

RESEARCH ARTICLE

Survey and occurrence of different diseases of cotton in cultivators' and farmers field under South Gujarat condition

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SUMMARY

Cotton (*Gossypium hirsutum* L.) is the world's leading food and fibre crop. Cotton recognized as "white gold" plays a pivotal role in the economy. In this experiment, different districts of South Gujarat were closely examined for various diseases in different cultivars. The cultivars susceptible to bacterial blight *viz.*, Surat dwarf, LRA 5166 showed bacterial blight intensity to the tune of 15 and 30 per cent, respectively. Whereas, on other cultivars like G. Cot. Hy. 6 BG II and G. Cot. Hy. 8 BG II intensity was 0.2 per cent only. Alternaria incidence was also noticed in G. Cot. 100 in good proportion (10 to 12 %) while on other cultivars, it was negligible. Roving survey was conducted at Olpad, Bhadol, Takarma and Hansot, the bacterial leaf blight (BLB) was in the range 1 to 5 per cent whereas, Alternaria leaf blight (ALB) was in the range of 3 to 10 per cent.

Key Words : Cotton, Intensity, Pest, Disease

How to cite this article : Sandipan, Prashant B., Bhanderi, G.R., Patel, R.D., Desai, H.R. and Solanki, B.G. (2016). Survey and occurrence of different diseases of cotton in cultivators' and farmers field under South Gujarat condition. *Internat. J. Plant Sci.*, **11** (2): 278-281, DOI: 10.15740/HAS/IJPS/11.2/278-281.

Article chronicle : Received : 13.03.2016; Revised : 05.05.2016; Accepted : 12.06.2016

Cotton is unique crop and economically very important in India and predominantly used world over with attention. Cotton "white gold" enjoys a pre-eminent status among all the cash crops in the country and is the principal raw material for a flourishing textile industry. Proper awareness with the emphasis on

crop improvement, crop production techniques, crop protection technologies and value addition are of the paramount importance in ensuring sustainability of cotton production and also livelihood security for the farmers. Cotton is manifested by various pests (Insects/diseases causing pathogens/ weeds *etc.*) causing serious economic losses. In the pre Bt cotton era (Before 2002) the boll worm complex led by American boll worm *Helicoverpa armigera* almost entirely damaged the cotton crop if left unprotected. In the post Bt cotton era (2002 onwards) sucking pests like aphids, jassids, thrips, whitefly, mealybugs, myrid bugs and mites continue to ravage the cotton crop and pose a serious threat to sustain and enhance cotton productivity (Tanweer, 2013). In India,

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30 diseases have been reported for cotton crop. Out of these, 17 are caused by pathogens of fungal origin, four of bacterial nature, two are of nematodes and many known and unknown viruses and physiological disorders (Sekhon *et al.*, 2008).

Among the diseases, bacterial blight caused by *Xanthomonas malvacearum* and boll rot complex is the major constraints. This pathogen infects almost all crop stages and causes considerable loss in the seed cotton yield, seed index, oil percentage and ginning out turn (Meshram and Sheoraj, 1988 and Shelke *et al.*, 2012). The bacterial blight is the most wide spread and destructive disease reported to cause yield losses of about 10 to 30 per cent (Kalpana *et al.*, 2004, Mishra and Krishna, 2001) and also affect the quality of lint (Sharma and Chauhan, 1985). Under natural bacterial blight infection, boll yield losses upto 35 per cent have been reported (Sheoraj and Verma, 1988). Bacterial leaf blight, boll rots, wilts and leaf spots are the most destructive cotton diseases and are also known to cause considerable losses in yield (Chopra, 1977 and Bashi *et al.*, 1983). Continuous rain and moist condition, injudicious use of nitrogen fertilizer and irrigation create most favourable condition for the fungal foliar diseases. Losses due to *Alternaria* leaf spot (26.6 %), grey mildew (29.2 %) and *Myrothecium* leaf spot (29.1 %) have been reported. This leads to felt a closer examination of the incidence of diseases those were present on cotton crop into the South Gujarat region, hence, it is felt necessary to carry out systemic investigation on various diseases.

Major cotton diseases in India :

- Bacterial blight [*Xanthomonas campestris* pv *malvacearum* (Smith) Dye], Maharashtra, Gujarat, Karnataka
- Cotton leaf curl (Gemini virus), North zone (Potential threat)
- *Alternaria* leaf spot (*Alternaria macrospora* Zimm.), Maharashtra, Gujarat, Karnataka
- Grey mildew (*Ramularia areola* Atk.), Central and South zone (Emerging)
- *Myrothecium* leaf spot (*Myrothecium roridum* Tode ex Fr.), Madhya Pradesh
- Leaf rust [*Phakopsora gossypii* (Arth) Hirat F.], Karnataka, Andhra Pradesh (Emerging)
- *Cercospora* leaf spots (*Cercospora gossypina* Southw.), Andhra Pradesh (Minor)
- *Helminthosporium* leaf spot [*Helminthosporium spiciferum* (Bain) Nicot.], Andhra Pradesh

(Minor)

- Anthracnose (*Colletotricum gossypii* Southw.), South zone (Minor)
- Tobacco streak virus (Iilar virus), Andhra Pradesh (Emerging)
- Wilt [*Fusarium oxysporum* f. sp. *vasinfectum* (Atk.) Snyder and Hansen], restricted to diploids
- New wilt/sudden wilt (Parawilt)
- Root rot [*Rhizoctonia solani* Kuhn, *R. bataticola* (Taub) Butler], scattered
- Leaf reddening
- *Verticillium* wilt (*Verticillium dahliae* Khleb.), Tamil Nadu, Karnataka.

MATERIAL AND METHODS

In South Gujarat region, survey of the major diseases of cotton crop was carried out in different fields in various districts. Bt cotton fields from different areas were selected randomly on the survey route. In each field, plants were selected at random and the severity for different diseases was recorded. The range of severity of disease intensity was calculated for foliar diseases as the incidence of particular disease in their respective areas (Table A).

Table A: Disease scale

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 %

Five leaves from lower part and 5 leaves from middle/ plant were selected by using 0-4 scale as given by (Sheoraj, 1989) and then these grades were converted into per cent disease intensity (PDI) by using the formula given by Wheeler (1969) :

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

RESULTS AND DISCUSSION

A rowing survey was conducted on cultivators' field during crop season and a fix point survey on G.Cot. Hy. 12 cotton was conducted periodically at research farm.

Periodically observations recorded on G. Cot. Hy. 12 cotton at Surat farm revealed that bacterial blight

appeared during 1st week of August (2.66 %) and progressively developed and reached at its peak (24.75 %) during 3rd week of September and then gradually declined, but prevailed upto 3rd week of November. Observations were also recorded on other cultivars. The cultivars susceptible to bacterial blight viz., Surat dwarf, LRA 5166 showed bacterial blight intensity to the tune of 15 and 30 per cent, respectively. Whereas on other cultivars like G. Cot. Hy. 6 BG II and G. Cot. Hy. 8 BG II, intensity was 0 to 2 per cent only (Table 1 and Fig. 1).

Alternaria incidence was also noticed in G. Cot. 100 in good proportion (10 to 12 %) while, on other cultivars, it was negligible. Rowing survey was conducted at Olpad, Bhadol, Takarma and Hansot, the bacterial leaf blight (BLB) was in the range 1 to 5 per cent, whereas Alternaria leaf blight (ALB) was in the range of 5 to 10 per cent.

At Achhalia Research Station, BLB intensity was 0 to 10 per cent, whereas Talod Research Station, bacterial blight intensity was 0 to 3 per cent and Alternaria intensity was 3 to 10 per cent (Fig. 2).

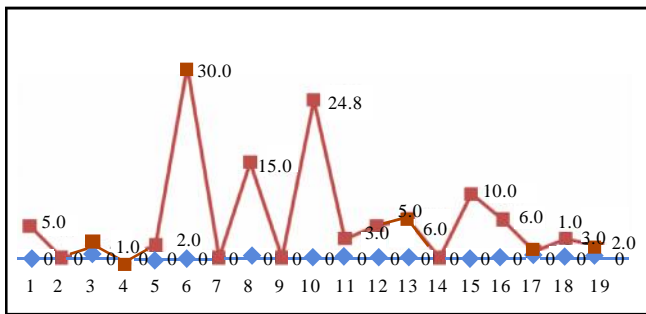


Fig. 1 : Shows the bacterial blight intensity, PDI. (Maximum range was taken)



Fig. 2 : Shows the alternaria leaf blight, PDI. (Maximum range was taken)

Table 1 : Occurrence of cotton diseases on Research Station and cultivators' fields (2013-14)

District	Month	Variety	Disease (PDI)	
Surat	September-October	G. Cot. 100	*BLB	0 to 5
			*ALB	10 to 12
MCRS, Surat		G. Cot. Hy. 6 BG II	BLB	0 to 1
			ALB	0 to 2
		G. Cot. Hy. 8 BG II	BLB	0 to 2
			ALB	0 to 1
		LRA 5166	BLB	15 to 30
			ALB	3 to 5
Surat dwarf		BLB	10 to 15	
		ALB	0 to 2	
Farmers' field	September	G. Cot. Hy. 12	BLB	2.66 to 24.75
			RCH-2 BG II	BLB
		Olpad , Bhadol, Takarma, Hansot	ALB	4 to 5
			Ajeet 155 BG II	BLB
		Vikram 5 BG II	ALB	8 to 10
			BLB	1 to 6
Acchalia Research Station	September	Suraj	BLB	3 to 10
		RCH-2 BG II	BLB	2 to 6
		G. Cot. Hy. 8 BG II	BLB	0 to 1
		Talod Research Station	November	G. Cot. Hy. 8 BG II
ALB	3 to 7			
G. Cot. Hy. 6 BG II	BLB	0 to 2		
	ALB	5 to 10		

*Bacterial leaf blight (BLB)

*Alternaria leaf blight (ALB)

Acknowledgement :

Author thanks to Main Cotton Research Station (MCRS), Surat (Gujarat) for providing the required facility and other necessary arrangements for the facilitating the experiment.

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