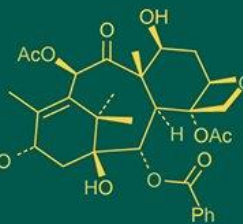
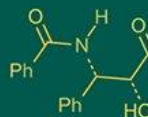


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Neelam Kumari
Department of Plant
Pathology, SHUATS, Naini,
Prayagraj, Uttar Pradesh,
India

Abhilasha A Lal
Department of Plant
Pathology, SHUATS, Naini,
Prayagraj, Uttar Pradesh,
India

Aditi Gupta
Department of Plant
Pathology, SHUATS, Naini,
Prayagraj, Uttar Pradesh,
India

First report of *Fusarium solani* causing root rot in fenugreek (*Trigonella foenumgraecum* L.) in Prayagraj, Uttar Pradesh

Neelam Kumari, Abhilasha A Lal and Aditi Gupta

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Abstract

Fenugreek (*Trigonella foenum-graecum* L.) is a leafy vegetable known for its medicinal properties, which is important economically in the national and international markets. The total Fenugreek annual production in India is 90,000 metric tons. In a survey from December 2022 to March 2023, root rot disease was observed in Prayagraj district, Uttar Pradesh. The data revealed that the disease incidence ranged was 39.14-55.67 per cent. In the second week of January to first week of February, the disease incidence was higher. The disease first appeared during January 5-6 (i.e. 15 to 17 days after sowing), became conspicuous from first week of January to first week of February and declined by the second week of February. Infected plants exhibited progressive yellowing, followed by drying and shedding of lower leaves, wilting, and reduced growth. The roots became brown and showed decay of the cortical tissues, which gradually collapsed and shriveled.

Keywords: Fenugreek, root rot, *Fusarium solani*, disease incidence

Introduction

Fenugreek is an important seed spice crop belonging to the family Fabaceae and is believed to have originated from South-Eastern Europe. India is one of the major producers of fenugreek and is considered the leading producer globally. It ranks as the third most important seed spice crop in India after coriander and cumin. The crop is cultivated over approximately 66,000 hectares, producing around 90,000 metric tonnes of seeds annually (Rani and Hegde, 2017) [7, 8]. Fenugreek possesses several medicinal properties, including antitumor, antiviral, antimicrobial, anti-inflammatory, hypotensive and antioxidant activities (Kor and Moradi, 2013) [4]. It is primarily cultivated for its seeds, which are widely used as a condiment and flavouring ingredient in various food preparations. The seeds contain diosgenin, an important steroid compound utilized in the production of contraceptive drugs. Fenugreek is also known to aid digestion and improve metabolic functions. In addition, its seeds serve as a source of alkaloids and steroids for industrial applications, while dried leaves and flowers are commonly used for enhancing the flavour of vegetable dishes (Arya, 2000) [2].

Despite its importance, fenugreek production is affected by several fungal diseases, including Cercospora leaf spot caused by *Cercospora traversiana*, root rot caused by *Rhizoctonia solani*, leaf spot caused by *Ascochyta* spp., powdery mildew caused by *Erysiphe polygoni*, downy mildew caused by *Peronospora trigonellae*, and Fusarium wilt caused by *Fusarium oxysporum* (Prasad et al., 2014) [6]. Among these diseases, Fusarium root rot has become increasingly serious in recent years, leading farmers to rely on fungicides for its management. The disease is more prevalent in young plants compared to mature plants, with seedling-stage rot incidence reported between 50–75% (Khokhar et al., 2012) [3]. The characteristic symptoms include damping-off, where newly emerged seedlings collapse and die, resulting in considerable mortality under severe infection conditions. Infected plants may also exhibit foot rot and brown canker-like lesions on roots and stems near the soil surface. The pathogen mainly infects underground plant parts but can also affect aerial tissues, seeds and hypocotyls, which contribute to spread of disease and crop losses (Acharya et al. 2014) [1].

Corresponding Author:
Aditi Gupta
Department of Plant
Pathology, SHUATS, Naini,
Prayagraj, Uttar Pradesh,
India

Materials and Methods

A survey was conducted in fenugreek-growing regions of Uttar Pradesh from the last week of December to the first week of February during the *Rabi* season of 2022–2023 to assess the incidence of root rot disease. For estimating disease incidence, one fenugreek field was selected and to ensure proper representation six sampling spots of 1 m² area were randomly marked diagonally across the field. The number of healthy and diseased plants was recorded from each spot and the percentage disease incidence was calculated using the standard formula given below.

$$\text{Percent disease incidence} = \frac{\text{Number of diseased plants}}{\text{Total number of plants observed}} \times 100$$

The disease incidence was recorded at weekly interval in the field.

Isolation of the Pathogen

Potato Dextrose Agar (PDA) medium was prepared and streptomycin (80 mg per 500 ml of PDA) was incorporated to suppress bacterial contamination. The diseased leaf tissues were cut into small pieces under aseptic conditions using scissors sterilized by flaming over a spirit lamp. The tissue segments were surface sterilized with 0.2% sodium

hypochlorite, followed by treatment with 70% ethanol and then placed on solidified PDA plates. The inoculated plates were incubated at room temperature until fungal growth appeared. The emerging fungal colonies were subsequently transferred to fresh PDA medium through repeated sub-culturing to obtain pure fungal cultures.



Fig 1: Representative fenugreek seedlings showing different levels of disease incidence, ranging from healthy seedlings (left) to severely infected and collapsed seedlings (right).

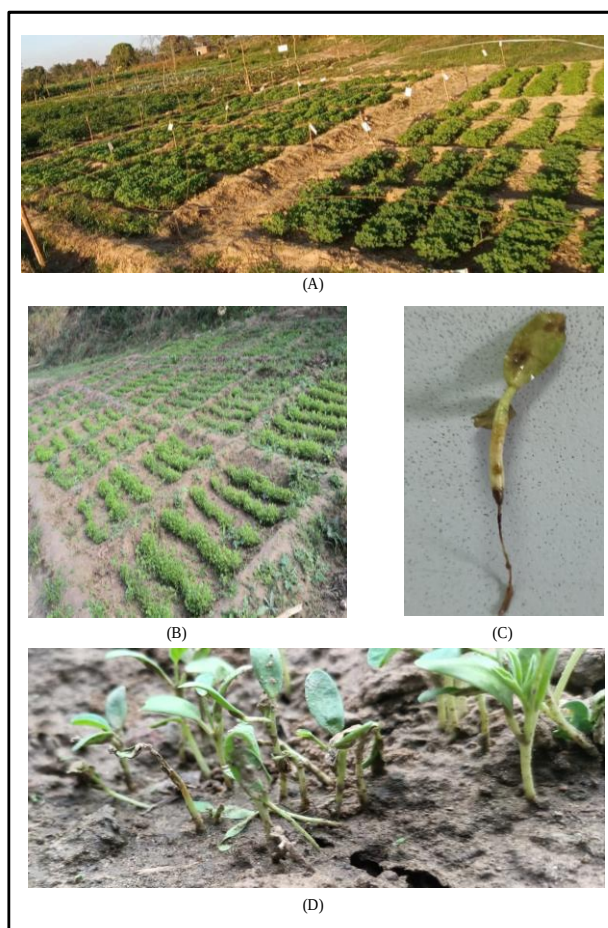


Fig 2: (A) and (B) Survey for Root Rot disease of fenugreek in Prayagraj; (C) and (D) Development of disease symptoms at seedling stage

Results and Discussion

Upon identification the fungus was found to be *Fusarium solani* based on its morphological features and cultural characteristics and its identity was confirmed by the Indian Type Culture Collection (ITCC 9247), Division of Plant Pathology, ICAR–IARI, New Delhi.

A survey was conducted to assess the occurrence of root rot disease in fenugreek during the *Rabi* season of 2022–2023 in Prayagraj district of Uttar Pradesh. The survey results indicated that the disease incidence varied from 39.14 to 55.67 per cent. The highest disease incidence was observed during the second week of January (55.67%), followed by

the February's first week (47.44%). The disease first appeared during January first week (i.e. 6th January) and disease symptoms became prominent from the first week of January to the first week of February and showed a decline by the second week of February.

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