

Powdery mildew incidence and conidial variability of *E. polygoni* in the samples collected from major fenugreek growing areas of North Gujarat

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Fenugreek (*Trigonella foenum graecum* L.) is an important spice crop. Powdery mildew caused by *Erysiphe polygoni* DC. is an important yield limiting factor and widely distributed disease of fenugreek. The disease has been observed to occur at flowering and pod formation stages (Dhruj *et al.*, 2000) and damages all parts of the plant. The yield losses due to powdery mildew disease in fenugreek were estimated to the tune of 27-33 per cent in Haryana (SomPrakash and Saharan, 2002). Hence, attempts were made to know the occurrence of disease in major fenugreek growing areas of North Gujarat as well as variability in the pathogen, if any.

Survey of powdery mildew disease of fenugreek was carried out in fenugreek growing areas of North Gujarat viz., Banaskantha and Patan during 2011-12. Three talukas of each of Banaskantha (Tharad, Dhanera and Vav) and Patan (Patan, Chanasma and Siddhpur) districts were surveyed to assess the extent of powdery mildew disease of fenugreek. The crop was critically observed thrice during crop growth periods viz., (i) vegetative stage (ii) pod formation stage (iii) maturity stage. Three villages in each Taluka and five fields in each village were observed. The incidence of powdery mildew was assessed from 15 spots per district by visual observation of diseased area and percent disease incidence was calculated as follows:

$$\text{Per cent Disease incidence} = \frac{\text{No. of fields infected}}{\text{No. of fields observed}} \times 100$$

The intensity of powdery mildew was worked out by randomly observing twenty five plants in each field. The plants were graded by using 0-5 scale at three crop growth stages as mentioned above.

Grade	Description
0	Healthy / No incidence
1	Nearly 50 per cent leaves covered with whitish growth
2	> 50 per cent leaves covered with whitish growth
3	> 50 per cent leaves, stems/branches covered with whitish growth
4	> 50 per cent leaves, stems/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).

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

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, 200 conidia stained in cotton blue and mounted in lactophenol were measured. The differences in the

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size of conidia were statistically analysed to find out the morphological difference, L/B (Length and Breadth in μm) ratio was also determined by dividing length of conidium with its Breadth.

RESULTS AND DISCUSSION

The data (Table 1) indicated that powdery mildew of fenugreek was prevalent in both the fenugreek growing districts. The disease was higher (75.55 %) in Banaskantha as compared to patan (66.66 %) district. Among different talukas, maximum disease incidence (86.66 %) was observed in Vav followed by Tharad (80.00 %) and least was in Dhanera (60.00 %) taluka of Banaskantha district. Similarly, maximum disease incidence (73.33 %) was observed in Patan followed by Chanasma (66.66 %) and least was in Siddhpur (60.00 %) taluka of Patan district.

As regards to per cent disease intensity, the disease was not recorded at any of the location surveyed at vegetative stage of the crop. At pod formation stage,

higher average intensity of (46.96 %) was recorded in Vav followed by Tharad (42.04 %) and least was in Dhanera (27.68 %) taluka of Banaskantha district. Similarly in Patan district also, higher average intensity of (36.00 %) was recorded in Patan followed by Chansma (33.36 %) and least was in Siddhpur (28.72 %). The powdery mildew intensity progressively increased towards maturity stage of crop wherein maximum average intensity of (68.48 %) was recorded again in Vav taluka, while, minimum (47.52 %) was in Dhanera taluka of Banaskantha district. In case of Patan district, average powdery mildew intensity was maximum (57.60 %) in Patan taluka, while, minimum (49.92 %) was in Siddhpur at maturity stage.

The average disease intensity varied in different talukas in different districts owing to varied agro-climatic conditions, inoculum potential and varieties cultivated with different genetic makeup. It was observed that disease progress in natural condition was from pod formation stage to maturity stage.

The results obtained in present investigations are in agreement with powdery mildew of different crops

Table 1 Taluka and district-wise per cent disease incidence and intensity of powdery mildew of fenugreek

Sr. No.	District	Taluka	* Disease Incidence (%)	Percent Disease Intensity (PDI)				
				Vegetative stage	Pod formation stage		Maturity stage	
					Range	Average	Range	Average
1	Banaskantha	Tharad	80.00	00.00	0.00-54.43	42.04	15.84-83.23	64.32
		Dhanera	60.00	00.00	0.00-41.60	27.68	7.45-59.43	47.52
		Vav	86.66	00.00	0.00-57.78	46.96	13.45-76.80	68.48
		Average	75.55	0.00	0.00-51.27	38.89	12.24-73.15	60.90
2	Patan	Patan	73.33	00.00	0.00-45.69	36.00	9.54-67.91	57.60
		Chanasma	66.66	00.00	0.00-48.12	33.36	14.58-67.32	52.64
		Siddhpur	60.00	00.00	0.00-39.03	28.72	5.88-60.38	49.92
		Average	66.66	0.00	0.00-44.28	32.69	10.00-65.20	52.58

* Mean of 15 fields observed

Table 2 Conidial size of *E. polygoni* of fenugreek recorded from different talukas of North Gujarat

Sr. No.	Taluka	Conidial size (L X B) (μm)		
		Maximum	Minimum	Average
1	Tharad	$38.80 \pm 2.73 \times 21.20 \pm 1.81$	$29.30 \pm 2.73 \times 15.80 \pm 1.81$	$33.52 \pm 2.73 \times 18.55 \pm 1.81$
2	Dhanera	$36.20 \pm 3.17 \times 21.60 \pm 1.35$	$25.30 \pm 3.17 \times 16.30 \pm 1.35$	$29.61 \pm 3.17 \times 18.37 \pm 1.35$
3	Vav	$40.40 \pm 2.51 \times 19.90 \pm 1.21$	$31.50 \pm 2.51 \times 16.40 \pm 1.21$	$35.44 \pm 2.51 \times 18.20 \pm 1.21$
4	Patan	$39.30 \pm 3.08 \times 22.60 \pm 2.22$	$28.40 \pm 3.08 \times 16.20 \pm 2.22$	$34.34 \pm 3.08 \times 18.55 \pm 2.22$
5	Chanasma	$34.50 \pm 2.30 \times 20.90 \pm 1.82$	$26.00 \pm 2.30 \times 15.80 \pm 1.82$	$30.98 \pm 2.30 \times 18.50 \pm 1.82$
6	Siddhpur	$39.30 \pm 2.71 \times 22.50 \pm 2.27$	$29.80 \pm 2.71 \times 15.70 \pm 2.27$	$34.25 \pm 2.71 \times 19.13 \pm 2.27$

reported earlier (Kansara, 2007; Patel, 2011 and Akhileshwari *et al.*, 2012).

During survey of the year 2011-12, the samples were collected from different talukas of Banaskantha and Patan districts and observed for morphological characters (Table 2). The length of conidia was observed maximum ($40.40 \pm 2.51 \mu\text{m}$) in the sample collected from Vav taluka, while it was minimum ($25.30 \pm 3.17 \mu\text{m}$) in the sample collected from Dhanera taluka. As regards to breadth of conidia, it was observed maximum ($22.60 \pm 2.22 \mu\text{m}$) in Patan

taluka and minimum ($15.70 \pm 2.27 \mu\text{m}$) in Siddhpur taluka. The average length and breadth of conidia was higher in Vav taluka ($35.44 \pm 2.51 \mu\text{m}$) and Siddhpur taluka ($19.13 \pm 2.27 \mu\text{m}$), respectively. This was also evident from length/breadth index of *E. polygoni*. The average length/breadth index (Table 3) was maximum (1.87) in Vav taluka followed by Patan taluka (1.85) among the samples collected. The results obtained in the present study supports the findings of Chattopadhyay and Maiti (1990) who reported that conidia of *E. polygoni* was measuring $29.0-45.0 \mu\text{m} \times 17.0-19.9 \mu\text{m}$.

Table 3 Length/Breadth index of *E. polygoni* of fenugreek recorded from different talukas of North Gujarat

Sr. No.	Taluka	Length (L) / Breadth (B) index			
		Maximum	Minimum	Average	Std. Dev.
1	Tharad	2.44	1.44	1.80	0.27
2	Dhanera	2.08	1.33	1.71	0.22
3	Vav	2.27	1.40	1.87	0.24
4	Patan	2.24	1.43	1.85	0.26
5	Chanasma	2.04	1.24	1.71	0.22
6	Siddhpur	2.23	1.35	1.81	0.27

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