

Response of fenugreek varieties against *Rhizoctonia solani*, causing root rot

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Abstract

The response of twenty three fenugreek varieties were seen in natural conditions against root rot disease caused by *Rhizoctonia solani*. Two fenugreek varieties viz. Azad methi (PDI 6.98) and AM-2 (PDI 8.54) were found highly resistant and 13 varieties including AM-1 (PDI 20.0), Rajendra Kranti (PDI 13.92), AFg-5 (PDI 11.97), AFg-3 (PDI 19.51), Rmt303 (PDI 11.11), Rmt305 (PDI 18.06), Rmt143 (PDI 11.11), Rmt1 (PDI 17.95), Hisar suvarna (15.07), Rmt361 (PDI 11.84), Gm1 (PDI 17.57), Hisar Sonali (18.18) and Hisar Madhavi (PDI 12.82) were recorded resistant. The remaining fenugreek varieties were reported as susceptible. The study would be helpful for development of breeding program and further improvement of fenugreek crop.

Key words : Disease incident, *Rhizoctonia solani*, root rot, screening

Introduction

Fenugreek or Methi (*Trigonella foenum-graecum* L.) belongs to family Fabaceae has wonderful importance in the life of human beings as rations as well as medicine. It is cultivated for seeds, which can be used as condiments as well as flavoring agent food, pickles etc. It has steroid diosgenin which is used in preparation of contraceptives (drug serving to prevent pregnancy) as seen by Bakrim *et al.*, 2014. Fenugreek stimulates the digestive process. Fenugreek seeds are utilized for extraction of steroids and alkaloids. The green leaves are used for preparation of vegetables whereas dried leaves and flowers are applied for flavoring vegetable and curries (Arya, 2000). The fenugreek crop is commonly attacked by a number of fungal diseases like powdery mildew (*Erysiphe polygoni* and *Leveillula taurica*), downy mildew (*Peronospora trigonellae*), wilt (*Fusarium oxysporum*), root rot (*Rhizoctonia solani*), leaf spot (*Cercospora traversiana*) rust (*Uromyces anthyllidis*), 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 a very important constraint to the growers of fenugreek in India. Under natural field conditions, the incidence of root rot of fenugreek was recorded up to 20.00 per cent in Rajasthan, Anonymous, (2007- 08). About 34.67 per cent incidence of root rot of fenugreek caused by *Rhizoctonia solani* with yield loss of 55.26 per cent reported from Chhattisgarh, Singh and Rao (2015).

Materials and methods

The present study was carried out at research farm of ICAR-National Research Centre on Seed Spices (NRCSS); Ajmer, Rajasthan, during *Rabi* season of 2014-2015. The centre lies on 74° 35 39 E to 74° 36 01 longitude, 26° 22 12 to 26° 22 31 N latitude and at an altitude of 460.17 m above mean sea level, in Ajmer (Rajasthan). The region falls under agro climatic zone III of Rajasthan. The soil of research farm (NRCSS) is sandy loam. A set of twenty three fenugreek varieties was evaluated against root rot disease caused by *Rhizoctonia solani* in 2014-2015, these included viz. AFg-6, Pant ragini, AM-1, Rajendra kranti, AFg-5, AFg-3, AFg-4, Rmt-303, Gm-2, Rmt-143, Azad methi, AM-2, Rmt-1, Hisar mukta, Lam Selection, Hisar suvarna, Co-2, Rmt-361, Rmt-351, Gm-1, Hisar sonali, Rmt-305 and Hisar madhavi. Three replications were maintained for each variety. Observations on disease incidence were recorded 75 days after sowing. For calculating disease index for root rot the total plant population per plot was counted separately as healthy plants population and diseased plants population and then the infected plants percentage was calculated from whole plant population per plot. Percent disease incidence (PDI) in experiments were calculated as follows:

Disease incidence (%) =

$$\frac{\text{Number of diseased plants}}{\text{Total number of plants observed}} \times 100$$

On the basis of disease incidence, the varieties were categorized as per criterion followed by Yadav *et al.*, (2019). On the basis of degree of Disease incidence (%) these were grouped in Category-1 (0-10) % Highly resistant (HR), Category-2 11-20% Resistant (R), Category-3 (21-30%) Moderately resistant (MR), Category-4 (31-50) Susceptible (S), Category-5 (50% or more) Highly susceptible (HS).

Results and discussion

All twenty three varieties of fenugreek were screened against root rot disease under natural conditions. Data revealed that minimum disease incidence was recorded in two varieties namely Azad methi (PDI 6.98) and AM-2 (PDI 8.54) while maximum disease incidence was reported in Rmt-351 (41.27) followed by AFg-6 (PDI 31.71). Thirteen varieties including AM-1 (PDI 20.0), Rajendra Kranti (PDI 13.92), AFg-5 (PDI 11.97), AFg-3 (PDI 19.51), Rmt-303 (PDI 11.11), Rmt-305 (PDI 18.06), Rmt-143 (PDI 11.11), Rmt-1 (PDI 17.95), Hisar suvarna (15.07), Rmt-361 (PDI 11.84), Gm-1 (PDI 17.57), Hisar Sonali (18.18) and Hisar

Madhavi (PDI 12.82) were recorded medium disease incidence. Based on disease reaction, all the fenugreek varieties were grouped into various five categories *i.e.* 1 highly resistant (HR), 2 resistant (R), 3 moderately resistant (MR), 4 susceptible (S) and 5 highly susceptible (HS). Two varieties namely Azad methi and AM-2 showed very low disease reaction as disease recorded was less than 10% hence these two varieties are considered in category 1 as highly resistant (HR). Thirteen varieties including Am1, Rajendra Kranti, AFg-5, AFg-3, Rmt-303, Rmt-305, Rmt-143, Rmt-1, Hisar suvarna, Rmt-361, Gm-1, Hisar Sonali and Hisar Madhavi showed medium disease reaction (between 1 to 10%) hence these varieties are considered in category 2 as resistant (R). Three varieties namely Rmt-351, AFg-6 and Pant ragini showed high disease reaction as disease recorded was (between 31 to 50%) hence these varieties were considered in category 4 as susceptible (S).

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

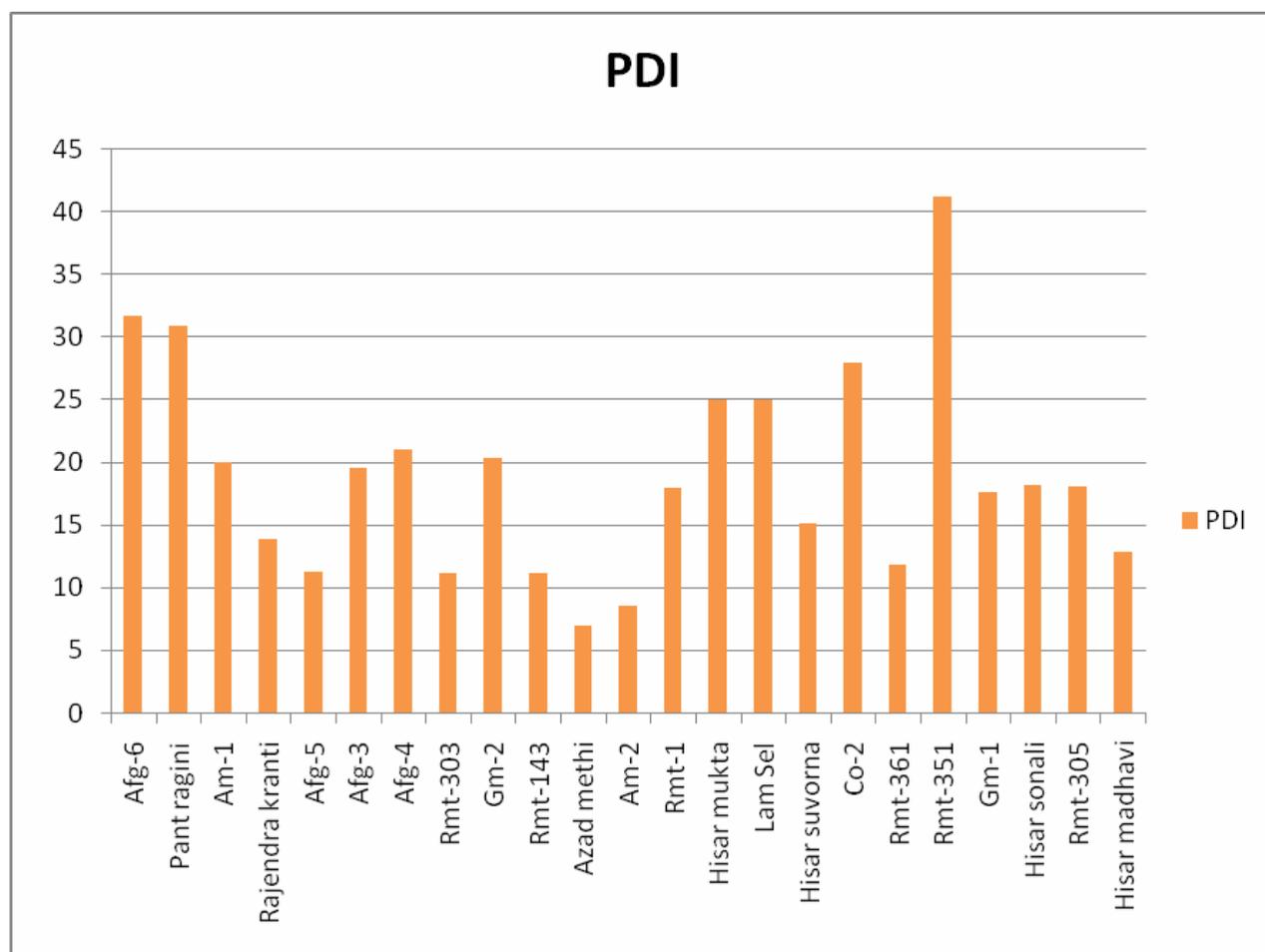


Fig. 1. Disease reaction of fenugreek varieties against root rot disease

genotypes was completely resistant to all three pathogens. However, GP 75, GP 82, GP 94, GP and PEB were the moderately resistant lines. 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. 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. The study would be helpful for development of breeding program and further improvement of fenugreek crop.

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