



Management of root rot disease of fenugreek

A K Singh* & S S Rao

Indira Gandhi Krishi Viswavidyalaya, College of Agriculture & Research Station,
Boirdadar, Raigarh-496 001, Chhattisgarh.

*E-mail: singh_ajit8@rediffmail.com

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Abstract

Field experiments were conducted for two years for the management of root rot of fenugreek and it was found that maximum reduction in disease incidence (14.52% and 11.4%, respectively) was observed in the treatment where seeds were treated with carbendazim (2 g kg^{-1}) + spray at 45, 60 & 75 days after sowing during both the years. This treatment also registered maximum seed yield of 7.3 q ha^{-1} and 7.9 q ha^{-1} , respectively during the two years. The next best treatment was seed treatment with hexaconazole (2 mL kg^{-1}) + spray (0.2%) at 45, 60 & 75 DAS with disease incidence of 16.41% and 13.7%, respectively and yield of 6.8 and 7.5 q ha^{-1} , respectively.

Keywords: carbendazim, fenugreek, root rot management

Fenugreek (*Trigonella foenum graceum* L.) is cultivated throughout India and other parts of the world as leafy vegetable, condiment, for medicinal and fodder purpose. Fenugreek is rich in minerals, protein, vitamin A and C (Arya 2000). The disease caused by *Fusarium* spp. (Singh 2005) associated with seed of fenugreek and root rot disease caused by *Rhizoctonia solani* (Prakasham *et al.* 1990; Muthulaxmi *et al.* 2010) damage and cause economic loss to fenugreek crop. Therefore, experiments were conducted for two years for management of root rot in fenugreek.

Field experiments were conducted in 2010-11 and 2011-12 at Indira Gandhi Krishi Viswavidyalaya, Regional Agricultural Research Station, Boirdadar Farm, Raigarh (Chhattisgarh). The experimental site is located in between $21^{\circ}20'$ to $23^{\circ}13'$ N Latitude and $82^{\circ}55'$ to $84^{\circ}20'$ E Longitude having an elevation

of 237 m above MSL. The minimum temperature falls to 8°C during winter (December-January) and maximum temperature remained as high as $47\text{--}49^{\circ}\text{C}$ during summer (May-June). The average annual rainfall of the area is about 1200 mm, received from South-West Monsoon, mostly concentrated during July to September. The experimental soil was sandy loam with pH 6.8, 0.6% organic C, 185 kg ha^{-1} available N, 8.4 kg ha^{-1} available P and 216.6 kg ha^{-1} available K. The plot size of the experiment was $3 \times 1.6 \text{ m}$. The fertilizers were applied as 20 kg N: 40 kg P_2O_5 :40 kg K_2O . All the recommended practices were followed during the experiment. The eight treatments were T_1 - seed treatment with commercial *Trichoderma harzianum* formulation 10 g kg^{-1} of seed + soil application of *Trichoderma harzianum* (2.5 kg ha^{-1}); T_2 - Seed treatment with *Pseudomonas* formulation 10 g kg^{-1} seed + soil application of *Pseudomonas*

Table 1. The effects of various treatments on root rot incidence and yield of fenugreek

| Treatments | Disease incidence (%) | | Yield (q ha ⁻¹) | |
|--|-----------------------|-----------------|-----------------------------|------------|
| | 2010-11 | 2011-12 | 2010-11 | 2011-12 |
| T ₁ -Seed treatment with commercial <i>Trichoderma</i> formulation (10 g kg ⁻¹ of seed) + soil application of <i>Trichoderma</i> | 17.67 (24.80) | 19.3 (26.06) | 18.5 (25.43) | 6.2 6.7 |
| T ₂ -Seed treatment with <i>Pseudomonas</i> formulation (10 g kg ⁻¹ seed) + soil application of <i>Pseudomonas fluorescens</i> | 17.24 (24.50) | 20.8 (27.13) | 19.02 (25.18) | 5.8 6.4 |
| T ₃ -Seed treatment with carbendazim @ 0.2% + its spray at 45, 60 & 75 DAS | 14.52 (22.38) | 11.4 (19.23) | 12.96 (20.80) | 7.3 7.9 |
| T ₄ -Seed treatment with ridomil @ 0.2% + its spray at 45, 60 & 75 DAS | 23.49 (28.58) | 20.1 (26.64) | 21.78 (27.61) | 5.6 6.0 |
| T ₅ -Seed treatment with blitox @ 0.2% + its spray at 45, 60 & 75 DAS | 25.56 (30.33) | 28.6 (32.33) | 27.08 (31.33) | 5.2 5.0 |
| T ₆ -Seed treatment with hexaconazole @ 0.2% + its spray at 45, 60 & 75 DAS | 16.41 (23.58) | 13.7 (21.72) | 15.1 (22.65) | 6.8 7.5 |
| T ₇ -Seed treatment with propiconazole @ 0.2% + its spray at 45, 60 & 75 DAS | 19.38 (26.06) | 15.6 (23.26) | 17.49 (24.66) | 6.1 6.9 |
| T ₈ -Control | 34.05 (35.67) | 35.3 (36.45) | 34.67 (36.1) | 3.1 3.6 |
| CD (P<0.05) | 1.56 | 0.98 | 1.36 | 1.57 |

Note: Figures in the bract are transformed values

fluorescens (2.5 kg ha⁻¹); T₃- Seed treatment with carbendazim (2 g kg⁻¹) + its spray (0.2%) at 45, 60 & 75 DAS; T₄- seed treatment with ridomil (2 g kg⁻¹) + its spray (0.2%) at 45, 60 & 75 DAS; T₅- Seed treatment with blitox (2 g kg⁻¹) + its spray at 45, 60 & 75 DAS; T₆- Seed treatment with hexaconazole (2 mL kg⁻¹) its spray (0.2%) + at 45, 60 & 75 DAS; T₇- Seed treatment with propiconazole (2 mL kg⁻¹) + its spray 0.2% at 45, 60 & 75 DAS and T₈ control. The treatments were laid out in randomized block design with three replications. The formulations of *Trichoderma* and *Pseudomonas fluorescens* were obtained from AICRP on Spices, ICAR-IISR, Kozhikode. The seeds were treated with *Trichoderma* and *Pseudomonas* kept for 72 h for proper colonization in shade conditions before sowing (Jeyrajan *et al.* 1991). Bioagents @ 10 g of talk base formulation + 1 kg of FYM were kept for 7 days under shaded conditions (25-28°C) and then applied to the soil at the time of sowing in last week of November 2010-11 and 2011-12. Spraying of fungicides was done as per schedule. Data were recorded for disease incidence after 25 days of application of fungicide. Per cent disease incidence was calculated using the formula $(Y / X) \times 100$; where, Y=No. of diseased plants; X=Total no. of plants plot⁻¹.

The study revealed that maximum reduction in disease incidence (14.52% and 11.4%, respectively) was observed in both the years in the treatment where seed treatment with carbendazim @ 2 g kg⁻¹ + its spray at 45, 60 & 75 days after sowing (DAS). This treatment was significantly superior to all the treatments except hexaconazole with maximum seed yield of 7.3 q ha⁻¹ and 7.9 q ha⁻¹ in the year 2010-11 and 2011-12, respectively (Table 1). This was followed by treatment where seed treatment with hexaconazole @ 0.2% + spray at 45, 60 & 75 DAS. In other treatments the disease incidence ranged between 17.24-25.56% and

13.7-28.6% in the year 2010-11 and 2011-12, respectively which was significantly lower than untreated control (34.05% and 35.3%, respectively) (Table 1). Seed treatment with carbendazim increased the germination and caused minimum pre- and post-emergence mortality (Singh *et al.* 2005). Seed and soil treatment with *Trichoderma* for the management of root rot of fenugreek was reported to be better (Muthulaxmi *et al.* 2010). Soil drench by carbendazim or quintazone was effective in managing root rot of fenugreek caused by *Rhizoctonia solani* (Prakasham *et al.* 1990). The use of *Trichoderma* and neem cake to manage root rot disease was reported by Chhata & Verma (2010). The present findings clearly indicated the importance of bio agents in combination with fungicides for the control of root rot disease in fenugreek.

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