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Survey for msajor foliar diseases of *Bt* cotton in Northern Eastern Karnataka

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Abstract
Survey conducted in four districts of Northern Karnataka during *kharif* 2017-18, revealed that the disease severity of major foliar diseases *viz.*, *Alternaria* leaf spot, *Cercospora* leaf spot and bacterial leaf blight ranged from 12 to 51, 8.50 to 30 and 3 to 13 per cent, respectively. The highest severity (51.00%) of *Alternaria* leaf spot was noticed at Chandrabanda village in Raichur district, maximum severity (30.00%) of *Cercospora* leaf spot was recorded at Indira Nagar in Raichur district. Whereas, highest severity (13.00%) of bacterial blight was noticed at Halagadda village of Kalaburgi district. The average highest *Alternaria* leaf spot and *Cercospora* leaf spot disease severity of 39.57 and 20.37 per cent, respectively was recorded in Raichur district. The average highest bacterial leaf blight severity of 9.28 per cent was recorded in Kalaburgi district.

Keywords: Foliar diseases, *Bt* cotton, during *kharif*

Introduction
Cotton, "The White Gold" or the "King of Fibres" enjoys a pre-eminent status among all cash crops in the country. In India, Inspite of severe competition from synthetic fibres it is occupying the premier position with 70 per cent share in the textile industry. India occupies first place in area and second place in cotton production after China in the world. India's production is 351 lakh bales of 170 kg lint from an area of 105 lakh ha with a productivity of 568 kg^{-1} ha (Anon., 2017) [2]. India's share in global cotton exports is around 22 per cent. In Karnataka, *Bt* cotton occupies an area of 6.33 lakh ha with a production of 18.02 lakh bales with a productivity of 510 kg^{-1} ha (Anon., 2015) [1].
The low productivity of cotton is attributed to many factors, one of which is the losses due to diseases although insect pests continue to be a major constraint. In India, *Bt* cotton is known to be attacked by 30 diseases. Out of these, 17 are caused by pathogens of fungal origin, four of bacterial in nature, two are of nematode and many known and unknown viruses and physiological disorders. Only the type of disease and virulence differs from different agro-climatic regions. These changes may be due to change over in the cultivation from Asiatic cotton to American cotton and hybrids. Most of them, even though they are high yielding but susceptible to most of the diseases (Shivankar and Wangikar, 1992) [5]. Among the fungal diseases *Alternaria* leaf spot, *Cercospora* leaf spot and grey mildew are predominant diseases causing economic losses and among bacterial disease, bacterial leaf spot is most important. Keeping this in view, a roving survey was conducted during *kharif* 2017-18 in North Eastern Karnataka.

Material and Methods
Bt cotton growing fields from different parts of Northern Karnataka *viz.*, Raichur, Koppal, Yadagir, and Kalaburgi districts were selected randomly. In each district, three major *Bt* cotton growing taluks were selected and in each taluk three villages were surveyed comprising two to three fields in each village. In each field ten plants were selected randomly and then the percent disease severity was assessed by using 0-4 scale (Mayee and Datar, 1986) [4]. Later these grades were converted into per cent disease index (PDI) by using the formula given by Wheeler (1969) [6].

$$\text{Per cent disease index} = \frac{\text{Sum of numerical ratings}}{\text{Total number of plants observed} \times \text{Maximum disease grade}} \times 100$$

Results and Discussion
The results of the survey (Table 1) indicated that, *Alternaria* leaf spot was present in all the areas surveyed followed by *Cercospora* leaf spot and low severity of bacterial blight was

recorded. The disease severity of *Alternaria* leaf spot was ranged from 12 to 51 per cent and highest severity of 51.00 per cent was noticed at Chandrabanda village in Raichur taluk followed by 44.06 per cent at Gabbur village in Deodurga taluk. Whereas, least severity of 12.00 per cent was recorded in Devlapur village of Koppal taluk. The Average highest *Alternaria* leaf spot severity was recorded in Raichur district (39.57%) followed by Yadagir (28.40%) and least of 21.18 per cent was noticed in Koppal district.

With regard to *Cercospora* leaf spot, the disease severity ranged from 8.50 to 30 per cent. The maximum disease severity of 30.00 per cent was noticed at Indira Nagar of Deodurga taluk followed by Basava camp (26.00%) in Raichur taluk and least severity of 8.50 per cent was noticed at Kolur village in Koppal taluk. The Average highest *Cercospora* leaf spot severity was recorded in Raichur district (20.37%) followed by Yadagir (17.58%) and minimum of 14.65 per cent was noticed in Koppal district (Table 1)

Bacterial leaf blight was recorded in all the four districts surveyed but it was noticed in lesser extent as compared to *Alternaria* and *Cercospora* leaf spots. The incidence ranged from 3 to 13 per cent, relatively highest severity of 13.00 per cent was recorded in Halagadda village of Jewargi taluk and least severity of 3.00 per cent was noticed at Jokuru village in Manvi taluk and Rastapur village of Shahapur taluk. The average highest severity of bacterial leaf blight was recorded in Kalaburgi (9.28%) followed by Yadagir (8.51%) districts and least severity was recorded at Raichur (6.96%) district (Table 1)

Table 1: Severity of major foliar diseases of Bt- cotton in North Eastern Karnataka during *kharif* 2017-18

District	Taluk	Village	Per cent disease index		
			***Alternaria* leaf spot**	***Cercospora* leaf spot**	**Bacterial leaf blight**
Raichur	Raichur	Bettadur	38.50	12.50	10.00
		Chandrabanda	51.00	22.00	5.00
		Basava camp	42.00	26.00	7.00
	Deodurga	Gabbur	44.06	20.88	12.50
		Mailapur	32.72	22.50	6.80
		Indira nagar	38.50	30.00	4.00
	Manvi	Rajolli	28.90	12.85	5.00
		Neer Manvi	39.00	18.20	9.50
		Jokuru	35.50	10.50	3.00
Koppal	Koppal	Kolur	24.62	8.50	10.20
		Hiresindhogi	20.00	15.00	12.00
		Devlapura	12.00	14.80	5.00
	Kustagi	Hulihyder	31.00	12.60	7.50
		Taveragera	22.60	20.00	5.80
		Hanumasagara	18.00	23.20	8.00
	Yalaburga	Revanaki	24.00	12.85	4.50
		mangalore	18.50	10.00	8.00
		Irkalgada	20.00	15.00	6.50
Yadagir	Yadagir	Shettyhalli	32.00	15.24	12.50
		Aalipura	36.00	20.30	6.80
		Nalvar	28.00	12.00	10.00
	Shahapur	Rastapur	28.50	15.20	3.00
		Hattigudur	23.00	22.58	8.50
		Kangandi	34.20	12.00	5.80
	Shorapur	Krishnapur	30.00	20.02	10.00
		Itga	25.00	15.80	12.50
		Lakshmipur	19.00	25.12	8.00
Kalaburgi	Kalaburgi	Sannur	28.80	13.50	12.50
		Shahabad	12.50	10.00	10.00
		Mugulnagavi	32.00	18.50	7.50
	Aland	Nimbal	38.50	12.00	8.00
		Madanahipparaga	21.00	10.00	10.02
		Hadalgi	20.50	18.65	3.50
	Jewargi	Nelogi	12.50	22.00	11.00
		Halagadda	18.20	20.00	13.00
		Chigarolli	23.50	16.60	8.25

Conclusion

Based on the study, the results indicated that the foliar diseases of *Bt* cotton *viz*., *Alternaria* leaf spot, *Cercospora* leaf spot and bacterial leaf blight in different parts of Northern Karnataka are ranked as first, second and third, respectively according to their prevalence. *Alternaria* leaf spot is predominant foliar disease taking upper hand and it is noticed in all the four districts surveyed. The next disease in order was *Cercospora* leaf spot and relatively lesser severity of bacterial leaf blight was noticed in surveyed areas with respect to their prevalence (Chattannavar *et al*., 2011) [3].

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