

**TOMATO**

**SC.NAME:***Lycopersicon esculentum*

**DFHCM (2+1)**

**THEORY CLASS**

**5THSEM**

# MAJOR DISEASE OF TOMATO

## FUNGAL DISEASE

<b>Early blight</b>	<i>Alternaria solani</i>
<b>Late blight</b>	<i>Phytophthora infestans</i>
<b>Wilt</b>	<i>Fusarium oxysporum f. lycopersici</i>
<b>Damping off</b>	<i>Pythium spp.</i>
<b>Buck eye rot of tomato</b>	<i>Phytophthora nicotianae var. parasitica</i>
<b>Stemphylium leaf spot</b>	<i>Stemphylium lycopersici</i>

## BACTERIAL DISEASE

<b>Bacterial wilt</b>	<i>Pseudomonas solanacearum var. abiaticum</i>
<b>Bacterial fruit canker</b>	<i>Clavibacter michiganense subsp. michiganense</i>

## VIRUS AND NEMATODE DISEASE

<b>Tomato spotted wilt</b>	<b>Tomato Spotted Wilt Virus (TSWV)</b>
<b>Tomato Mosaic</b>	<i>Tomato mosaic virus</i>
<b>Leaf curl</b>	<b>Tomato leaf curl virus</b>
<b>Root knot nematode</b>	<i>Meloidogyne sp.</i>

# EARLY BLIGHT

- Small, isolated, scattered pale brown spots on the leaf.
- Fully developed spots are irregular, brown to dark brown in colour, and with **concentric rings inside the spot**.
- Spots coalesce to form large patches resulting in the leaf blight.
- Lowest leaves are attacked first and the disease progresses upwards.
- In severe attacks the entire plant may be defoliated.
- Zonate lesions may also develop on **stems and petioles, which break at the point of infection**.
- Brown spots are also seen on **calyx**
- Slightly dark, sunken, round to irregular lesions on fruit at the calyx end.

# EARLY BLIGHT



# Cont...

## **DISEASE CYCLE**

- P.I: Mycelium or conidia in infected plant debris.
- S.I: Conidia dispersed by wind, water or rain splashes.

## **EPIDEMIOLOGY**

- Dry warm weather alternating with the intermittent rains.
- Reduction in plant vigour and senescence.

## **MANAGEMENT**

- Maintain proper vigour of the plant.
- Use of disease free seed.
- Removal and burning of diseased crop debris
- Mancozeb@0.25% or chlorothalonil@0.2% or Zineb@0.25% spray at weekly intervals

# LATE BLIGHT OF TOMATO

## Symptom:

- Late blight of tomato is identified by black/brown lesions on leaves and stems that may be small at first and appear water-soaked or have chlorotic borders, but soon expand rapidly and become necrotic.
- Late blight infections produce dark brown, firm lesions which may enlarge and destroy the entire tomato fruit.
- Late blight lesions on tomato fruit are often followed by soft rot.

# LATE BLIGHT OF TOMATO



**Causal organism:** *Phytophthora infestans* , **Sub-division:** *Mastigomycotina*

**Disease cycle:**

- **Primary infection:** Oospore present in infected plant debris and soil.
- **Secondary infection:** Sporangia dispersed by wind or water.

**Favourable conditions**

- Cool moist conditions.
- RH: >90% and with suitable temperature (12-13<sup>0</sup> C) and optimum soil moisture (15-20% saturation).

**Management:**

- Regulatory measures.
- Grow certified seed.
- Delayed harvesting.
- Treat the seeds with Metalaxyl @ 6 g/kg.
- Soil drenching with Metalaxyl + Mancozeb (Ridomil Gold) @ 0.2% gives good control.



# **DAMPING OFF- *Pythium spp.***

## **SYMPTOMS**

- In the nursery seed rot or radicle and plumule rot before coming out resulting in poor germination (premergence damping off.).
- In seedling toppling over after emergence due to infection in roots or collar region infected tissue soft and water soaked, constriction of the stem at base and hence seedling prostrated.
- Large patches in of seedlings die.

## **MODE OF SPREAD:**

- Soil borne zoospores spread through, irrigation water.
- Favourable conditions:
- Excess soil moisture due to stagnation, high humidity, over crowding of seed rate.

## **MANAGEMENT:**

- Use of light soil for nursery, raised seed bed, light but frequent irrigation better drainage, drenching with copper fungicides at 8-10 days interval.

# DAMPING OFF



# FUSARIUM WILT

## INTRODUCTION:

- The disease is found through out the world and is serious where tomato is crop grown in the same field continuously.

## SYMPTOMS:

- Clearing of the leaf veins and chlorosis are the initial symptoms of the disease.
- Petioles and leaves of affected plants droop and wilt.
- In severe cases black discoloration of vascular tissues can be seen if the roots and stem are split open.

## Causal organism

- *Fusarium oxysporum f. sp. lycopersici* is the causal pathogen of the disease.
- The pathogen hyphae are found in the vascular tissues and are inter and intra cellular.

# FUSARIUM WILT



# CONT..

## **MODE OF SURVIVAL AND SPREAD**

- The pathogen remains saprophytically in soil.
- Survive in crop debris.
- Spread through irrigation water.

## **MANAGEMENT**

- Summer deep ploughing, destruction of left over plants, crop rotation, and removal of affected plants.
- Require of good drainage system.
- Seed treatment with Carbendazim @ 2g/kg.
- Spot drenching with Carbendazim @ 0.1%.
- Grow resistant varieties such as Kanora and Roma.

# BUCK EYE ROT OF TOMATO

## Symptom:

- Pale brown spots with concentric rings appear on fruits.
- Entire fruit may be covered by spot but remain firm unless attacked by secondary organism.
- Immature fruits shrink and are mummified.

**Causal organism:** *Phytophthora nicotianae var. parasitica*

**Sub-division:** *Mastigomycotina*

# BUCK EYE ROT OF TOMATO



## **Disease cycle:**

- **Primary infection:** Mycelium or oospore present in infected plant debris and soil.
- **Secondary infection:** Sporangia dispersed by wind or water.

## **Favourable conditions**

- Fruit come in contact with water-logged soil start the infection.
- High rainfall.

## **Management**

- Crop rotation with non host crop.
- Good soil drainage.
- Treat the seeds with Metalaxyl @ 6 g/kg.
- Soil drenching with Metalaxyl + Mancozeb (Ridomil Gold) @ 0.2% gives good control.



**VIRAL  
DISEASE OF  
TOMATO**

# TOMATO MOSAIC-*TOMATO* *MOSAIC VIRUS*

## SYMPTOMS

- The leaves exhibit alternate green and light green patches with raised dark green area and distorted crinkled younger leaves.
- The plants are stunted and leaves may be distorted to a fan leaf or tendril like.

## CAUSAL ORGANISM

- The causal virus is tomato mosaic virus which belongs to **tobamovirus** group.
- The virus particle are rod shaped, usually straight with a modal length of 300 nm and width 18 nm.
- Virions contain 5% nucleic acid and 95% protein.
- The genome is ssRNA.

# TOMATO MOSAIC



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## **TRANSMISSION:**

- The virus does not have a vector but is transmitted by mechanical inoculations, grafting, and by contact of diseased and healthy plants.
- It is transmitted externally seed infection.

## **DISEASECYCLE**

- The primary inoculum comes via seed and then spread by contact.
- Infection normally occurs during transplanting.

## **MANAGEMENT**

- Rouge out and destroy diseased plants
- Virus free seed should be obtained and used for sowing
- Seed treatment with sodium hypochloride to remove external inoculum from seed.
- Cross protection of tomato seedlings by inoculating with mild strains.
- Field workers should avoid using tobacco products while working in the field.

# LEAF CURL – TOMATO LEAF CURL VIRUS

## INTRODUCTION

- The disease is present in tomato through out India and is a major threat to tomato production.
- Due to this disease yield loss upto 85%.

## SYMPTOMS

- Affected plants remain stunted, with small chlorotic puckered leaves.
- Affected plants look bushy in the field and hardly bear any fruit.
- The mild or severe symptoms of the disease depend on the variety and strain of the causal virus.

## CAUSAL ORGANISM

- The causal virus is belongs to **family geminiviridae**.
- The virus has large number of hosts in several plant families.
- The virions are geminate, 20 x 30 nm in size.
- The genome of the virus is **ssDNA**.

# LEAF CURL – TOMATO LEAF CURL VIRUS



# CONT...

## TRANSMISSION

- The virus is transmitted by an insect vector, *Bemisia tabaci*, *a whitefly* in a persistent manner.
  - The virus is also transmitted mechanically and by grafting.
  - Several plant species in family solanaceae, leguminoceae and malvaceae are susceptible to virus infection.

## DISEASE CYCLE

- Both virus and its vector have very wide host range.
- The inoculum is present throughout the year either on cultivated crops or on weeds.
- The virus is not seed borne.

## MANAGEMENT

- Use virus-free transplants.
- Rouging of infected and infected-looking plants from field.
- Tomato fields should be cleaned up immediately after harvest.
- Spraying of Imidacloprid @ 1.5ml/lit of water

***Causal organism: Sclerotium rolfsii (Deuteromycotina)***

## **Disease cycle**

- **Primary infection – Sclerotia**
- **Secondary infection - Water**

## **Favourable Condition**

- Lack of plant vigour, accumulation of water around the stem, and mechanical injuries help in the development of this disease.

## **Management**

- Seed treatment with 2 g of Carboxin + Thiram per kg seed will help in reducing the disease.
- Spraying with Carbendazim + Mancozeb @ 0.25%.
- Collection and destruction of diseased parts and portions of the plant.