



VARIETAL SCREENING OF VARIETIES/ BREEDING MATERIALS FOR RESISTANCE TO DIFFERENT DISEASES IN NATURAL CONDITION UNDER SOUTH GUJARAT REGION

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ABSTRACT

Cotton is the main principal commercial crop of our economy. Cotton leftovers the most phenomenal fiber crop and is still nature's wonder fiber. Cotton is grown all around the globe, and is traded internationally as well. The production is inclined by the repeated out breaks of pest and diseases and these are the major factors responsible for lower yield of cotton. A field trial was conducted at Main Cotton Research Station (MCRS), NAU, Surat in the year 2014 for a season to determine the influence of diverse diseases in respect to different varieties/ entries. During the season, entries/ varieties were evaluated for their reaction against the different diseases in cotton crop. Total thirty six varieties/ entries including checks were evaluated for their reaction against the bacterial blight disease. Out of these entries, GSHV 159 and GSHV 172 found disease free. Whereas, eleven entries viz., GSHH 2529, GSHH 2646, GTHH 193, G. Cot. Hy.8, GISV 272, GBHV 164, GBHV 180, G. Cot. 16, G. Cot. 20, G. Cot. 22 and GBHV 185 were found moderately resistant and G. Cot. Hy. 12 and G. Cot. 10 were moderately susceptible and rest of the entries was found resistant against the bacterial leaf blight disease.

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INTRODUCTION

Cotton is a main commercial of our country and natural fibre know as "White Gold" contains with soft, fluffy staple fiber that grows in a boll, or protective case, around the seeds of the cotton plant. The fiber is almost pure cellulose. The plant is a shrub native to tropical and subtropical regions around the world, including the Americas, Africa and India.

It 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. Higher production of cotton requires high investment in terms of fertilizers, pesticides, weedicides and other cultural operations. This ultimately sometimes leads to or influenced by the repeated out breaks of pest and diseases and occasionally responsible for lower yield of cotton. Out of 30 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, Kalpana et al., 2004, Sekhon et al., 2008 and Sandipan et al., 2016) 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 natural, bacterial blight

infection, boll yield losses up to 35 % 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 aerea*) have been reported to be damaging. Bacterial leaf blight (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). In north India, the cotton leaf curl virus disease (CLCuD) caused by a Gemini virus and transmitted by whitefly, *Bemisia tabaci* has become a major threat to cotton cultivation since its appearance in 1993 (Monga et al., 2011). Seed is the costliest input and is highly prone to losses in germination and vigour due to seed mycoflora. Seeds acts as carrier in transmission of pathogens and thereby causes economic threat to cotton cultivation. Resistant varieties are the valid option and a good source in any disease management strategies. Considering this whole scenario, this present exploration was made to ascertain the spectrum of fungal flora associated with the cotton seeds.

Word cloud from the Introduction

Agro meteorological situation of MCRS, Surat (Gujarat)

In this year, monsoon was delayed in Surat about one month, after that there was sufficient rainfall during the month of July-14. Sowing of most of the experiments was completed

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during the third week of July-2014. The germination was good and satisfactory plant populations were maintained by proper gap filling. In all 886.4 mm rainfall was received in 40 rainy days. Monsoon ceased at the end of September month and two supplemented irrigations (last week of October and first week of December) were given. During the season, the incidence of leaf hopper was observed throughout the crop season and crossed ETL 2 to 3 times. Aphid and Thrips found above ETL once in the season. Mealy bug was found to build up after the cessation of rain. Among bollworms, *Helicoverpa* and *Earias* were moderate to high on non Bt cotton varieties/hybrids. Low to medium infestations of pink bollworm was observed during November to January. No serious attack of disease was observed except low to medium incidence of BLB during September-October. In general, the sowing was delayed however the crop condition is normal and favourable during the reporting period.



Meteorological Data for 2014-15

Parameter	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Total
Surat									
Rainfall	3.0	404.4	286.2	192.8	-	-	-	0.0	866.0
Rain Day	2.0	11.0	18.0	9.0	-	-	-	0.0	40.0
Max Temp	34.3	32.7	31.6	32.3	36.9	35.2	30.9	30.0	
Min Temp	29.5	28.1	27.6	27.4	25.8	22.7	18.1	17.5	
Morning RH	80.2	86.6	88.7	86.1	76.2	81.1	74.8	86.4	
Evening RH	74.4	82.2	83.8	71.1	51.6	55.3	55.1	46.0	
Sunshine	7.4	4.9	1.8	4.8	7.7	6.6	5.8	5.2	

MATERIAL AND METHOD

The susceptible cultivar LRA – 5166 were sown after each four entry in this experiment by dibbling method with the following experimental details (Table:1). All the recommended agronomic practices were followed for raising the good crop. In each net plot of each treatment randomly tag 5 plants and score 5 lower and 5 middle leaves of each plant in terms of 0-4 grade and work out PDI as mentioned below by using 0-4 scale as given by Sheoraj, 1988 and then these grades were converted into per cent disease incidence (PDI) by using the formula given by Wheeler, 1969 (Bacterial leaf blight and *Alternaria* leaf spot diseases).

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

For, Bacterial leaf blight (BLB) disease

Score	Description
0	DF= Immune, completely free from bacterial blight
1	R= Resistant, nearly 1 mm in diameter, not coalescing, reddish, not angular, veins free (Spots few scattered)
2	MR= Moderately resistant, leaf area covered up to 10 %
3	MS= Moderately susceptible, leaf area covered up to 11-20 %
4	S= Susceptible, leaf area covered more than 20 %

For, Alternaria leaf spot (ALS) disease

Score	Description
0	No infection, Completely free from the infection
1	Few <2mm, scattered, brown spots, leaf area covered < 5
2	Spots bigger, 3 mm , not coalescing, brown and 6-20 % leaf area covered
3	Spots 3-5 mm, irregular in shape-coalescing, 21-40 % leaf area covered
4	Spots coalescing to form bigger lesions, irregular > 40 % leaf area covered

For Alternaria disease, it is standard methodology of AICCP, Cotton and similar disease scale was used by Anil, G. H. in his thesis on Studies on leaf blight of Bt cotton caused by *Alternaria* spp. in 2013 submitted to the University of Agricultural Sciences, Dharwad and Hosagoudar *et al.*, 2008ab.

For, Wilt disease

Count diseased plants out of total plants assessed and work out per cent disease incidence and decide disease reaction by referring grade chart.

$$\text{PDI} = \frac{\text{No of diseased plants}}{\text{No of plant assessed}} \times 100$$

Score	Description
0	I=No infection
1	R= Slight yellowing and no defoliation, < 5 % wilting
2	MR=Yellowing and browning of leaves, 6-15 % plants showing wilting MS= Yellowing, browning and discolouration of leaves, Some leaves fall off. Of late partial wilting may occur, 16-25 % plants showing wilting
3	S= In early infection seedlings wilt, adult plant show yellowing, browning and dropping off of the leaves, >25 % plants showing wilting

For wilt disease, it is standard methodology of AICCP, Cotton.

Table 1 Experiment Details

1	Details of the Experiment	
2	Name of Trial	-
3	Objective	To find out resistant sources for different diseases
4	Location	Main Cotton Research Station, Surat (Gujarat)
5	Year	Kharif, 2014
a	Design	Non replicated
b	Treatment /Variety	
c	Replication	
d	Plot size in mts	Gross: 1.2 x 3.6, Net: 1.2 x 2.7
e	No. of varieties/treatment	36 + 01 Susceptible check (LRA 5166)
f	No. of rows/plot	Single row
g	No. of dibbles/row	8
h	Plot size in sq. meter	-
i	Expt. area in ha.	0.03
j	Spacing	120 x 45 cm
k	FYM t/ha	
l	Fertilizer dose NPK kg/ha	240:40:00
m	No. of plant protection	Unprotected for diseases
n	No. of irrigation	As & when required
o	Date of harvesting	-

RESULT AND DISCUSSION

Efforts were made to locate resistant sources and their utilization in resistance breeding programme is imperative to

manage the diseases in the long run. Screening was therefore undertaken to evaluate a number of cotton entries against the bacterial blight disease and other diseases during *kharif* 2014. Total thirty six varieties/ entries including checks were evaluated for their reaction against the bacterial blight disease. Out of these entries, GSHV 159 and GSHV 172 found disease free. Whereas, eleven entries *viz.*, GSHH 2529, GSHH 2646, GTHH 193, G. Cot. Hy.8, GISV 272, GBHV 164, GBHV 180, G. Cot. 16, G. Cot. 20, G. Cot. 22 and GBHV 185 were found Moderately resistant and G. Cot. Hy. 12 and G. Cot. 10 were Moderately susceptible and rest of the entries were found resistant against the bacterial blight disease. Moreover, other diseases were not observed.

Reaction of cotton varieties/cultures against bacterial blight disease at MCRS, NAU, Surat during 2014-15

Sr. No.	Entries	Bacterial leaf blight		
		PDI	Max Grade	Reaction
MLT hirsutum - Hybrids				
1	GSHH 2529	2.0	2	MR
2	GSHH 2646	1.5	2	MR
3	GSHH 2777	0.5	1	R
4	GTHH 193	2.5	2	MR
5	GTHH 194	0.5	1	R
6	GTHH 209	0.5	1	R
7	GTHH 49	0.5	1	R
8	G. Cot. Hy.8	10.0	2	MR
9	G. Cot. Hy.12	11.5	3	MS
MLT of <i>G. hirsutum</i>				
10	GSHV 159	0.0	0	DF
11	GISV 216	0.5	1	R
12	GISV 272	5.0	2	MR
13	GBHV 164	6.0	2	MR
14	GBHV 170	1.0	1	R
15	GBHV 177	2.5	1	R
16	GBHV 180	6.5	2	MR
17	G. Cot. 10	12.5	3	MS
18	G. Cot. 16	9.0	2	MR
19	G. Cot. 20	8.5	2	MR
20	G. Cot. 22	10.5	2	MR
LSVT of <i>G. hirsutum</i>				
21	G. Cot. 10	14.5	3	MS
22	GSHV 172	0.0	0	DF
23	GSHV 173	1.5	1	R
24	GSHV 175	4.5	1	R
25	GBHV 12	3.0	1	R
26	GBHV 183	3.5	1	R
27	GBHV 185	7.5	2	MR
28	GJHV 473	0.5	1	R
29	GJHV 517	2.0	1	R
30	GJHV 519	4.0	1	R
31	GJHV 526	6.5	1	R
32	GTHV 8/10	4.5	1	R
33	GTHV 10/25	3.0	1	R
34	GTHV 10/28	3.5	1	R
35	G. Cot. 16	9.5	2	MR
36	G. Cot. 20	12.0	2	MR

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