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## Status of fusarium wilt of tomato in Uttar Pradesh

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### Abstract

The tomato cultivation under protected conditions is increasing gradually in Uttar Pradesh but monoculture of crop under protected condition has resulted the appearance of soil borne diseases. So, that farmers should take precautions to protect the crop. The pathogen associated with the wilt disease of tomato is identified as *fusarium oxysporum f. sp. lycopersici*. The highest incidence was observed 26.5% in Moradabad district followed by 23.89, 13.67 and 11.53% in Meerut, Bareilly and Bulandshahr respectively.

**Keywords:** Fusarium, tomato, cultivation, gradually

### Introduction

In India, total protected cultivation area is around 28000 hectare and out of which 3500 hectares area is under greenhouse vegetable cultivation (Singh 2019). The green house technology had made the farmers to be more interested to do the cultivation of vegetables in protected area in Uttar Pradesh. Tomato crop is also been grown in different places of hills and plains in India (Sabir and Singh 213) [13]. Prevalence of changing microclimatic conditions and intensive cultivation of single crop in protected land have leads to emergence of soil borne plant diseases. Fusarium wilt caused by *fusarium oxysporum* is a serious soil borne disease of tomato Specially in western plains of Uttar Pradesh in warmer season. Therefore, present study was undertaken to estimate the prevalence status of *Fusarium* wilt of tomato in Uttar Pradesh.



**Fig 1:** Healthy tomato plant showing no symptoms inoculated with sterilized water

### Materials and Methods

A survey of different tomato protected fields and polyhouses in Meerut, Bulandshahr, Moradabad and Bareilly were carried out to record the incidence of fusarium wilt disease of tomato. Survey was conducted during May-June 2019 in protected fields, the fields was divided into four quadrants in crossway and from each quadrant, 500 plants were examined showing fusarium wilt symptoms. In polyhouse, minimum 200 plants were inspected to take the observations of fusarium wilted symptoms. The disease incidence percentage was calculated by the formula given below:

$$\text{Disease incidence (\%)} = \frac{\text{Number of diseased plants}}{\text{Total number of plants observed}} \times 100$$

Isolation of fusarium pathogen from infected tomato plant roots, collar region part of the plant was made. The infected plant material was washed with tap water to remove the surface soil and then washed again with Sterlize water. Now the sterilize pieces cut into small pieces (1-2mm) from the juncture of disease and healthy portion of roots, and collar region of the plant part with the help of sterilize blade. These small pieces were surface sterilized with 0.1% Mercuric chloride solution by dip for 10-20 seconds and then washed thrice with sterilized distilled water at the time of plating in growth chamber. These small pieces were then placed on sterilize filter paper to remove the excess moisture. The sterilized pieces were inoculated in petri plates containing sterilize potato dextrose (PDA) agar medium. 30 mg Streptomycin per liter medium was added before pouring the medium in petri plates. Inoculated plates were then incubated at 28 +2 °C in B.O.D. incubator for 48 hours. The fungal growth develop in petri plates was transferred in PDA slants by hyper tip technique method. The morphological characters of the fungus were studied on PDA slants or petri plates and on host.

Pathogenicity test - Conidial suspension along with the mycelium of the pathogen was prepared in a conical flask from cultures grown in potato dextrose broth with constant agitation on Cyclomixer at 120 rpm at room temperature for one week. After 7 days, the population in liquid broth was assessed. The population should not be less than  $2 \times 10^6$ . This solution having the population  $10^6$  was used for the root inoculation of one month old tomato seedlings of round tomato solan variety. One month old seedlings were used for inoculation, these seedlings were emerged in conidial fungal solution for 15 minutes. Inoculated seedlings were transplanted in pots containing sterilize soil mixture (1:1 sand & FYM), 10 treated seedlings were transplanted in 10 pots. For control, 10 healthy untreated seedlings were also transplanted in 10 separate pots as control. These inoculated pots were put in green house for 5 to 6 weeks, after 5 weeks the inoculated seedlings showed the fusarium wilt symptoms - yellowing of leaf, vascular necrosis and wilting of plants. After 45 days of inoculation, the inoculated plants could not survive. The control plants could not show any symptoms.

## Results and Discussion

The collected information on the incidence of fusarium wilt of tomato were compiled and presented in table. The survey data showed that fusarium wilt incidence was observed significantly high incidence varied from 11.54 - 26.51% in protected fields at all the places. The maximum incidence (26.51%) was observed in protected field in Joya - Moradabad followed by 23.89% in Chilora - Meerut, 13.67% in Gurudwara area - Bareilly and 11.54% in Khurja area Bulanadshahr. In polyhouses maximum 16.96% tomato wilt plant was observed in Dhanaura Moradabad as compare to 11.6% in Siwaya Meerut, 9.36% in Sunder Nagar Bareilly and 8.73% in Shikarpur Bulanadshahr. The fusarium wilt is known to appear in warmer area having above 30 °C soil temperature for the pathogen multiplication (Gupta and Shind 2006) [2]. During the summer in May-June in the U.P. temperature varied from 30-35 °C or more. So, that it seems that fusarium wilt is becoming the more problem in the polyhouses.

During the course of survey, the disease symptoms were observed in different polyhouse and protected fields - as yellowing of lower leaves, stunting growth, necrosis and

wilting of the plant. The wilt symptoms moved upward with the gradual extension, discolouration of vascular tissue of root and stem and finally wilt affected plants ultimately kill or die due to multiplication of pathogen in the vascular system of plant.

The culture of *fusarium oxysporum f. sp. Lycopersici* was white to pinkish in colour on PDA plate. Under microscope micro and macro types conidia were observed along with their septate hyaline mycelium. The isolated fungus was identified as *fusarium oxysporum* on the basis of its colony, morphology and microscopic features given by Booth 1971.



**Fig 1:** Inoculated tomato plant with *Fusarium oxysporum* fungus showing typical wilt symptoms

**Table 1:** Incidence of fusarium wilt of tomato under protected condition in U.P.

District	Locality	Protected condition	Disease incidence (%)
Meerut	Siwaya	Polyhouse	11.60
	Chilora	Protected field	23.89
Bulanadshahr	Shikarpur	Polyhouse	8.73
	Khurja	Protected field	11.54
Moradabad	Dhanaura	Polyhouse	16.96
	Joya	Protected field	26.51
Bareilly	Sunder Nagar	Polyhouse	9.36
	Gurudwara area	Protected field	13.67

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