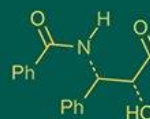


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Powdery mildew disease incidence in fenugreek varieties as influenced by different farming system modules

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Abstract

The field experiment was conducted at college of horticulture, Bagalkot, Karnataka in *Rabi* season 2024-25 revealed that by following varies pest and disease management practices with differ farming modules such as the M₁ module comprises of timely sowing of crop, Agniastara or Neemastra (3-5%) for insect pest, Butter milk @ 10 ml/l for powdery mildew were practiced, M₂ module comprises of Neem oil @ 2% for insect pest control, Butter milk @ 10 ml/l or *Bacillus subtilis* @ 2 g/l for powdery mildew, M₃ with 50% RPP + vermicompost @ 2 t/ha + FYM 5 t/ha and M₄ with NPK @ 50: 25: 40 kg/ha + FYM 10 t/ha, In M₃ where emamectin benzoate @ 0.25 g/l or Neem oil @ 2 ml/l for insect pest control, Meptyl dinocap (kerathana gold) @ 0.6 ml/l or Butter milk @ 10 ml/l for powdery mildew were followed and In M₄ emamectin benzoate @ 0.25 g/l for insect pest control and meptyl dinocap (kerathana gold) @ 0.6 ml/l for powdery mildew were fallowed for pest and disease control resulted that the lowest percent disease incidence (powdery mildew) of 21.92% and 29.17% was noticed with M₁ (natural farming system module) and M₂ (organic farming system modules), cultural practices (Beejamruth, Jeevamruth and Panchagavya) and botanicals (Neem oil) commonly adopted in natural or organic systems reduce inoculum load and pathogen spread, while the highest percent disease incidence (42%) was recorded with the M₄ (package of practice farming system module).

Keywords: Fenugreek varieties, farming system modules, fenugreek seed yield

Introduction

Fenugreek (*Trigonella foenum-graecum* L.), is a multipurpose crop grown during winter season in northern Indian. It is one of the most important leafy vegetables in India which is also grown for fodder, spices and condiments purpose. In recent past, its high market price has attracted the farmers to include this crop in their cropping system. Its seed has both feed and medicinal value particularly against digestive disorders. Whereas its leaves are rich source of protein, mineral and vitamin C. Being a leguminous crop, the root nodules enrich the soil with atmospheric nitrogen. In the recent years, the importance of fenugreek seed has further enhanced due to the presence of alkaloids 'diosgenin' and 'trigonellin' having pharmaceutical use. Therefore in true sense it is multipurpose crop having paramount importance. Because of low water requirement and for seed purpose (seeds spice) the crop fits well in the cropping system in the winter dry regions of Karnataka. During winter major threat to this crop is a powdery mildew disease. Hence the present study on powdery mildew disease incidence in fenugreek varieties as influenced by different farming system modules was designed.

Materials and Methods

The field experiment was conducted during the *rabi* season of 2024-25 at the College of Horticulture, University of Horticultural Sciences, Bagalkot. The site is located at 16°18' N latitude, 75°69' E longitude and 542 m above MSL, representing the Northern dry zone (Zone III) of Karnataka. The soil was light black loam. The experiment was laid out in a split-plot design with four farming system modules as main plots; natural farming system module (M₁), organic farming system module (M₂), integrated farming system module (M₃), recommended package of practices farming system module (M₄) and four fenugreek

varieties, Krishna Prabha Devimenthe 1, AFg-3, AFg-4 and AFg-5, as subplots and replicated thrice. Healthy and disease-free seeds were sown at 30 × 10 cm spacing. The M₁-module comprises of jeevamrutha, beejamrutha and mulching practices timely sowing of crop, Agniasthra or Neemastra (3-5%) for insect pest, Butter milk @ 10 ml/l for powdery mildew were practiced, M₂-module comprises vermicompost applied on nitrogen equivalent base, Neem oil @ 2% for insect pest control, Butter milk @ 10 ml/l or Bacillus subtilis @ 2 g/l for powdery mildew, M₃-with 50% RPP + vermicompost @ 2 t/ha + FYM 5 t/ha and M₄ with NPK @ 50: 25: 40 kg/ha + FYM 10 t/ha, In M₃ where emamectin benzoate @ 0.25 g/l or Neem oil @ 2 ml/l for insect pest control, Meptyl dinocap (kerathana gold) @ 0.6 ml/l or Butter milk @ 10 ml/l for powdery mildew were followed and in M₄-module emamectin benzoate @ 0.25 g/l for insect pest control and meptyl dinocap (kerathana gold) @ 0.6 ml/l for powdery mildew were followed for pest and disease control. Full dose of phosphorus, potash and half

dose of nitrogen is applied at the time of sowing as basal dose and remaining 50 percent of nitrogen applied 30 days after sowing. Nutrient and crop management practices were followed as per respective modules.

Incidence of Powdery Mildew Diseases

The percent powdery mildew disease incidence (PDI)

The percent disease incidence for powdery mildew disease was recorded from plants by using 0-5 disease rating scale as described below (Kumawat *et al.*, 2015) ^[4]. Twenty leaves were examined from 20 randomly selected plants in each treatment from prior to first and second spray and after 15 days of second spray (Plate 1). The percent disease incidence was calculated by using formula given below.

$$\text{Percent disease incidence} = \frac{\text{Total number of plant (part) infected}}{\text{Total number of plants observed}} \times 100$$

Grade	Description/PDI	Reaction
0	Healthy/Free from disease	Immune
1	1 to 10 percent area of leaves/plant parts infected	Resistant
2	11 to 25 percent area of leaves/plant parts infected	Moderate resistant
3	26 to 50 percent area of leaves/plant parts infected	Moderate susceptible
4	51 to 75 percent area of leaves/plant parts infected	Susceptible
5	More than 75 percent area of leaves/plant parts infected	Highly susceptible



Plate 1: Area of fenugreek leaf affected by powdery mildew disease (0-5 scale rating)

Results and Discussion

Observations on percent disease incidence of powdery mildew of fenugreek varieties as influenced by different farming system modules are presented in table below. The powdery mildew disease was noticed due to favorable weather condition for the growth of this pathogen for a short period.

The percent disease incidence had significant difference with different farming system modules. Significantly, the lowest percent disease incidence (21.92%) was noticed with M₁ (natural farming system module), while the highest (42%) disease incidence was recorded with the M₄ (package of practice farming system module). Remarkably percent disease incidence (powdery mildew) was significantly lowest of 21.92% and 29.17% was noticed with M₁ (natural farming system module) and M₂ (organic farming system modules), respectively. The reduced incidence of powdery mildew in fenugreek under natural (M₁) and organic (M₂) farming modules can be attributed to the enrichment of

beneficial antagonistic microbes from organic amendments (vermicompost, FYM), which suppress foliar pathogens and induce systemic resistance (Joshi *et al.*, 2009, Kone *et al.*, 2010) ^[2, 3]. Organic inputs improve plant vigour and nutrient balance, thereby enhancing tolerance against infection (Neghman *et al.*, 2023) ^[5]. In addition, cultural practices (Beejamruth, Jeevamruth and Panchagavya) and botanicals (Neem oil) commonly adopted in natural or organic systems reduce inoculum load and pathogen spread. The highest percent disease incidence (42%) was recorded with the M₄ (package of practice farming system module).

The percent disease incidence was not significantly impacted by varieties. However, numerically AFg-5 variety recorded 32.92 percent disease incidence which was highest and least was recorded with KPD-1 variety (31.08%).

The interaction effect of farming system modules and different varieties was non-significant. Numerically, highest percent of disease incidence were recorded with M₄V₂ (package of practices farming system module with AFg-3)

with 43.33 percent while the interaction M_1V_1 (natural farming system module with KPD-1) recorded minimum

percent disease (21.00%). These results were also supported by Devakumar *et al.* (2014) ^[1]

Table 1: The percent disease incidence for powdery mildew disease of fenugreek (*Trigonella foenum-graecum* L.) varieties as influenced by farming system modules.

Treatments	Percent disease incidence (PDI)				
Farming system modules (M)	Fenugreek varieties (V)				
	V ₁	V ₂	V ₃	V ₄	Mean
	KPD-1	AFg-3	AFg-4	AFg-5	
M ₁ : Natural farming system module	21.00	22.00	23.00	21.67	21.92
M ₂ : Organic farming system module	28.67	29.67	28.00	30.33	29.17
M ₃ : Integrated farming system module	34.67	33.67	34.33	37.00	34.92
M ₄ : Package of practices farming system module	40.00	43.33	41.33	42.67	41.83
Mean	31.08	32.17	31.67	32.92	31.96
	S. Em±		CD at 5%		
Main Plot (M)	0.40		1.41		
Subplot (V)	0.45		NS		
Interaction (M × V) at same level	0.90		NS		
Interaction (M × V) at different level	0.87		2.9		

Note: KPD-Krishna Prabha Devimenthe 1, AFg-Ajmer fenugreek

Conclusion

The lowest percent disease incidence (powdery mildew) of 21.92% and 29.17% was noticed with M_1 (natural farming system module) and M_2 (organic farming system modules), cultural practices (Beejamruth, Jeevamruth and Panchagavya) and botanicals (Neem oil) commonly adopted in natural or organic systems reduce inoculum load and pathogen spread, while the highest percent disease incidence (42%) was recorded with the M_4 (package of practice farming system module).

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