

Sources of resistance of different cotton genotypes against bacterial blight disease incited by *Xanthomonas axonopodis* pv. *malvacearum* under natural epiphytotics

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ABSTRACT : A total 36 cotton genotypes were screened against bacterial blight disease incited by *Xanthomonas axonopodis* pv. *malvacearum* under natural epiphytotics. Results revealed that 3 genotypes showed moderately resistant, 31 showed moderately susceptible and 2 showed susceptible against bacterial blight of cotton. Disease severity at 60 DAS ranged from 2.42 to 27.5 per cent. PH 1009 (2.42%), Paig 29 (2.42%) had shown lowest disease severity. Disease severity at 90 DAS ranged from 9.63 to 58.6 per cent. NH 633 (9.63%) had shown minimum disease severity followed by PH 1062 (9.91%) and PH 1031 (10.37%). Disease severity at 120 DAS ranged from 11.63 to 68.94 per cent. The lowest PDI was recorded by NH 633 (11.63 %) followed by Paig 265 (13.26 %) and NH 637 (13.55 %). Mean disease severity (PDI) of cotton genotypes was recorded in the range 9.71 to 51.68 per cent.

Key words : Cotton, natural epiphytotics, resistance, *X. axonopodis* pv. *malvacearum*

Amongst the several factors responsible for reduction in yield and quality deterioration of cotton in India, diseases occupies a vital place. Bacterial blight of cotton caused by *Xanthomonas axonopodis* pv. *malvacearum* is one of the serious diseases of cotton. It is recorded in almost every country in the world which grows cotton. The disease is considered as semi systemic disease. Pathogen infects all the stages of plants. In India, the disease is known to occur in all the cotton growing areas with an annual losses upto 30 per cent. The pathogen is both externally as well as internally seed borne which plays a important role in primary spread of the disease.

Considering the importance of the disease in cotton cultivation, resistant varieties have been advocated in past for the management of this disease. Use of resistant cultivars, however remains the most efficient and eco friendly method, followed by this, the efficient management of the bacterial blight have been obtained by chemical mean.

A field experiment was carried out, to study the sources of resistance against bacterial blight of cotton, replicated thrice in randomized block design (RBD). Thirty six genotypes of *Gossypium arboreum* and *hirsutum* were screened

for their reaction during 2008-2009 in plot size of 5.4 x 3.6 m. Spacing maintained for *hirsutum* 60 x 60 cm and *arboreum* 45 x 22.5 cm. Observations on disease incidence and severity were recorded at 60, 90 and 120 DAS.

Per cent disease intensity was calculated as per the standard method. For recording the disease intensity at field conditions, 0 to 9 disease rating scale was used. For this purpose 5 leaves located at the bottom, 5 middle and 5 top of the plant were chosen and scored as per grades : Disease free (F), Resistant (R), Moderately resistant (MR), Moderately susceptible (MS), Susceptible (S).

The average intensity of each plot was worked out by using following formula.

$$\text{PDI} = \frac{\text{Sum of observed numerical ratings}}{\text{Number of leaves observed} \times \text{maximum of grade scale}} \times 100$$

Measurement of disease intensity (severity) was carried out on five randomly selected plants in each plot.

Per cent incidence was calculated from the number of infected plants against the total number of plants at the time of observation by

using following formula.

$$\text{Per cent incidence (PI)} = \frac{\text{No. of plants diseased}}{\text{Total number of plants observed}} \times 100$$

Results (Table 1 and 2) revealed that out of 36 genotypes of cotton screened under natural conditions of infection, none showed immune and resistant reaction, while 3 genotypes were moderately resistant, 31 were moderately susceptible and 2 were susceptible against the

disease.

Disease severity at 60 DAS ranged from 2.42 to 27.5 per cent. Highest PDI was recorded by LRA 5166 (27.5 %) followed by NH 619 (15.59 %), MCU 5 (11.11 %) and PA 646 (11.11 %). Lowest PDI was recorded by PH 1009 (2.42 %) and Paig 29 (2.42 %).

Disease severity at 90 DAS ranged from 9.63 to 58.6 per cent. Highest PDI was recorded by LRA 5169 (58.6 %) followed by NH 619 (20.3 %) and NHH 44 (17.9 %). Lowest PDI was recorded by NH 633 (9.63 %) followed by PH 1062 (99.91 %)

Table 1. Screening of different genotypes of cotton to bacterial blight disease

Sr. No.	Genotypes	Mean per cent disease intensity (DAS)			Mean reaction	Disease reaction
		60	90	120		
1	NHH 44	10.64	17.90	19.62	16.05	MS
2	NH 619	15.59	20.30	33.33	22.07	S
3	NH 640	9.36	15.31	20.51	15.06	MS
4	NH 634	10.62	16.90	18.82	15.44	MS
5	NH 615	6.12	10.91	15.81	10.96	MS
6	NH 635	7.65	19.36	21.55	16.19	MS
7	NH 637	7.65	11.34	13.55	10.85	MS
8	NH 633	8.15	9.63	11.63	9.71	MR
9	NH 630	5.73	10.78	14.50	10.34	MS
10	NH 632	8.67	11.11	13.13	10.97	MS
11	MCU 5	11.11	16.90	26.81	18.27	MS
12	DCH 32	6.38	12.10	17.57	12.02	MS
13	PH 1062	5.12	9.91	15.81	10.28	MS
14	PH 1029	10.21	16.54	22.86	16.54	MS
15	PH 1031	6.13	10.37	14.27	10.26	MS
16	PH 1004	6.13	11.10	15.15	10.79	MS
17	PH 1047	7.54	12.84	18.89	13.09	MS
18	PH 1009	2.42	13.10	15.65	10.39	MS
19	PH 1052	4.53	14.38	17.57	12.16	MS
20	PH 348	4.78	11.11	15.42	10.44	MS
21	PA 532	5.34	10.64	13.26	9.75	MR
22	PA 541	9.36	12.80	20.52	14.22	MS
23	PA 405	5.54	12.42	14.38	10.78	MS
24	PA 687	7.38	10.56	17.47	11.80	MS
25	PA 528	6.66	11.11	14.35	10.70	MS
26	PA 304	4.44	10.63	16.39	10.49	MS
27	PA 693	5.54	11.52	14.52	10.53	MS
28	PA 646	11.11	16.37	25.17	17.55	MS
29	PA 653	4.53	12.83	15.38	10.91	MS
30	PA 08	6.66	16.35	27.71	16.91	MS
31	PA 686	10.21	16.09	31.55	19.28	MS
32	Paig 29	2.42	14.96	30.86	16.08	MS
33	Paig 265	5.34	10.64	13.26	9.75	MR
34	Paig 8/1	4.44	10.63	16.39	10.49	MS
35	Paig 255	6.66	11.11	14.35	10.70	MS
36	LRA 5166 (SC)	27.50	58.60	68.94	51.68	S

Table 2. Reaction of cotton genotypes against *X. axonopodis* pv. *malvacearum* under field conditions

Disease grade	Disease reaction	Number	Name of genotypes
0	Disease free (F)	0	None
I	Resistant (R)	0	None
II	Moderately resistant (MR)	3	NH 633, PA 532, Paig 265
III	Moderately susceptible (MS)	3	NHH 44, NH 640, NH 634, NH 615, NH 635, NH 637, NH 630, NH 632, MCU 5, DCH 32, PH 1062, PH 1029, PH 1031, PH 1004, PH 1047, PH 1009, PH 1052, PH 348, PA 541, PA 405, PA 687, PA 528, PA 304, PA 693, PA 646, PA 653, PA 08, PA 686, Paig 29, Paig 8/1 and Paig 255
IV	Susceptible (S)	2	NH 619, LRA 5166(SC)

and PH 1031 (10.37 %).

Disease severity at 120 DAS ranged from 11.63 to 68.94 per cent. Highest PDI was recorded by LRA 5166 (68.94 %) followed by NH 619 (33.33 %). The lowest PDI was recorded by NH 633 (11.63 %) followed by Paig 265 (13.26 %) and NH 637 (13.55 %).

Mean disease severity ranged from 9.71 to 51.68 per cent. Highest mean disease severity recorded in LRA 5166 (51.68 %) followed by NH 619 (22.07 %) and PA 686 (19.28 %). Lowest mean disease severity recorded in NH 633 (9.71 %), Pa 532 (9.75 %) and Paig 265 (9.75 %).

The present field screening of cotton genotypes in this study indicates resistance to bacterial blight is inheritable as the resistant character is passable from the parental inbred lines to their hybrids. Thus, screening cotton genotypes for resistance to bacterial blight is of paramount importance and it should be part of the efforts in the development of commercial hybrids with high yield potential and superior resistance to *X. axonopodis* pv. *malvacearum*.

Similar type of work was also undertaken by several workers previously against bacterial

blight of cotton and reported disease reaction of cotton varieties by Singh and Garg *et al.*, (2002), Khodke *et al.*, (2003), Singh (2003) and Singh *et al.*, (2007).

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