

Studies on bacterial blight of cotton with different weather parameters under south Gujarat condition

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ABSTRACT

Main objective of present study is to study the progress of the bacterial blight disease of cotton (BLB), caused by *Xanthomonas campestris* pv. *malvacearum* (Smith) dye, with relation to the environmental parameters. This is a common disease affecting the growth, development and yield of cotton. A field trial was conducted to determine the influence of environmental factors viz., rainfall periods, temperature and humidity on development of disease. Bacterial blight disease was recorded with its appearance and subsequently at weekly interval till it prevailed on G. Cot. Hy. 12. The result presented and indicates that the disease was first appeared in 36th Met. week (First week of September) with 1.37 per cent intensity and prevailed upto 48th Met. week i.e. last week of November (1.75 %) with its peak during 42nd week i.e. 2nd week of October (24.50 %).

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INTRODUCTION

Cotton caused by *Xanthomonas campestris* pv. *malvacearum* (Smith) dye (synonyms *Xanthomonas malvacearum* (E. F. Sm) Dowson) is one of the most important and serious disease of cotton, for in cotton growing areas of the world. This cotton is the back bone of national economy. Cotton posses the most miraculous fibre under the sun, since 8,000 years. No other fibre has quality like cotton fibre. The fibre of a thousand faces and almost as many uses, cotton is noted for its versatility, appearance, performance and above all, its natural comfort. From all types of apparel, including astronauts'

in-flight space suits, to sheets and towels and tarpaulins and tents, cotton in today's fast-moving world is still nature's wonder fibre, it is smart textile. It provides thousands of useful products and supports millions of jobs as it moves from field to fabric (www.cotton.org). Cotton is a white fibrous agricultural product that has a wide variety of uses, from textile production, to creating paper, to producing oil and food products. Cotton is grown all around the globe and is traded internationally as well. The production is influenced by the repeated out breaks of pest and diseases and these are the major factors responsible for lower yield of cotton in India. Out of 25

diseases known to occur in cotton crop from time to time, the bacterial blight is the most wide spread and destructive disease reported to cause yield losses of about 10 to 30 per cent (Bhatti and Bhutta, 1983 and Kalpana *et al.*, 2004) and also affect the quality of lint (Sharma and Chauhan, 1985). Bacterial leaf blight, boll rots, wilts and leaf spots are the most destructive cotton diseases (Chopra, 1977). Under, bacterial blight infection, boll yield losses upto 35 per cent have been reported (Sheo Raj and Verma, 1988). Leaf spots rank third among the diseases on cotton in India. Among the leaf spots, bacterial blight (*Xanthomonas campestris* pv. *malvacearum* (Smith), *Alternaria* leaf spot (*Alternaria macrospora* Zimm) and grey mildew (*Ramularia aereola*) have been reported to be damaging. Bacterial blight disease (BLB) of cotton caused by *Xanthomonas campestris* pv. *malvacearum* (Smith). Dye affects the entire aerial parts of cotton plant *i.e.* necrosis of parenchymatous tissue in the local phase and blockage of xylem vessels in its systemic phase (Casson *et al.*, 1977 and Sandipan *et*

al., 2015).

Resistant varieties are the true option for any disease management strategies. Control of the disease through chemicals, seed treatment or acid delinting is recommended but bactericide alone or in combination with fungicides does not eradicate the pathogen completely (Khan and Ilyas, 1999 and Hussain and Tahir, 1993). Characterization of environment factors for bacterial blight disease may provide a basis to forecast the disease and which helps the cotton growers for its timely management. Keeping in view, a study was conducted at Main Cotton Research Station (MCRS), Surat (Gujarat) during *Kharif*, 2012 to know the affect of environment parameters on the disease development.

MATERIAL AND METHODS

The susceptible cultivar LRA – 5166 was sown around the G. Cot. Hy. 12 in this experiment with the following experimental details. All the recommended agronomic practices were followed for raising crop (Table A). The observations on disease development were recorded at weekly interval from 20 randomly selected tagged plants and 5 leaves from lower part and 5 leaves from middle/ plant were selected by using 0-4 scale as given by (Sheoraj, 1989) (Table B).



$$\text{Disease incidence (\%)} = \frac{\text{No. of infected plants}}{\text{No. of leaves observed} \times \text{Max. grade}} \times 100$$

The weather data of the corresponding period was obtained from the meteorological observatory of MCRS, Surat (Gujarat). The data were compiled to standard weeks and subjected to correlation equations (Gomez and Gomez, 1984).

Table A : Recommended ogronomic practices to raise the crop

Location/ zone	Treatment	Variety	Rep.	Plot size (mtr)		Spacing (cm)	Sowing date	Fertilizer NPK kg/ha	Irrigation
				Gross	Net				
SG II Surat (Gujarat)	1	G.Cot.Hy. 12	1	11.7 x 39.6	11.7 x 39.6	120 x 45	07/07/12	240.40.0	2

Table B : observation on disease development

Score	Description
0	Immune, completely free from bacterial blight
1	Highly resistant, infection 0-10 %
2	Moderately resistant, infection 11-20 %
3	Moderately susceptible, infection 21-40 %
4	Highly susceptible, infection more than 40 %

RESULTS AND DISCUSSION

Bacterial blight disease was recorded with its appearance and subsequently at weekly interval till it prevailed on G. Cot. Hy. 12. The results are presented in Table 1 and Fig. 1 indicated that the disease was first appeared in 36th Met. week (First week of September) with 1.37 per cent intensity and prevailed upto 48th Met. week *i.e.* last week of November (1.75 %) with its peak during 42nd week *i.e.* 2nd week of October (24.50 %) (Table 1 and Fig. 1).

The correlation of incidence bacterial blight disease (BLB) with the weather parameters revealed positive and significant correlation with all the weather parameters except minimum temperature.

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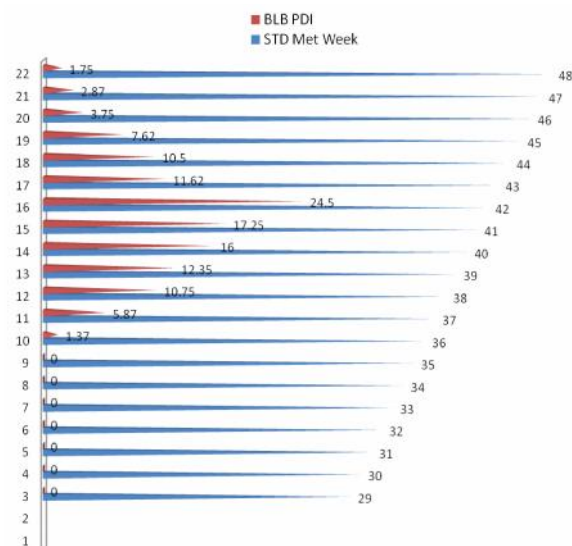


Fig. 1 : Seasonal incidence of bacterial blight disease in cotton during 2012-13

Table 1 : Occurrence of bacterial blight on G. Cot. Hy. 12 in relation to different weather parameters at MCRS, NAU, Surat (2012-13)

Sr. No.	STD met week	Period	BLB PDI	Weather parameter					
				Temp		Humidity		Rainy days	Rain fall
				Max	Min	Morning	Evening		
1.	29	16/07/2012	0.00	32.8	27.5	87.5	71.5	19.2	3
2.	30	23/07/2012	0.00	31.8	27.3	92.2	86.0	2.6	1
3.	31	30/07/2012	0.00	31.2	26.4	91.4	88.7	8.0	1
4.	32	06/06/2012	0.00	31.9	23.0	83.8	76.2	66.0	3
5.	33	13/08/2012	0.00	31.5	25.6	80.2	70.8	18.0	1
6.	34	20/08/2012	0.00	32.0	25.6	75.1	76.5	29.4	5
7.	35	27/08/2012	0.00	32.5	25.9	82.8	77.0	55.8	2
8.	36	03/09/2012	1.37	31.1	25.6	92.8	87.4	218.2	6
9.	37	10/09/2012	5.87	30.3	24.9	91.8	86.7	77.8	6
10.	38	17/09/2012	10.75	32.0	25.6	82.0	61.2	0.0	0
11.	39	24/09/2012	12.35	33.4	24.8	82.0	55.4	30.6	2
12.	40	01/10/2012	16.00	34.6	25.2	84.7	63.5	13.6	3
13.	41	08/10/2012	17.25	35.7	22.5	82.4	45.7	0.0	0
14.	42	15/10/2012	24.50	36.0	21.4	70.6	33.9	0.0	0
15.	43	22/10/2012	11.62	36.1	20.4	68.0	36.0	0.0	0
16.	44	29/10/2012	10.50	34.8	18.8	58.0	37.3	0.0	0
17.	45	05/11/2012	7.62	33.4	18.4	69.0	47.7	0.0	0
18.	46	12/11/2012	3.75	32.7	18.2	77.4	41.3	0.0	0
19.	47	19/11/2012	2.87	33.9	16.7	69.0	23.7	0.0	0
20.	48	26/11/2012	1.75	33.2	16.7	79.0	39.0	0.0	0
21.	49	03/12/2012	0.00	34.2	21.0	67.0	32.0	0.0	0
22.	50	10/12/2012	0.00	31.7	17.4	65.6	37.0	0.0	0
23.	51	17/12/2012	0.00	32.7	20.6	62.8	30.6	0.0	0
24.	52	24/12/2012	0.00	33.4	17.1	64.7	28.4	0.0	0
Correlation co-efficient				0.6935**	-0.4001*	0.6659**	0.8032**	0.5684**	0.7797**

* and ** indicate significance of values at P=0.05 and 0.01, respectively

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