

Original Research Article

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Reaction of Fenugreek Varieties against *Rhizoctonia solani*, causing Root Rot Disease

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ABSTRACT

Keywords

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Root rot of fenugreek (*Trigonella foenum-graecum* L.), caused by *Rhizoctonia solani* has become an important constraint to the growers of fenugreek in Rajasthan. Eight varieties of fenugreek viz., RMT-1, RMT-143, RMT-303, RMT-305, RMT-351, RMT-354, RMT-361 and Local variety were tested against *Rhizoctonia solani*, the reaction of RMT 354 and RMT-361 were observed to be moderately resistant against root rot and rest of the varieties were rated as susceptible. RMT-305 and Local were highly susceptible to the disease.

Introduction

Fenugreek (*Trigonella foenum-graecum* L.) commonly known as 'Methi' has tremendous importance in the life of human beings as a food, medicine and belongs to family *Fabaceae*. It is commercially cultivated for seeds, which are used as condiments and as a flavoring agent for relishing food preparations. Its seeds contain important steroid 'diosgenin' which is used in preparation of contraceptives. It is believed that fenugreek stimulates the digestive process as well as metabolism in general. In

industry, seeds are used for extraction of alkaloids and steroids. The dried leaves and flowers are also used for flavoring vegetable curries (Arya, 2000).

This crop attacked by a number of fungal diseases viz., root rot (*Rhizoctonia solani*), powdery mildew (*Erysiphe polygoni* and *Leveillula taurica*), downy mildew (*Peronospora trigonellae*), wilt (*Fusarium oxysporum*), rust (*Uromyces anthyllidis*), leaf spot (*Cercospora traversiana*) and charcoal rot (*Macrophomina phaseolina*) (Godara *et al.*, 2010). Among these, Root rot of

fenugreek (*Trigonella foenum-graecum* L.) caused by *Rhizoctonia solani* has become an important constraint to the growers of fenugreek in Rajasthan. Under natural field conditions, the incidence of root rot of fenugreek was recorded up to 20.00 per cent in Jaipur district of Rajasthan (Anonymous, 2007-08).

Singh and Rao (2015) reported 34.67 per cent incidence of root rot of fenugreek caused by *Rhizoctonia solani* with yield loss of 55.26 per cent from Chhattisgarh.

Nene *et al.*, (1989) evaluated 225 genotypes of chickpea for broad based resistance to wilt (*F. oxysporum*), dry root rot (*R. bataticola*), wet rot (*R. solani*) and charcoal rot (*F. solani*) at 24 locations in 11 countries during a five year period (1978-82). Among these, few lines were found resistant to wilt and root rot. In addition, the genotypes ICC 2862, ICC 9023, ICC 9032, ICC 10803, ICC 11550 and ICC 11551 were resistant to wilt and root rot.

Gupta *et al.*, (1997) screened 110 lines of fenugreek for resistance to *Erysiphe polygoni*, *Rhizoctonia solani* and *Fusarium oxysporum* in Hisar (Haryana). None of the genotypes was completely resistant to all three pathogens. However, GP 75, GP 82, GP 94, GP and PEB were the moderately resistant lines.

Gaur *et al.*, (2007) reported that, out of 23 varieties screened against dry root rot of chickpea, two varieties *viz.*, BG-203 and BG-209, which recorded incidence below 10 per cent were termed as resistant, eight varieties/germplasm *viz.*, BG-377, BG-416, GMS-469, GMS-1292, GNG-469 and RSG-887 having incidence below 11-30 per cent were categorized as moderately resistant and 12 varieties/germplasm had 31-70 per cent disease incidence termed as moderately susceptible.

Benagi *et al.*, (2008) tested 12 genotypes and one susceptible check JG-62 variety of chickpea against *Rhizoctonia bataticola*. Out of 12 genotypes tested against root rot disease, four were found resistant, two were moderately susceptible, three were susceptible and three were highly susceptible to the disease.

Jayalaxmi *et al.*, (2008) conducted a pot culture experiment for screening of chickpea against dry root rot, caused by *Rhizoctonia bataticola*. Out of 12 genotypes, 4 (GBM-6, GBM-2, GCP-101 and ICCV-10) were found resistant, 2 (GBM-10, AC) were moderately susceptible, 2 were (J-11, GBS-964) susceptible and 4 (GBC-2, BGD-103, GCP-107 and L-550) were highly susceptible to the disease.

Singh *et al.*, (2010) evaluated three popular varieties of fenugreek against foot rot caused by *Fusarium moniliforme*, Deshi Methi was most susceptible to the disease showing maximum disease incidence (21-46%) followed by Pusa Early Bunching and Pusa Kasuri (17-43 and 8-23%).

Rani *et al.*, (2017) screened thirty eight genotypes against *Fusarium* wilt of fenugreek under artificial inoculation condition. Out of them, four genotypes like, DFC-3, DFC-8, DFC-27 and DFC-29 were found moderately resistant. Twenty eight genotypes were found moderately susceptible and three namely DFC-16, DFC-24 and DFC-25 showed susceptible reaction and three genotypes were highly susceptible to the disease.

Materials and Methods

The present studied were carried out in the field experiments were conducted at Agronomy Farm, S.K.N. College of Agriculture, Jobner during *Rabi* 2016-17 and 2017-18. Eight varieties of fenugreek *viz.*,

RMT-1, RMT-143, RMT-303, RMT-305, RMT-351, RMT-354, RMT-361 and Local variety were collected from AICRP on Seed Spices, SKN College of Agriculture, Jobner for evaluating against root rot during *Rabi* 2016-17 and 2017-18. Inoculum multiplied on sterilized sorghum grains was added in furrows @ 20 g/m row length. Three replications were maintained for each variety. Observations on disease incidence were recorded 60 days after sowing.

Calculation and Statistical Analysis: Percent disease incidence (PDI) and disease control in various experiments were calculated as follows:

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

$$\text{Disease control (\%)} = \frac{\text{Disease incidence in inoculated control (\%)} - \text{Disease incidence in treatment (\%)}}{\text{Disease incidence in inoculated control (\%)}} \times 100$$

On the basis of disease incidence, the varieties were categorized as per criterion followed by Iqbal *et al.*, (2005).

Rating scale	Disease incidence (%)	Category
1	0-10	Highly resistant (HR)
3	11-20	Resistant (R)
5	21-30	Moderately resistant (MR)
7	31-50	Susceptible (S)
9	>50	Highly susceptible (HS)

Results and Discussion

In all, eight varieties of fenugreek were screened in *Rabi* 2016-17 and 2017-18 against root rot disease under artificial inoculation conditions. Two years pooled data (Table 1) revealed that minimum disease incidence was recorded in varieties namely RMT-361 (22.34%) and RMT—354 (27.15%), whereas maximum disease incidence was observed in Local var. (64.72%) followed by RMT-305 (52.91%), RMT-303 (47.79%), RMT-351(44.40%), RMT-143 (43.13%) and RMT-1 (42.98%). Based on disease reaction, fenugreek varieties were grouped into different categories *i.e.* highly resistant (HR), resistant (R), moderately resistant (MR), susceptible (S) and highly susceptible (HS). Two varieties namely RMT-354 and RMT-361 showed moderately resistant reaction whereas RMT-1, RMT-143, RMT-303 and RMT-351 showed susceptible reaction. Rest two varieties, RMT-

305 and Local were found highly susceptible. Reaction of resistance is a continuous process due to evolution of new biotypes of the pathogen or break down of resistance in host resistance. Combating plant disease through host resistance is an economic, ecologically safe and a viable proposition for disease management. Monoculture/lack of diversity, pre-disposes a crop to disease and the situation is more alarming in cases where pathogen evolution frequently takes place.

Eight varieties were tested for their resistance to *R. solani*, causing root rot of fenugreek. In the present case, out of eight varieties, tested for two consecutive cropping seasons, two varieties namely, RMT-354 and RMT-361 were found moderately resistant while two variety, RMT-305 and Local were found highly susceptible to the pathogen. None of the varieties was found resistant against the disease.

Table.1 Reaction of fenugreek varieties against *Rhizoctonia solani*

Varieties	Per cent disease incidence*			Disease Reaction
	2016-17	2017-18	Pooled	
RMT-1	41.43 (40.07)	44.52 (41.85)	42.98 (40.96)	S
RMT-143	42.09 (40.45)	44.16 (41.65)	43.13 (41.05)	S
RMT-303	47.27 (43.44)	48.30 (44.03)	47.79 (43.73)	S
RMT-305	51.66 (45.95)	54.16 (47.39)	52.91 (46.67)	HS
RMT-351	43.90 (41.50)	44.89 (42.07)	44.40 (41.78)	S
RMT-354	26.94 (31.27)	28.08 (32.00)	27.51 (31.63)	MR
RMT-361	21.22 (27.43)	23.45 (28.96)	22.34 (28.20)	MR
Local	63.80 (53.01)	65.63 (54.11)	64.72 (53.56)	HS
SEm₊	1.21	1.27	1.24	
CD (p=0.05)	3.73	3.92	3.82	

*Average of three replications

Figures in parentheses are angular transformed values

HR- Highly Resistant (0-10% incidence),

R- Resistant (11-20 %incidence),

MR – Moderately Resistant (21-30% incidence),

S-Susceptible (31-50% incidence),

HS- Highly susceptible (>50% incidence)

In corroborate to present finding, Gupta *et al.*, (1997) screened 110 lines of fenugreek for resistance to *Erysiphe polygoni*, *Rhizoctonia solani* and *Fusarium oxysporum* in Hisar (Haryana). None of the genotypes were completely resistant to all 3 pathogens, however, GP 75, GP 82, GP 94, GP and PEB were the moderately resistant lines. Gaur *et al.*, (2007) reported that out of 23 varieties screened against dry root rot of chickpea, two varieties viz., BG-203 and BG-209, which recorded incidence below 10 per cent were termed as resistant, while BG-377, BG-416, GMS-469, GMS-1292, GNG-469 and RSG-887 having incidence between 11-30 per cent and categorized as moderately resistant.

Benagi *et al.*, (2008) tested 12 genotypes and one susceptible check JG-62 of chickpea against *Rhizoctonia bataticola*. Out of these, tested against root rot disease, four were found resistant, two were moderately susceptible, three were susceptible and three were highly susceptible to the disease.

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