

## Major Fungal Diseases of Tomato and their Management

Mallikarjun Channappa Chitti<sup>1</sup> and Sukanya Gogoi<sup>2</sup>

<sup>1</sup>M.Sc. Student, Department of Plant Pathology, Assam Agricultural University, Jorhat, Assam

<sup>2</sup>Ph.D. Scholar, Department of Plant Pathology, Assam Agricultural University, Jorhat, Assam

### SUMMARY

Tomato is adversely affected by numerous fungal, bacterial and viral diseases. The fungal diseases are key limiting factor for the crop which leads to reduction in the yield and fruit quality. The major fungal disease, their symptoms, causal organisms, mode of spread and survival and management practices are mentioned in the article.

### INTRODUCTION

Tomato (*Solanum lycopersicum* L.) is one of the most widely grown vegetables in the world belonging to the family Solanaceae. Tomatoes are important sources of nutrients and secondary metabolites such as minerals, vitamin C and E, flavonoids, lycopene and beta-carotene. They also possess anti-oxidant property. Tomato seeds contain additional amount of minerals. The total production of tomato in the world is approximately around 181 million tonnes. China is the chief producer of tomato in the world, accounting 35% of total production, followed by India and Turkey (FAOSTAT, 2019). The estimated production in India is about 19,328 thousand metric tonnes having productivity 25 metric tonnes per hectare during 2017-18. However, the crop is known to be attacked by a number of pest and pathogens which causes substantial losses every year. The fungal diseases are more destructive than the diseases caused by the other pathogens. The major fungal diseases of tomato are discussed below.

#### Damping-off:

**Causal organism:** *Pythium aphanidermatum*

**Symptoms:** Damping-off occurs in two stages:

**Pre-emergence damping off :** Here, the seedlings are killed just before they reach the soil surface. There is complete rotting of the seedlings.

**Post-emergence damping-off :** Here, the infection occurs to the young, juvenile tissues of the collar region at the ground level. The infected tissue becomes soft and water-soaked.

#### Mode of survival and spread

*Pythium* spp. are good saprotrophs and survive for a long time on decaying plant debris. Conditions for the development of this disease are high temperature, high humidity, high soil moisture, poor aeration, high levels of nitrogen fertilizer, and closely sown seed.

#### Management

- Seed treatment with fungal culture *Trichoderma viride* (4g/kg of seed) or Thiram (3g/kg of seed) is the only preventive measure to control the pre-emergence damping off.
- Drench with Copper oxychloride 0.2% or Bordeaux mixture 1%.
- Spray 0.2% Metalaxyl when there is cloudy weather.



**Early blight/ Alternaria leaf spot/ target spot****Causal organism:** *Alternaria solani***Symptoms:** First observed on the plants as small, black lesions mostly on the older foliage. The fungus attacks the foliage causing characteristic leaf spots and blight. As the spot enlarges, concentric rings in a bull's eye pattern can be seen in the center of the diseased area. This target-board symptom aids in the diagnosis of early blight.**Mode of survival and spread :** During the winter season, the fungus survives in infected plant debris. In the soil, upto three years and is also seed-borne. The pathogen is spread by wind and rain splashes.**Management**

- Removal and destruction of crop debris.
- Practicing crop rotation helps to minimize disease incidence.
- Use of disease- free seeds for sowing.
- Seed treatment with Thiram 2g/ kg gives good protection against seed borne infection.
- Spraying the crop with Mancozeb (0.2%) gives effective disease control.

**Fusarium wilt:****Causal organism:** *Fusarium oxysporum* f. sp. *lycopersici***Symptoms:** The first symptom of the disease is vein clearing and chlorosis of the leaves. Then, yellowing of the lower leaves occurs and affected leaflets wilt and die. Infected leaves show downward curling, followed by browning and drying. At a later stage, vascular browning can be seen in stem and leaf petiole.**Mode of survival and spread :** The fungus survives in the soil as chlamydospores or as saprophytically in infected crop debris for more than 10 years. The fungus is seed and soil borne. Wind borne spores, irrigation water, and agricultural implements also help in the spread of the pathogen from field to field.**Management:**

- The affected plant should be removed and destroyed outside the field.
- Crop rotation with a non-host crop to reduce the inoculum potential for the next season.
- Spot drenching with Carbendazim (0.1%) Should be done.





**Septoria Leaf Spot:****Causal organism:** *Septoria lycopersici***Symptoms:** First symptom appear as small, water-soaked spots that soon become circular spots. Gradually the lesions develop white grayish centers with dark margins. The light-colored centers of these spots are the most distinctive symptom of Septoria leaf spot.**Mode of survival and spread :**The pathogen survives from one season to the next on infected crop debris and also on solanaceous weeds. The fungus also survives on or in the seed. Seed stocks contaminated with spores produce infected seedlings. It is spread by wind, rain splashes, and on the hands and clothing of tomato pickers.**Management :**

- Removal and destruction of the affected plant parts.
- Seed treatment with Thiram or Dithane M-45 (2 g/kg seed) is useful in checking seed-borne infection.
- In the field, spraying with Mancozeb (0.2%) effectively controls the disease.

**Gray mould:****Causal organism:** *Botrytis cinerea***Symptoms :** The most characteristic symptom is a grey furry mould covering the infected area. This mould is a mass of spores of the grey mould fungus. Watery lesion area with a light brown or tan-colored central region. Converted into a soft, watery mass within a few days. V- shaped dead lesions appear on leaves.**Mode of survival and spread :**The fungus survives in plant debris and soil. The optimum temperature for infection is between 18° and 24°C. High temperatures, above 32°C suppress growth and spore production. The high relative humidity is necessary for prolific spore production, these spores are carried by wind current.**Management :**

- Good ventilation should be provided if the crop is grown in greenhouse conditions.
- Avoid overuse of fertilizers especially nitrogen.
- Spraying crops with Bordeaux mixture (1%) or mancozeb (0.2%) helps to reduce the disease.



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