

Influence of sowing time and direction on powdery mildew incidence and loss assessment

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Fenugreek (*Trigonella foenum graecum* L.) is an important spice crop and occupies a prime position among different seed spices. Fenugreek suffers from number of diseases caused by various pathogens. Among them, powdery mildew of fenugreek caused by *Erysiphe polygoni* DC. is considered as the most destructive as it damages to all parts (Chattopadhyay and Maiti, 1990). The disease has been observed to occur at flowering and pod formation stages (Dhruj *et al.*, 2000). Change in sowing period may be an important cultural practice followed to minimize the extent of damage due to powdery mildew disease as it avoids coincidence with susceptible stage of the crop. The direction of sowing may also influence the disease incidence because disease severity increases if crop is sown such that lower canopy of plants has less exposure to sunlight. With that assumption, the present studies were carried out to observe their influence on powdery mildew.

A field experiment with three treatments of different sowing dates viz., 20th October (D₁), 10th November (D₂) and 30th November (D₃), was conducted in Randomized Block Design with Factorial concept during *rabi* season of 2012 at Agronomy Instructional farm, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar. The recommended fenugreek variety GM 2 was sown maintaining 30 cm distance between rows in a gross plot size of 4.5 m X 1.5 m as well as two directions of sowing viz., North-South and East-West. The recommended agronomical practices were followed.

The observations on intensity of powdery mildew was recorded from 25 randomly tagged plants in each plot at three crop growth stages viz., vegetative stage (45 days after sowing), pod formation stage (70 days after

sowing), and maturity stage (95 days after sowing) using 0-5 scale as described follows :

- 0 = Healthy plant/No incidence
- 1 = Less than 50 per cent leaves covered with whitish growth
- 2 = > Fifty per cent leaves covered with whitish growth
- 3 = > Fifty per cent leaves, stem/branches covered with whitish growth
- 4 = > Fifty per cent leaves, stem/branches and pods covered with whitish growth
- 5 = Plant completely covered with whitish growth

The per cent disease intensity was worked out by using following formula (Mckinney, 1923).

$$\text{Percent Disease Intensity (PDI)} = \frac{\text{Sum of all numerical rating}}{\text{Total number of plants examined} \times \text{Maximum rating}} \times 100$$

For assessing the losses due to powdery mildew disease in fenugreek, 100 matured pods for each of the categories as mentioned below were harvested from diseased as well as healthy plants from the experimental plots.

- 1. Few whitish specks on pods
- 2. Fifty per cent area of the pods covered with whitish specks
- 3. Pods completely covered with whitish growth
- 4. Healthy pods

From the pods of above different categories, observations viz., number of seeds per pod, weight of seeds per pod and 1000-seed weight were recorded and losses (%) were worked out as per Krishna *et al.* (1988).

The effects of different dates as well as direction of sowing on the development of powdery mildew disease are presented in Table 1. The data revealed significant differences in per cent intensity of powdery mildew

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disease at pod formation (70 days after sowing) and physiological maturity stage (95 days after sowing). The disease was not initiated at vegetative stage (45 days after sowing) of the crop. At pod formation and physiological maturity stages, significantly lowest powdery mildew intensity of 21.67 and 44.01 per cent was recorded when the crop was sown on 10th November (D₂), while it was highest (39.41 and 62.48 per cent, respectively) at delayed sown crop i.e. 30th November (D₃). Among two direction of sowing, the disease intensity was non-significant. Thus, it can fairly be concluded that late sown crop suffered more because of ready availability of inoculums build up in early sown crop and result in higher percent disease intensity. Kumari and Prasad (1998) reported minimum intensity of powdery mildew of pea caused by *E. polygoni* in early sown crop compared to late sown crop. Tripathi and Rath (2000) revealed no effect of row direction on severity of Botrytis gray mold of chick pea. Singh and Sirohi (2003) reported increased intensity of powdery mildew in late sowing of black gram. The average powdery mildew severity was significantly lower in early and mid-sown green gram crop (Thakar *et al.*, 2004). The results obtained in present study are in agreement with earlier reports.

The data (Table 2) on number of seeds per pod, weight of seeds per pod and 1000-seed weight revealed that maximum reduction of 14.45, 30.24 and 12.68 per cent in number of seeds per pod, weight of seeds per pod and 1000-seed weight, respectively was observed when pods were completely covered with whitish growth as compared to healthy pods. When fifty per cent area of the pod covered with whitish growth, there was corresponding reduction of 6.62, 18.53 and 7.43 per cent in number of seeds per pod, weight of seeds per pod and 1000-seed weight, respectively, while, these parameters were reduced to nearly half when only few whitish specks were observed on pod. Thus, it can be concluded that powdery mildew caused considerable reduction in agronomic characters like number of seeds per pods, weight of seeds per pods and 1000 seed weight which in turn causes considerable reduction in seed yield of fenugreek. Reduction of 22.8-25.6, 16.3-18.8 and 14.3-17.2 per cent in pods per plant, seeds per pod and test weight, respectively was recorded when powdery mildew intensity in fenugreek was more than 80 per cent (Rathi *et al.*, 2002). Dakshayani and Mummigatti (2004) also reported that the number of pods per plant was reduced by 29 %, number of seeds per pod by

Table 1 Effect of sowing date and sowing direction on powdery mildew intensity in fenugreek

Treatments	Percent Disease Intensity (PDI)		
	Vegetative stage	Pod formation stage	Physiological maturity stage
Date of sowing (A)			
D ₁ - 20 th Oct.	0.00	32.89* (29.48)	47.03 (53.54)
D ₂ - 10 th Nov.	0.00	27.75 (21.67)	41.56 (44.01)
D ₃ - 30 th Nov.	0.00	38.89 (39.41)	52.17 (62.38)
S. Em. ±	0.93	1.16	
C.D. at 5 %	2.80	3.51	
Sowing directions (B)			
North-South	0.00	33.31 (30.15)	47.50 (54.35)
East-West	0.00	33.04 (29.72)	46.35 (52.35)
S. Em. ±	0.76	0.95	
C.D. at 5%		NS	NS
Interaction (A X B)			
C.V. %	7.94	NS	NS
		7.03	

*Figures are Arc sin transformed values and in parentheses retransformed values

Table 2 Assessment of losses due to powdery mildew in fenugreek

Treatments	Vegetative stage	Pod formation stage	Physiological maturity stage	Vegetative stage	Pod formation stage	Physiological maturity stage
Few whitish specks on pod	16.10	3.01	0.19	6.82	11.92	3.71
Fifty per cent area of the pod covered with whitish growth	15.50	6.62	0.16	18.53	11.46	7.43
Pod completely covered with whitish growth	14.20	14.45	0.14	30.24	10.81	12.68
Healthy pod	16.60	-	0.20	-	12.38	-

27 % and test weight by 13 % due to powdery mildew (*E. polygoni*) of green gram. Thus, the results obtained in present study are more or less in conformity with the results reported earlier.

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