

Original Research Article

<https://doi.org/10.20546/ijcmas.2019.810.306>

Status of Different Diseases of Cotton under South Gujarat Region of India

Prashant B. Sandipan*, R. K. Patel, G. O. Faldu and D. M. Patel

Main Cotton Research Station (MCRS), Navsari Agricultural University (NAU),
Surat 395 007 (Gujarat), India

*Corresponding author

ABSTRACT

In this experiment, different districts of South Gujarat were closely examined for various diseases in different cultivars/ Bt hybrids. A roving survey was conducted on cultivars' field during the crop season and a fix point survey on cotton crop was conducted periodically at Research farm, Surat. During the season, only Bacterial leaf blight disease was found on G. Cot. Hy. 12. The incidence of Bacterial leaf blight disease (BLB) was noticed from 33rd to 50th standard week with the maximum disease intensity in the third week of October (22.5 %) *i.e.* in 42nd Met. week. Results indicated that Bacterial leaf blight (BLB) disease has positive correlation with the maximum and minimum temperature and sunshine hour for the disease development. Survey was conducted on farmer's field as well as on Research farm. Bacterial leaf blight incidence varied from 0.0 to 22.5 PDI and Alternaria leaf spot disease varied from 0.0 to 12.0 PDI in different cultivars/ hybrids on Research farm. Whereas, in case of farmer's field, roving survey was mostly carried out on BG II hybrids, the BLB incidence was in the range of 0.0 to 4.5 %, 0.0 to 12.0 % and 2.0 to 4.5 PDI in Surat, Bharuch and Narmada districts, respectively. Moreover, Alternaria leaf spot disease was observed to the tune of 0.0 to 8.0 %, 0.0 to 10.0 % and 0.0 to 1.0 PDI in Surat, Bharuch and Narmada district, respectively.

Keywords

Cotton, Survey,
Intensity, Pest,
Disease

Article Info

Accepted:
15 September 2019
Available Online:
10 October 2019

Introduction

Cotton is called as "The White Gold" of "The king fibers" which aggregates a pre-eminent status and a leading role among all the cash crops in the country and is the foremost raw material for booming a textile industry. Proper awareness with the emphasis on crop improvement, crop production techniques, crop protection technologies and other value

addition parts are of the overriding importance in ensuring sustainability of cotton production and also livelihood security for the cotton growing farmers.

The crop is affected by abundant pests, diseases and weeds *etc* causing serious economic losses in a crop. In the post Bt cotton era (2002 onwards) sucking pests like Aphids, Jassids, Thrips, Whitefly, Mealybugs,

Myriad bugs and Mites continue to ravage the cotton crop and pose a serious threat to sustain and enhance cotton productivity (Tanweer, 2013) and now the pink bollworm a serious thread remains. In India, 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 Raj, 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, Krishna, 2001 and Sandipan *et al.*, 2016) and also affect the quality of lint (Sharma and Chauhan, 1985).

Under natural bacterial blight infection, boll yield losses up to 35 % 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 on the whole state of affairs leads to felt a closer inspection of the diseases those were present

on cotton crop under South Gujarat region, hence systemic explorations on various cotton diseases were carried out.

Major Diseases of Cotton

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 & 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 gossypisii* Southw.), South zone (Minor)

Tobacco streak virus (Iilar virus), Andhra Pradesh (Emerging)

Wilt (*Fusarium oxysporum* f. sp. *vasinfectum* (Atk.) Snyder & Hansen), Restricted to diploids

New wilt/sudden wilt (Parawilt)

Root rot (*Rhizoctonia solani* Kuhn, *R. bataticola* (Taub) Butler), Scattered

Leaf reddening almost all the pockets

Verticillium wilt (*Verticillium dahliae* Khleb.), Tamil Nadu, Karnataka

Materials 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 diseases in their respective areas. 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).

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

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 |
| 2 | MR= Moderately resistant, leaf area covered up to 2- 10 % |
| 3 | MS= Moderately susceptible, infection 11-20 % |
| 4 | S= Susceptible, infection more than 20 % |

For, Alternaria leaf spot (ALS) disease

| Score | Description |
|-------|---|
| 0 | No infection |
| 1 | Few < 2mm, scattered, brown spots, < 5 leaf area covered |
| 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 |

Results and Discussion

A roving survey was conducted on cultivars’ field during the crop season and a fix point survey on cotton was conducted periodically at Research farm. On Research farm, periodically observations were recorded on G. Cot. Hy. 12 revealed that Bacterial leaf blight disease appeared during the second week of August (1.0 %) *i.e.* in 33rd Met. week and then gradually developed and reached at its peak in the third week of October (22.5 %) *i.e.* in 42nd Met. week. The susceptible cultivars *viz.*, LRA 5166 showed Bacterial leaf blight intensity to the tune of 0.0 to 22.5 per cent PDI moreover, non Bt cotton was more susceptible to the Bacterial leaf blight disease and also to Alternaria leaf spot disease.

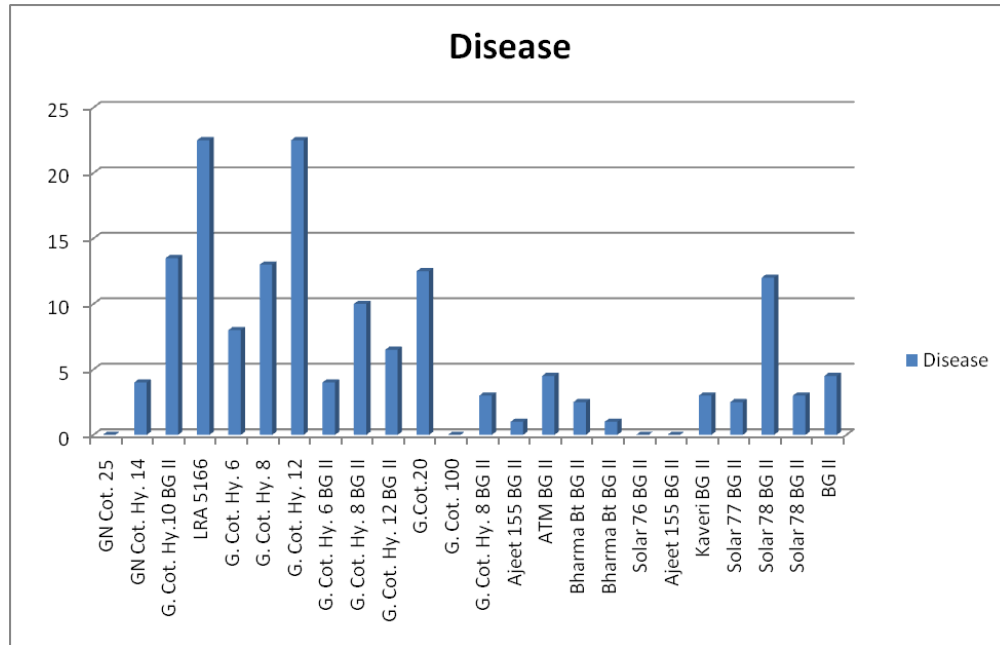
During 30 - 45 DAS (vegetative stage of the crop), the BLB and ALS was more pronounced on the lower leaves of the cotton crop. Alternaria leaf spot disease was observed to the tune of 0.0-12.0 PDI in the cultivar G. Cot.100 as shown in the Table : 1 & Graph: 1 & 2.

Roving survey was conducted in Surat, Bharuch and Narmada districts on farmer’s field where the mostly BG II hybrids were cultivated.

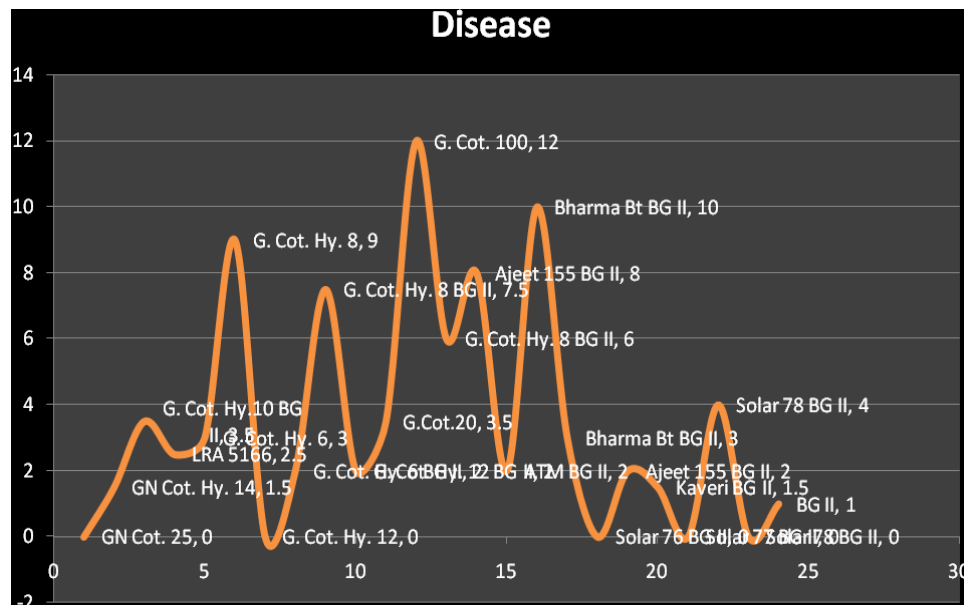
Table.1 Observations on the occurrence of the diseases (in farmer's field and research farm) during 2017-18

| Sr. No. | District | Taluka | Location/ Village | Month | Variety/ Hybrids/cultivars | Disease (PDI) (Range) | |
|---------|----------|-------------|---|-----------------------------|-------------------------------|--------------------------|----------|
| | | | | | | BLB | ALS |
| 1 | Surat | Choryasi | MCRS 21.10'1" °N 72.47'57" °E | September to November | GN Cot. 25 | 0.0-0.0 | 0.0-0.0 |
| | | | | | GN Cot. Hy. 14 | 0.0-4.0 | 0.0-1.5 |
| | | | | | G. Cot. Hy.10 BG II | 0.0-13.5 | 0.0- 3.5 |
| | | | | | LRA 5166 | 0.0-22.5 | 1.0-2.5 |
| | | | | | G. Cot. Hy. 6 | 0.0-8.0 | 0.0-3.0 |
| | | | | | G. Cot. Hy. 8 | 0.0-13.0 | 0.0-9.0 |
| | | | | | G. Cot. Hy. 12 | 0.0-22.5 | 0.0-0.0 |
| | | | | | G. Cot. Hy. 6 BG II | 0.0-4.0 | 1.0-2.0 |
| | | | | | G. Cot. Hy. 8 BG II | 0.0-10.0 | 1.0-7.5 |
| | | | | | G. Cot. Hy. 12 BG II | 2.0-6.5 | 0.0-2.0 |
| | | | | | G.Cot.20 | 0.0-12.5 | 0.0-3.5 |
| | | G. Cot. 100 | - | 0.0-12.0 | | | |
| | | Mangrol | Vad 21.30'1" °N 73.16'27" °E | October | G. Cot. Hy. 8 BG II | 2.0-3.0 | 5.0-6.0 |
| | | Mangrol | Ubhariya 21.30'57" °N 73.19'56" °E | | Ajeet 155 BG II | 0.0-1.0 | 5.0-8.0 |
| | | Mangrol | Mosali 21.44'53" °N 73.14'98" °E | | ATM BG II | 1.0- 4.5 | 0.0- 2.0 |
| 2 | Bharuch | Jhagadia | Dharoli 21.36'16" °N 73.14'58" °E | October | Bharma Bt BG II | 0.0-2.5 | 8.0-10.0 |
| | | Valia | Merapur 21.29'43" °N 73.19'56" °E | October | Bharma Bt BG II | 0.0-1.0 | 2.0-3.0 |
| | | | Kambodiya 21.36'24" °N 73.21'21" °E | October | Solar 76 BG II | 0.0-0 | 0.0-0.0 |
| | | | Chiklota 21.37'53" °N 73.18'36" °E | October | Ajeet 155 BG II | 0.0-0.0 | 0.0-2.0 |
| | | Vagra | Kesavan 21.86'65" °N 72.69'91" °E | October | Kaveri BG II | 0.0-3.0 | 0.0-1.5 |
| | | | Khojbal 21.73'92" °N 72.74'62" °E | October | Solar 77 BG II | 0.0-2.5 | 0.0-0.0 |

Graph.1 Shows the Bacterial blight intensity, PDI (Maximum grade was taken)



Graph.2 Shows the *Alternaria* leaf blight, PDI. (Maximum grade was taken)



The incidence of Bacterial leaf blight disease was in the range of 0.0 to 4.5 %, 0.0 to 12.0 % and 2.0 to 4.5 PDI in Surat, Bharuch and Narmada districts, respectively on cultivars fields in majority cultivated areas of BG II

hybrids. However in Vad village of Mangrol taluka of Surat district, Para wilt symptoms were observed in the range of 0.0 to 20.0 %. Moreover, in case of Alternaria leaf spot disease it was observed in the tune of 0.0 to

8.0 %, 0.0 to 10.0 % and 0.0 to 1.0 PDI in Surat, Bharuch and Narmada district, respectively as shown in the Graph: 1 & 2.

Acknowledgement

Author is highly thankful to main Cotton Research Station (MCRS), NAU, Surat (Gujarat) for providing the required facility and other necessary arrangements for conducting the experiment in an efficient way.

References

- Bashi, E., Sachs, Y. and Rotem, J. 1983. *Phytoparasitica*, 11: 89-97.
- Chopra, B. L. 1977. Important diseases of cotton and their control measures in India. Paper presented at staff course on cotton production, its processing and marketing technology held at P.A.U., Ludhiana.
- Kalpana, P., Chellamuthu, V. and Jeyalakshmi, C. 2004. Screening of cotton hybrids against bacterial blight incited by *Xanthomonas campestris* pv. *malvacearum* (Smith) Dye, Paper presented in Inter. Symp. Strat. Sust. Cotton Prod. – A Global Vision 3, Crop Production, 23-25 November 2004, Univ. Agric. Sci., Dharwad (India), pp. 373-374.
- Meshram, M. K. and Sheo, Raj. 1988. Assessing losses due to bacterial blight diseases. Plant Pathology. The Tata McGraw Hill Publ. Co. Ltd., New Delhi, pp. 315.
- Mishra, S. P. and Krishna, A. 2001. Assessment of yield potential losses due to bacterial blight of cotton. *Journal of Mycology and Plant Pathology*, 31: 232-233.
- Prashant B. Sandipan, 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. *International. J. Plant Sci.*, 1 (2): 278-281.
- Sharma, B. K. and Chauhan, M. S. 1985. Studies on the chemical control of foliar diseases of cotton in Haryana state. *Agric. Sci. Digest*. 5: 153-56.
- Sekhon, P. S., Singh, D. and Singh, G. 2008. Cotton pathology research achievements and targets in Punjab. All India Coordinated Cotton Improvement Project Report. PAU, Ludhiana.
- Sheoraj and Verma, J. P. 1988. Diseases of cotton in India and their management. *Review of Tropical Plant Pathology*, 5: 207-254.
- Sheoraj. 1989. Grading system for cotton disease. CICR Publication, Nagpur.
- Shelke, G. V., Aurangabadkar, L. P., Kashikar, A. R., Wadyalkar, S. R., Phalak, M. S., Kharkar, H. H. and Umlkar, G. V. 2012. Identification of resistance source for Bacterial blight disease caused by *Xanthomonas axonopodis* pv. *malvacearum* and its genetic inheritance in upland cotton. *Cotton Research Journal*, 3 (2): 167-173.
- Tanweer, Asif. 2013. Pesticides in Cotton – The Road Ahead. National convention on India cotton: Gearing up for Global leadership. Pp. P 9-11.
- Wheeler, B. E. J. 1969. An Introduction of Plant Disease, John Wiley and Sons Limited, London, p. 301.

How to cite this article:

Prashant B. Sandipan, R. K. Patel, G. O. Faldu and Patel, D. M. 2019. Status of Different Diseases of Cotton under South Gujarat Region of India. *Int.J.Curr.Microbiol.App.Sci*. 8(10): 2651-2657. doi: <https://doi.org/10.20546/ijcmas.2019.810.306>