowded plants also lead to high incidence.

Management:

- 🍅 Main sources of inoculum should be removed or ploughed deep.
- 🍅 Mechanical injury to plants should be avoided as injuries by insects and nematodes provide entry for the pathogen into the plant.
- 🍅 Staking should be done to keep fruits above soil level.
- 🍅 Solar heating of the soil using polyethylene sheets is very effective.
- 🍅 Rotation with cereals helps to control the disease.
- 🍅 Soil application of *T. viride* or *P. fluorescens* @ 2.5 kg / ha

5. Early blight

In severe attack ,the loss may be upto 80 per cent.

Etiology: *Alternaria solani*

Mycelium is septate, branched, light brown which become darker with age.

Conidiophores are dark coloured.

Conidia are beaked, muriform, dark coloured and borne singly ,with 5 to 10 transverse and a few longitudinal septa are present.

Symptoms:

- Leaves show circular to **angular, dark brown** to black spots with **characteristic concentric rings** are found.
- The spots **coalesce and cause drying** of leaves.
- Dark spots are found at the stem base, **girdle**.
- On the fruit, dark brown **sunken spots** are found.
- **Shedding** of immature fruits also occur.







Epidemiology:

Plants grown under **high soil moisture** and **high atmospheric humidity** are highly susceptible.

Water stress, insect injuries and **sandstorms** favours the disease.

Mode of spread and survival:

The pathogen is spread by **wind and rain splashes**.

Under **dry** conditions, it survives in **infected plant debris** in the soil for up to **three years** and **is also seed-borne**.

Management:

- 🍅 Disease **free seeds** should be used for sowing.
- 🍅 Soaking of seeds in **Thiram** 0.2 % or seed treatment with **Thiram** 2g/kg
- 🍅 Three sprayings with **Difolatan** 0.2 % or **Mancozeb** 0.2 % or **Zineb** 0.2 % or **Carbendazim** 0.2 % or **Benomyl** 0.1 % at fortnightly interval.
- 🍅 Infected plant debris should be removed.
- 🍅 Three year rotation with **non-solanaceous crops** is recommended.
- 🍅 Heavy doses of **nitrogenous fertilizers** and dense planting should be avoided.
- 🍅 Irrigation should be given at regular intervals to **avoid water stress or stagnation**.

6. Late blight

Etiology: *Phytophthora infestans*

Mycelium is hyaline and **coenocytic**.

Sporangiophores are slender, hyaline, branched and relatively thick walled, branches showing bulbous enlargements at intervals.

Sporangia are multinucleate, thin walled, hyaline, oval or pear shaped with a distinct papilla at the apex.

Zoospores are biflagellate.

Symptoms:

- Leaves, stems and the fruits are attacked.
- The symptoms are **most prominent** on the **leaves** which appear in the form of **water soaked lesions** with pale green patches.
- Margin has **whitish mildew** like growth.
- Under humid weather, **blighting of foliage** is common.

- Early **russet, brown marbled** areas appear on the green fruits which becomes completely brown and shrivelled.
- When the fruit is **cracked**, a weft of fungus appears in the fruit and results in **soft rot**.

Mode of spread and survival:

The pathogen survives in **diseased crop debris** under wet condition.

Epidemiology:

The disease occurs in **rain fed crops**, where **dew** is frequent.

It develops quickly in **rainy** seasons and in **high humidity conditions**.



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Management:

🍅 **Field sanitation** and destruction of diseased plant materials reduce the crop loss.

🍅 **Overhead irrigation** should be avoided.

🍅 The disease can be controlled by adequate spraying with **Mancozeb** 0.2 % or **Captafol** 0.2 % or **Zineb** 0.2 % at 3 to 7 days interval.

7. Buck-eye rot / Stem rot / Fruit rot

Etiology: *Phytophthora nicotianae* var. *parasitica*

Sporangiophores are thinner, irregularly or sympodially branched.

Sporangia are papillate, broadly ovoid, ellipsoid or pyriform to spherical.

Fungus produces **oospores**.

Symptoms:

➤ **Brownish, circular spots with numerous concentric rings** appear on immature green fruits at the blossom end.

➤ The fruits remain **firm and retain their shape**. The old affected fruits **rot and drop**.





Mode of spread and survival:

- The fungus survives in the soil in the form of **resting spores** from one season to another.
- The pathogen is **soil-borne** and internally **seed-borne**.
- It is spread **by splash transmission of soil** or when fruits come into **contact** with the ground.

Epidemiology:

Disease is common in **poorly drained** fields.

Conditions of **high humidity** favour disease development.

Rainfall is the most important factor for the development of the disease.

Management:

- 🍅 Good drainage facilities minimizes the infection.
- 🍅 Avoid soil splash by removing lower leaves and fruits.
- 🍅 Avoid the contact of fruits with soil by staking or mulching.
- 🍅 Selection of light soil for cultivation and adoption of crop rotation helps in the control of disease.
- 🍅 Weekly spraying with Captafol 0.2 % or Chlorothalonil or Zineb or Mancozeb or Bordeaux mixture 0.8 % for up to six weeks controls the disease.
- 🍅 Combination of mulching and Difolatan 0.3 % sprays can be recommended.

8. Grey mould / Leaf mould / Black mould

Etiology: *Fulvia fulva* (*Cladosporium fulvum*)

Mycelium is septate, branched and hyaline

Conidiophores are branched and bear conidia at the apex.

Conidia are continuous or one septate, oblong and dark.

Symptoms:

➤ **Pale yellowish patches** develop in the leaves' upper surface and the corresponding areas below become covered with a light **greyish** or pale brown **velvety mould-growth** consisting of **fungus** and **spores**.

- The spores first produced are readily dispersed and cause new centers of infection.
- Later the yellow patches turn darker and finally become reddish-brown.
- The fungus also may develop a violet colour.
- The attacked leaves wither and die, but do not drop off.
- In severe cases, the flowers are attacked.
- The fungus causes internal blackening of the fruit.



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Mode of spread and survival:

- **Conidia** remain viable for nine months.
- The pathogen is seed-borne.
- The spores of the fungus are readily distributed by currents of **air, insects, the clothing of workers** and by other means.
- They are very resistant to **dryness** and **low temperature**.

Epidemiology:

The optimum **temperature** for development of the disease is about **22°C**.

High humidity is essential for disease development. The disease spreads rapidly during **humid and rainy seasons**.

Management:

🍅 Spraying with Bordeaux mixture 1.0 % or

Mancozeb 0.2 % is helpful in reducing the disease.

🍅 Resistant varieties may be grown in areas where disease appears in an endemic form.

9. Septoria leaf spot / Defoliation disease

Etiology: *Septoria lycopersici*

Mycelium is septate, branched, hyaline when young and darkens with age.

Pycnidia are erumpent.

Pycnidiospores are filiform, hyaline and 3 to 9-septate.

Symptoms:

➤ Small **round, circular spots** with a **grey centre** and dark margin appear on the leaves.

➤ During rainy weather, **complete defoliation** may occur.

Stems and flowers are sometimes attacked. **Fruits** are rarely attacked.





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Mode of spread and survival:

- The pathogen is spread by **rain splash, wind, water, insects** and on the hands and **clothing of tomato pickers**.
- It survives from one season to the next on infested crop **debris** and also on **solanaceous weeds**.
- The fungus also survives on or **in the seed**.
- Seed stocks contaminated** with spores produce infected seedlings.

Epidemiology:

Disease development is favoured by conditions of **persistent dew** or long periods of **high humidity at 25°C**.

Management:

🍅 **Crop rotation** excluding susceptible host like potato and brinjal should be accomplished.

🍅 Infected crop **debris** should be destroyed.

🍅 Seed treatment with **Thiram or Mancozeb** or **Zineb** at 2g / kg of seed is useful in checking seed-borne infection.

🍅 Spraying with **Zineb 0.2 % / Mancozeb 0.2 % / Copper oxychloride 0.3 % / Bordeaux mixture 0.8 %** at 10 days interval controls the disease.

10. Bacterial wilt / **Southern bacterial wilt**

In India loss may be up to 90.6 %

Etiology: *Burkholderia solanacearum*

The bacterium is gram negative, rod-shaped, often occur in pairs, motile with 1 - 4 polar flagella.

Symptoms:

- Young plant shows **a rapid wilting and yellowing.**
- Affected plants are **stunted and downward curling** of leaflets occurs.
- Sometimes excessive **adventitious roots** are produced along the stem.
- Plants **collapse and die.**
- The **xylem may blacken** at the junction between the stem and the leaf.

➤ Further, down the stem the **whole vascular system** may be blackened and when cut, **cream coloured bacterial slime oozes** from it.

Mode of spread and survival:

- The bacterium survives in soil and they spread through **irrigation water and by transplanting** of infected seedlings.

- The bacterium survives for **3 years** in fallow and for an unlimited period in cultivated land. **Chilli, egg plant groundnut, potato and tobacco** are **alternative** hosts.

Epidemiology:

The disease is favoured by **warm temperature** and **high soil moisture** together. **Bacterial wilt** is found in a severe form during summer than during monsoon and winter seasons.

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It is serious on **sandy loam, clay and peat soils**. **Root-knot** nematodes increase the severity of the disease.

Management:

🍅 **Seeds** should not be sown in land where infected crop have previously grown.

🍅 Rotations **excluding solanaceous crops** and other hosts should be practiced.

🍅 **Bleaching powder** incorporated into the soil @10 to 15 kg / ha before transplanting.

🍅 Use **resistant varieties** whose resistance is being maintained even with variation in soil temperatures.

11. Bacterial canker

Etiology: *Clavibacter michiganense* subsp. *michiganense*

It is a non-motile rod, Gram positive and produces capsules in culture. On **beef agar**, colonies become **mustard yellow**, smooth, glistening and **butyrous**.

Symptoms:

- **Chlorosis, drying** of the leaves and **wilting**.
- **Long brownish stripes** on the stem, **shoots and petioles**
On splitting show **creamy white, yellow or reddish**
brown discoloured **cavities in the pith** and exude
bacteria.
- In **fruit**, develops '**birds eye spots**'.
- Light brown roughened centers surrounded by a **white flat halo**.
- Browning and **shrivelling of sepals** and lessens the fruit's attachment to the plant.





Mode of spread and survival:

- The pathogen is **seed-borne** and survives in diseased plant **debris**, soil-covered **crevices of wood stakes**, **posts** where tomatoes are staked and trellised.
- In soil it survives for **1 - 4 years**. It enters the plant through **wounds**.
- Spots on the fruit are probably caused by **rain splash** or **overhead irrigation** dripping from centers on stems and leaves.
- Long distance distribution is through **seed** and **seedlings**.

Epidemiology:

Influenced by various **soil and air** factors. The optimum temperature is about **28°C**. It survives in **solanaceous weed, *Solanum nigrum***. **Root knot** nematode increases the incidence.

Management:

🍅 Seeds treatment with **hydrochloric acid**.

🍅 Soil sterilization with **Methyl bromide** and three year **crop rotation** with non-hosts are recommended.

🍅 Application of 2 to 4 sprays of **Streptomycin** to the bed followed by weekly field sprays of **Copper sulphate** controls the disease.

🍅 Seeds treatment in 1.0 % **Sodium hypochlorite** followed by four weekly applications of **Streptomycin** to the crop is effective.

12. Bacterial leaf spot

Etiology: *Xanthomonas vesicatoria*

The bacterium Gram negative, short rod-shaped and has a single polar flagellum. Capsules are formed. On nutrient agar, colonies are yellow, circular with entire edges, wet, shining.

Symptoms:

- Small **translucent water-soaked spots** which enlarges into circular dark **brown to black, greasy** spot surrounded with **yellowish borders**.
- Severe spotting may cause **distortion and death** of the leaflets.
- The lesions are large, **black and canker - like** on the stem and petiole.

➤ Spots on the green fruits are corky and resemble scabs with irregular margins.

Mode of spread and survival:

- The pathogen is seed borne and survives in the diseased plant debris, volunteer plants.
- The bacterium enters through stomata or injuries and lenticels.
- Secondary spread through rain splashes.
- Disease spreads to new areas through infected seeds and diseased transplants.

Management:

🍅 Seeds should be treated with hot water at 50°C for 25 min or immersed in 0.1 % Mercuric chloride for 5 to 7 min.



Figure 5. Bacterial spot on tomato foliage



13. Tomato mosaic

Etiology: *Tomato mosaic virus* (ToMV)

Virus particles are rod shaped, not enveloped and usually straight.

Symptoms:

- Light and **dark green mosaic mottle** with raised dark green areas and **crinkled** younger leaves.
- Plants are **stunted**.
- Leaves may be distorted to a **'fern leaf' or tendril shape**.
Yellowing or **'aucuba' mosaic leaf mottling**.
- Longitudinal **necrotic streaks** on stems or petioles. In this case, the plant dies.
- Necrotic **sunken lesions** on the fruits and sometimes with mature fruit **internal necrosis** or browning occurs.





Mode of spread and survival:

- The virus is **seed-borne** and found on the outside of the seed, sometimes in the **endosperm** but not in the embryo.
- The virus infection occurs during transplanting. It is readily **sap transmissible**.
- Many **solanaceous plants** are susceptible to ***Tomato mosaic virus***.
- The virus is spread easily by **man and implements** in cultural operations or by **animals** and by **leaf contact**.
Infection is through roots.

Management:

🍅 **All old crops of tomato** and hosts should be destroyed before planting.

🍅 Avoid **solanaceous crops**, 4 to 6 months before raising tomato crop.

🍅 Volunteer plants and weeds should be removed and diseased plants rogued and destroyed.

🍅 **Use virus-free seeds**. Seeds should be soaked for 15 to 20 min in 10 % solution of Na_3PO_5 (**Sodium Perphosphate**). Internal virus can be removed by heat treatment for 2 to 4 days.

🍅 **Nursery beds** should be sterilized properly.

🍅 Field workers should avoid using tobacco products.

🍅 If they remove diseased plants they should wash their hands in 3 % solution of Tri-sodium phosphate or soap before touching any healthy plant.

🍅 The virus has been controlled with 'attenuated virus' *i.e.*, by inoculating tomato seedlings with mild strain.

14. Tomato spotted wilt / Bronzy wilt

Etiology: *Tomato spotted wilt virus* (TSWV)

Viruses are isometric particles.

Symptoms:

- Thickening of the veins of the younger leaves accompanied by **one or two concentric rings**.
- Young leaves **curl slightly** downwards and inwards.
- Later **bronzing** of the leaves takes place.
- This bronzing may cover the leaf surface completely.
- Then yellowish **mosaic mottling** of the leaves develops.

- The pale areas are of the most varied shapes, ranging from an **irregular mottling or blotchiness** to distinct concentric circles.
- Fruits are reduced in size with loss in weight.
- Shape is affected and **locule numbers** are reduced with practically **no seed in fruits** of early infected plants.
- Infection leads to reduction in seed recovery, germination, shoot length, vigour index and productivity.
- **Lycopene** content is also reduced.





Mode of spread and survival:

- **Adult thrips** are **unable** to pick up the virus .
- The virus must be acquired by the **larval form first** and the subsequent adult can then transmit the virus.
- The virus is transmitted by **sap and by grafting**.

Management:

- 🍅 Removal and **destruction** of the infected plants and weed hosts.
- The virus is spread by **thrips**.
- 🍅 Insect vectors can be controlled by spraying with **Dimethoate** 0.03 % or **Methyl demeton** 0.03 % at 10 days interval.

🍅 Young plants **should not be transplanted** during the wetter and warmer months which are favourable for vector population.

🍅 ***Crotolaria juncea*** planted around the crop **acts as a barrier** and it reduces vector migration into the crop.

15. Leaf curl

Etiology: *Tobacco leaf curl virus* (TLCV)

Symptoms:

- The characteristic symptoms are **curling** and **puckering** of the leaves as also **blistering and smalling**.
- The plants are **stunted**.
- On the under surface of leaves, there will be leafy outgrowths called '**enations**' followed by **mottling** and **vein clearing** with complete or partial sterility.

Mode of spread and survival:

It is neither seed nor sap transmissible. But virus may be on the seed coat of fresh seeds. The virus is transmitted by **whitefly** and **grafting**. Even a single viruliferous insect is able to transmit the virus. The whitefly remains infective throughout its life span.



Epidemiology: The disease progresses during **February-June** when the dry hot season with low humidity prevail. The incidence may even reach up to 100 % during summer months.

Management:

🍅 The **nursery bed** should be treated with granular insecticides **like Carbofuran** @ 1.0 kg a.i. / ha at the time of sowing.

🍅 Foliar sprays of either **Dimethoate or Monocrotophos** 0.05 % or **Metasystox** 0.02 % at 10 days interval.

🍅 **Mineral oil (Power oil)** 2.0 % spray after fruit formation prevents acquisition and inoculation of the virus by **whiteflies**.

🍅 **Infected plants** should be removed as and when noticed in the field.

🍅 **Collateral hosts** of the virus and **vector** should be removed.

🍅 Growing **border or barrier crops** like maize or sorghum or Pearl millet protect the crop from virus infection.

🍅 **Yellow sticky board** traps have also been used to control whiteflies.

16. Tomato big bud

Etiology: Mycoplasma - like organism

The MLOs are found in the sieve tubes of diseased tomato leaves. The MLOs are particularly abundant in mature **sieve tubes**. They are rounded forms.

Symptoms:

- Leaves show **vein clearing** and **chlorosis**.
- Plants are stunted with **shortened internodes** and thickened stems.
- **Auxiliary shoots** proliferate.
- Leaves are **numerous, smaller, more rounded** and thinner than those of healthy plants.
- The lower sepals **join together** and enlarge to form a **swollen calyx** with bladdery form flowers.

- Occasionally leaves and auxiliary shoots show a **purple pigmentation**.
- The incidence of Phyllody, in which **flowers change into leaf-like structures**.

Mode of spread and survival:

The disease is not sap transmissible. It may be transmitted by **dodder (*Cuscuta spp.*)**, grafting and by the **leaf hopper, *Orosius argentatus***.

Management:

Diseased plants and weed hosts should **be rogued and destroyed**.



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17. Marginal flavescence

Etiology: Mycoplasma - like organism

Symptoms:

- The disease is characterised by slight **chlorosis** along the leaf margins.
- The infected leaves are small and plants show **stunted growth with short internodes**.
- Infected plants produce **numerous auxiliary branches** and give **bushy** appearance.

- The flower buds take upright position.
- As the plant ages, diseased plants exhibit rosette appearance.
- The infected plants normally do not bear fruits.

Mode of spread and survival:

The disease is neither mechanical nor seed transmitted. It is transmitted by leaf hopper, *Orosius albicinctus*. The MLO perpetuates on tomato, potato and *Datura stramonium*.

Management:

🍅 Infected plants should **be rogued** out.

🍅 Spraying with systemic insecticides like **Monocrotophos** or **Dimethoate** 0.05 % at 10 days interval effectively controls leaf hopper population and reduce the disease.

🍅 Spraying with **Oxytetracycline hydrochloride** solution of 500 ppm at one week interval is helpful in reducing the symptoms.

Minor diseases

- a) Root rot : *Macrophomina phaseolina*, *Rhizoctonia solani*, *Phytophthora* sp. *Sclerotium rolfsii* and *Pythium* sp.
- b) *Phoma* fruit rot : *Phoma destructiva*
- c) Grey leaf spot : *Stemphylium solani*
- d) Nail head spot : *Alternaria tomato*
- e) *Ascochyta* leaf spot : *Ascochyta lycopersici*
- f) Powdery mildew : *Leveillula taurica*
- g) Canker : *Didymella lycopersici*
- h) *Stemphylium* fruit rot : *Stemphylium vesicarium*
- i) *Nigrospora* rot : *Nigrospora oryzae*
- j) *Fusarium* fruit rot : *Fusarium nivale*

- k) *Cladosporium* rot : *Cladosporium tenuissimum***
- l) *Rhizopus* soft rot : *Rhizopus nigricans***
- m) *Myrothecium* rot : *Myrothecium roridum***
- n) Bacterial speck : *Pseudomonas syringae* pv.
*tomato***
- o) Bacterial soft rot : *Erwinia carotovora* subsp.
*carotovora***
- p) Black ring spot : *Tomato black ring spot virus***
- q) Tomato bunchy top : Virus**