

Occurrence and study of powdery mildew disease of fenugreek (*Trigonella foenum-graecum* L.) in South Gujarat

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ABSTRACT

Survey of powdery mildew of fenugreek in Navsari district revealed that at flowering and pod formation stages, higher average intensity of 20.67 and 51.11 per was recorded in KVK, Navsari area and least was in 9.78 and 31.33 per cent Sandalpore village, respectively. Total average PDI of Navsari district was recorded 12.96 and 36.85 respectively, at flowering stage and pod formation stage of crop. The average length of conidia was maximum 49.76 μm in the samples collected from KVK, Navsari area, while minimum 38.08 μm was in the samples collected from Pethan village. Maximum breadth of conidia 21.55 μm in KVK, Navsari area and minimum 18.00 μm in Pethan village of Navsari district. The average length and breadth of conidia of all villages 43.73 μm length and breadth 20.24 μm , respectively. While length/breadth index was maximum 2.30 μm in KVK, Navsari area followed by Abrama 2.09 among the collected samples. In case of conidiophore maximum length in KVK, Navsari area 68.43 μm and minimum length in Crafeat area 58.83 μm . While, maximum length of conidiophores was recorded in KVK, Navsari area 6.78 μm and minimum in Cafetra 8.48 μm . The average of length and width of conidiophore was 63.73 μm and 7.67 μm , respectively.

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INTRODUCTION

Fenugreek suffers from number of diseases caused by various pathogens. Among them powdery mildew of fenugreek caused by two different pathogens viz., *Erysiphe polygoni* DC. and *Leveillula taurica* (Lav.) Arn. wide spread in its occurrence and considered as the most destructive (Chaudhary and Patel, 2016) as it damages to all parts. The disease has been observed to

occur at flowering and pod formation stages in Saurashtra region of Gujarat state (Dhruj *et al.*, 2000). Fenugreek yield loss of 27 to 33 per cent due to powdery mildew caused by *L. taurica* and *E. polygoni* in Haryana (Prakash and Saharan, 2002).

MATERIAL AND METHODS

Survey of powdery mildew disease of fenugreek

was carried out in fenugreek growing areas of South Gujarat *viz.*, Navsari during 2016-17. Five villages of Navsari district were surveyed to assess the extent of powdery mildew disease of fenugreek. Standard procedure was adopted to observe powdery mildew disease of fenugreek thrice during crop period *viz.*, vegetative stage and pod formation stage. Five fields in each village were observed to assess the following aspects of powdery mildew:

Disease intensity:

The intensity of powdery mildew was worked out by randomly observing twenty five plants in each field. The plants were graded by using 0 to 5 scale at two crop growth stages as mentioned above. Observations were recorded at the vegetative and pod formation stage of the disease and at 15 days interval starting from germination to harvesting and were graded as mentioned below (Rathi and Tripathi, 1994).

Scale	Percentage (%)	Particulars
0	0-5	Healthy
1	6-20	Suppressed colonies
2	21-40	Upper leaf surface only
3	41-60	Upper and lower surface both side
4	61-80	On leaves and petioles
5	>80	On leaves, petioles and stems

Formula for calculating per cent disease intensity was (Prakash and Saharan, 1999).

$$\text{Per cent disease intensity} = \frac{\text{Sum of all numerical rating} \times 100}{\text{No. of leaves examined} \times \text{Maximum disease rating}}$$

Scale	Percentage	Particulars
0	Free from disease	Immune
1	1 to 10 per cent area of leaves/plant parts infected	Resistant
2	11 to 25 per cent area of leaves/plant parts infected	Moderately resistant
3	26 to 50 per cent area of leaves/plant parts infected	Moderately susceptible
4	51 to 75 per cent area of leaves/plant parts infected	Susceptible
5	More than 75 per cent area of leaves/plant parts infected	Highly susceptible

Fenugreek plants sowing typical powdery mildew symptoms were collected from each infected spot and brought to the laboratory for the purpose of examination.

The length (L) and breadth (B) of conidia were measured by ocular micrometer and their L/B index was calculated. In each case, ten conidia stained in cotton blue and mounted in lectophenol were measured. The differences in the size of conidia were statistically analyzed to find out the morphological difference, L/B (Length and Breadth in μm) ratio was also determined by dividing length of conidium with breadth.

RESULTS AND DISCUSSION

As regards to per cent disease intensity, the disease was not recorded at any location surveyed at vegetative stage of the crop. At flowering stage, higher average intensity of 14.82 per cent was recorded Navsari area followed by Abrama 13.20 per cent and least was in Sandalpore 10.93 per cent villages of Navsari district. The powdery mildew disease intensity progressively increased towards pod formation stage of crop. In case of Navsari district average powdery mildew intensity was maximum 41.59 per cent and 31.37 per cent in Sandalpore village.

Average disease intensity varied in different villages owing to varied agro climatic conditions, inoculums potential and varieties cultivated with different genetic makeup. It was observed that disease progress in natural condition was from flowering stage to pod formation stage. The results obtained in present investigations are in agreement with powdery mildew of different crops reported earlier (Akhileshwari *et al.*, 2012)

During survey of the year 2016-2017, the samples were collected from different villages of Navsari district for morphological characters (Table 2). The length of conidia was observed maximum 49.76 μm in the samples of KVK, Navsari area, while it was minimum 38.08 μm in the sample collected from Pethan village of Navsari district. As regards to breadth of conidia, it was observed maximum 21.55 μm in KVK, Navsari area and minimum 18.00 μm in Pethan village of Navsari district. The average length and breadth of conidia of all villages 43.73 μm length and breadth 20.24 μm , respectively. This was also evident from length/breadth index (Table 3) was maximum 2.30 in KVK, Navsari area followed by Abrama 2.09 among the samples collected. In case of conidiophores maximum length in KVK, Navsari area 68.43 μm and minimum length in Crafeat area 58.83 μm . While, maximum length of conidiophores was recorded in KVK, Navsari are 6.78 μm and minimum in Crafeat

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Table 1: Intensity of fenugreek powdery mildew in different villages of Navsari district

District	Villages	Sites	PDI (%)	Mean	PDI (%)	Mean
			(Flowering stage)		(Pod formation stage)	
Navsari	Navsari	KVK	20.67	14.82	51.11	41.59
		RHRS NAU	14.22		45.33	
		Botany Farm NAU	19.78		37.78	
		Horticulture poly tech.	15.33		42.67	
		Organic farm	13.36		35.33	
		Crafet area	5.56		37.33	
	Athan	Site-1	12.89	13.16	35.78	35.07
		Site-2	13.11		34.67	
		Site-3	13.78		33.78	
		Site-4	13.33		34.44	
		Site-5	12.67		36.67	
	Sandalpore	Site-1	9.78	10.93	31.33	31.37
		Site-2	10.89		32.44	
		Site-3	12.00		31.78	
		Site-4	10.44		31.56	
		Site-5	11.56		29.78	
	Pethan	Site-1	11.78	12.71	40.89	40.80
		Site-2	11.56		38.22	
		Site-3	13.11		41.33	
		Site-4	14.44		41.11	
Site-5		12.67	42.44			
Abrama	Site-1	12.44	13.20	36.37	35.40	
	Site-2	12.22		30.22		
	Site-3	14.89		38.00		
		Site-4	13.56		37.56	
		Site-5	12.89		34.89	
		Average PDI		12.96		36.85

Table 2 : Conidial size of fenugreek powdery mildew from different villages of Navsari district of South Gujarat

Sr. No.	Location	Conidia (μm)			Conidiophore (μm)		
		Length	Breadth	L/B	Length	Breadth	L/B
1.	KVK	49.76	21.55	2.31	68.43	6.78	10.09
2.	Horticulture poly tech.	47.41	21.45	2.21	64.67	7.54	8.58
3.	RHRS NAU	40.80	19.44	2.10	63.90	8.13	7.86
4.	Botany farm, NAU	47.24	21.49	2.20	66.46	7.37	9.02
5.	Organic farm Agronomy	44.25	20.35	2.17	63.77	7.70	8.28
6.	Crafet area	39.58	19.36	2.04	58.83	8.48	6.94
7.	Athan	42.22	19.68	2.15	61.51	7.56	8.14
8.	Pethan	38.08	18.00	2.12	62.89	7.78	8.08
9.	Sandalpore	46.40	21.19	2.19	64.62	7.40	8.73
10.	Abrama	41.65	19.90	2.09	62.24	8.02	7.76
Average	-	43.73	20.24	2.15	63.73	7.67	8.0

Table 3 : L/B index of powdery mildew of fenugreek					
Sr. No.	Morphological characters	Measurement (μm)			Std. dev.
		Minimum	Maximum	Average	
1.	Conidia				
	Length (L)	38.08	49.76	43.73	3.86
	Breadth (B)	18.00	21.55	20.24	1.18
	L/B index	2.09	2.30	2.17	0.08
2.	Conidiophore				
	Length (L)	58.83	68.43	63.73	2.65
	Breadth (B)	6.78	8.48	7.67	0.47
	L/B index	8.68	8.06	8.31	0.84

area 8.48. The average of length and width of conidiophores was 63.73 μm and 7.67 μm , respectively. The results obtained in the present study supports the finding of Chattopadhyay and Maiti (1990) who reported that conidia of *E. Polygona* was measuring 29.0-45.0 $\mu\text{m} \times 17.0$ -19.9 μm .

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