

## Survey for disease severity of *Alternaria* leaf spot of *Bt* cotton from major growing parts of Karnataka

G. N. HOSAGOUDAR AND S. N. CHATTANAVAR\*

Department of Plant Pathology, University of Agricultural Sciences, Dharwad, 580 007

\*E-mail: uasdsnc1211@gmail.com

**ABSTRACT:** From the survey during *kharif* 2010-2011, revealed that the disease severity ranged from 5.42 to 32.16 per cent in different parts of the districts. The highest severity (32.16%) was noticed at Guladkoppa village in Dharwad district, whereas least (5.42%) severity was recorded at Ingaldahalli village in Chitradurga district. The average highest disease severity of 23.25 per cent was recorded in Gulbarga district. The lowest disease severity of 10.09 per cent was recorded in Haveri district. During *kharif* 2011-2012, the disease severity ranged from 8.75 to 28.42 per cent in different parts of the districts. The highest severity (28.42%) was noticed at fields of Dharwad Farm in Dharwad district, whereas least (8.75%) severity was recorded at Malagunda village in Gadag district. The average highest disease severity of 19.91 per cent was recorded in Bellary district. The lowest disease severity of 14.31 per cent was recorded in Gadag district.

**Key words:** *Bt* cotton, survey, disease, leaf spot

Cotton is one of the most ancient and important commercial crops next only to food grains and is the principal raw material for a flourishing textile industry. There has also been a manifold improvement in production, productivity and quality with virtual increase in area. India now produces around 371.20 lakh bales of cotton ranging from short staple to extra long staple from an area of 121.91 lakh ha with productivity of 481.23 kg/ha (Anonymous, 2012). In Karnataka, the area under cotton cultivation is 5.49 lakh ha with a production of 13.10 lakh bales and an average productivity of 405.65 kg/ha (Anonymous, 2012). However, the production potential of the crop has not been fully exploited due to several biotic and abiotic factors. The crop suffers from many fungal diseases, of which foliar diseases take a heavy toll and among the diseases, *Alternaria* leaf spot causes yield losses up to 26 per cent (Chattannavar *et al.*, 2006).

Keeping this in view, the present investigations were undertaken to survey for disease severity of *Alternaria* leaf spot on *Bt* cotton from major growing parts of Karnataka

### MATERIALS AND METHODS

**Survey for disease severity :** Roving method of survey was followed to assess the incidence of *Alternaria* leaf spot. The survey conducted during *kharif*, 2010-2011 and 2011-2012 in areas of Dharwad, Haveri, Belgaum,

Bagalkot, Gadag, Bellary, Raichur, Yadagiri, Chitradurga, Koppal and Gulbarga districts of north Karnataka to assess the per cent disease index of *Alternaria* leaf spot in farmers' fields and research farms. The mean for each district was worked out as follows.

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

The incidence of disease was recorded by using 0 - 4 scale and then these grades were converted into per cent disease indices (PDI).

### RESULTS AND DISCUSSION

**Survey for disease severity :** Roving survey was carried out for recording the severity during *kharif*, 2010-2011 and 2011-2012 in 12 major *Bt* cotton growing districts of northern Karnataka *viz.*, Dharwad, Haveri, Belgaum, Bagalkot, Bijapur, Gadag, Koppal, Chitradurga, Raichur, Bellary, Yadagiri and Gulbarga and the data pertaining to survey work was presented in Table 1. From the survey it was observed that the disease was severe in all the districts during *kharif*, 2010-2011 and disease severity ranged from 5.42 to 32.16 per cent in different districts. The highest severity (32.16%) was noticed in fields of Guladkoppa village in Dharwad district,

**Table 1.** Survey for disease severity of *Alternaria* leaf spot of *Bt* cotton in North Karnataka during 2010-11

District	Taluk	Grown under	Locations	Per cent Disease Index		
<b>Chitradurga</b>	Holalkere	Rainfed	Nandan Hosur	20.80		
		Rainfed	Gangathi	21.54		
		Rainfed	Hoodigeri	22.32		
		Rainfed	Ingaldahalli	5.42		
			<b>District Mean</b>	<b>17.52</b>		
<b>Haveri</b>	Haveri	Rainfed	Haveri	10.87		
		Rainfed	Agadi	6.38		
		Rainfed	Talemorab	7.24		
		Rainfed	Halageri	10.33		
		Rainfed	Haunsbhavi	12.42		
		Rainfed	Yogikoppa	13.28		
			<b>District Mean</b>	<b>10.09</b>		
<b>Belgaum</b>	Bailhongal	Irrigated	Kittur	25.42		
		Rainfed	Hirenandihalli	22.34		
		Rainfed	Sangolli	25.43		
		Irrigated	Nayanagar	21.58		
		Rainfed	Bylawad	23.46		
		Rainfed	Murkibhavi	22.87		
		Rainfed	Mallapur	20.38		
		Rainfed	Khanagao	23.82		
		Rainfed	Kolavi	15.56		
		Rainfed	Paranahatti	12.63		
	Gokak	Irrigated	ARS Arabhavi	24.32		
		Irrigated	Jodatti	13.36		
		Rainfed	Yaragatti	8.40		
		Irrigated	Goravanakolla	20.90		
		Rainfed	Saudatti	18.10		
		Rainfed	Ulligeri	20.72		
			<b>District Mean</b>	<b>19.96</b>		
		<b>Dharwad</b>	Dharwad	Rainfed	MARS Dharwad	30.28
				Rainfed	Guladkoppa	32.16
Rainfed	Harobelavadi			13.20		
Rainfed	Hebballi			17.38		
Rainfed	Byahatti			21.83		
Hubli	Rainfed		Hebbasur	15.78		
	Rainfed		Navalgund	16.32		
Navalgund	Rainfed		Basapur	18.28		
	Rainfed		Annigeri	20.56		
			<b>District Mean</b>	<b>20.64</b>		
<b>Gadag</b>	Gadag	Rainfed	Hulkoti	17.34		
		Rainfed	Lakkundi	12.48		
			<b>District Mean</b>	<b>14.91</b>		
<b>Koppal</b>	Koppal	Rainfed	Talakalla	8.33		
		Rainfed	Kidadal	12.10		
			<b>District Mean</b>	<b>10.22</b>		
<b>Raichur</b>	Sindhanur	Irrigated	Sindhanur	16.78		
		Irrigated	Javalageri	18.86		
		Irrigated	Potnala	13.82		
	Manvi	Irrigated	Kapagal	12.93		
		Irrigated	Kallur	30.12		
	Raichur	Rainfed	MARS Raichur	18.43		
		Irrigated	Kalmala	7.46		
	Devadurga	Irrigated	Sulthanpur	17.86		
		Irrigated	Gabbur	19.61		
		Irrigated	Sunkeshwarhala	25.72		
		Irrigated	Mandagalla	24.23		
		Irrigated	Devadurga	16.95		
		<b>District Mean</b>	<b>18.56</b>			
<b>Yadagiri</b>	Shahapur	Irrigated	Beeranur	20.63		
		Irrigated	Hattigudoor	17.43		
		Irrigated	Gudekalla	18.33		
		Irrigated	B. Gudi	25.78		
		Irrigated	Hohtpet	26.35		
			<b>District Mean</b>	<b>21.70</b>		
<b>Gulbarga</b>	Jevaragi	Rainfed	Jevaragi	22.20		
		Rainfed	Nelogi	24.32		
		Rainfed	Jeratagi	23.28		
			<b>District Mean</b>	<b>23.27</b>		
<b>Bijapur</b>	Sindagi	Rainfed	Hanchinal	26.10		
		Rainfed	Kannolli	18.34		
	Bijapur	Rainfed	Bijapur	23.40		
			<b>District Mean</b>	<b>22.61</b>		

whereas least (5.42%) severity of the disease was recorded at Ingaldahalli village in Chitradurga district. The average highest disease severity of 23.25 per cent was recorded in Gulbarga district followed by Bijapur (22.61%). The lowest disease severity of 10.09 per cent was recorded in Haveri district.

In Chitradurga district, the average disease severity of 17.52 per cent and was in the range of 5.42 per cent (Ingaldahalli) to 22.32 per cent (Hoodigeri). In Haveri district, the average disease severity of 10.09 per cent and was in the range of 6.38 per cent (Agadi) to 13.28 per cent (Yogikoppa). In Belgaum district, the average disease severity of 19.96 per cent and was in the range of 8.40 per cent (Yaragatti) to 25.43 per cent (Sangolli). The average disease severity in Dharwad district of 20.64 per cent and was in the range of 13.20 per cent (Harobelavadi) to 32.16 per cent (Guladkoppa), while in Gadag district the range was 12.48 per cent (Lakkundi) to 17.34 per cent (Hulkoti) with average district disease severity of 14.91 per cent. In Koppal district, the average disease severity of 10.22 per cent and was in the range of 8.33 per cent (Talakalla) to 12.13 per cent (Kidadal). In Raichur district, the average disease severity of 18.56 per cent and was in the range of 7.46 per cent (Kalmala) to 30.12 per cent (Kallur). In Yadagiri district, the average disease severity of 21.70 per cent and was in the range of 17.43 per cent (Hattigudoor) to 26.35 per cent (Hothpet). The average disease severity in Gulbarga district of 23.27 per cent and was in the range of 22.20 per cent (Jevaragi) to 24.32 per cent (Nelogi), while in Bijapur district the range was 18.34 per cent (Kannolli) to 26.10 per cent (Hanchinal) with district average disease severity of 22.61 per cent.

From the survey it was revealed (Table 2) that the disease was severe in all the districts during *kharif* 2011-2012 and disease severity ranged from 8.75 to 28.42 per cent in different parts of the districts surveyed. The highest severity (28.42%) was noticed in fields of Dharwad Farm in Dharwad district, whereas least (8.75%) severity was recorded at Malagunda village in Gadag district. The average highest disease severity of 19.91 per cent was recorded in Bellary district followed by Dharwad (18.83%). The lowest disease severity of 14.31 per cent was

recorded in Gadag district.

In Gadag district, the average disease severity of 14.31 per cent and was in the range of 8.75 per cent (Malagunda) to 22.86 per cent (Naragund). In Belgaum district, the average disease severity of 17.86 per cent and was in the range of 13.18 per cent (Mallapur) to 24.12 per cent (Talawai). In Dharwad district, the average disease severity of 18.83 per cent and was in the range of 9.48 per cent (Siraguppi) to 28.42 per cent (Dharwad farm). The average disease severity in Bagalkot district of 16.18 per cent and was in the range of 13.94 per cent (Sulikeri) to 18.13 per cent (Bagalkot KVK), while in Bijapur district the range was 12.63 per cent (Hadagali) to 16.73 per cent (Guttaragi) with average district disease severity of 14.94 per cent.

In Gulbarga district, the average disease severity of 17.83 per cent and was in the range of 17.59 per cent (Jevaragi) to 18.12 per cent (Jeeratagi). In Yadagiri district, the average disease severity of 17.72 per cent and was in the range of 16.18 per cent (Hothepet) to 19.26 per cent (Hattigudoor). In Raichur district, the average disease severity of 17.31 per cent and was in the range of 11.43 per cent (Sirivar) to 23.63 per cent (Lingasuar). The average disease severity in Bellary district of 19.91 per cent and was in the range of 14.83 per cent (Bailur) to 28.26 per cent (Bellary), while in Haveri district the range was 11.78 per cent (Bisnalli) to 19.81 per cent (Shiggaon) with district average disease severity of 16.94 per cent (Fig 1).

A total rainfall of 853 mm was well distributed in 72 rainy days during January to November in the cropping period of 2010, mean daily temperature of 19.58 to 27.93°C and mean morning relative humidity was 91.42 per cent. But the year 2011 received an annual rainfall 827.60 mm in 65 rainy days during February to November in the cropping period, mean daily temperature of 19.17 to 28.40°C and mean morning relative humidity of 88.04 per cent might have advanced the disease development.

A survey conducted by Hosagoudar *et al.*, (2008) and Chattannavar, *et al.*, (2009) during *kharif*, 2006 revealed the incidence of disease in parts of Dharwad, Haveri, Belgaum, Bagalkot, Gadag, Bellary, Raichur and Gulbarga districts of North Karnataka. The maximum incidence was recorded in Dharwad, Haveri, Belgaum and

**Table 2.** Survey for disease severity of *Alternaria* leaf spot of *Bt* cotton in North Karnataka during 2011-12

District	Taluk	Grown under	Locations	Per cent Disease Index	
<b>Gadag</b>	Naragund	Rainfed	Kalakeri	18.40	
		Rainfed	Naragund	22.86	
		Rainfed	Konnur	17.81	
	Gadag	Rainfed	Bentur	10.28	
		Rainfed	Malagunda	8.75	
		Rainfed	Gadag	12.68	
	Shirahatti	Irrigated	Magadi	13.92	
		Rainfed	Lakmeshwar	9.78	
			<b>District Mean</b>	<b>14.31</b>	
	<b>Belgaum</b>	Bailhongal	Rainfed	Kittur	13.28
			Rainfed	Avaradhi	14.56
Rainfed			Sangolli	21.37	
Rainfed			Talawai	24.12	
Rainfed			Kanganoor	23.41	
Irrigated			Nayanagar	22.56	
Rainfed			Bailawad	17.93	
Gokak		Rainfed	Mallapur	13.18	
		Rainfed	Khanagao	19.23	
		Irrigated	Arabhavi	17.46	
Savadatti		Rainfed	Madalgeri	14.67	
		Rainfed	Goravankolla	16.79	
		Rainfed	Ulligeri	13.63	
			<b>District Mean</b>	<b>17.86</b>	
<b>Dharwad</b>		Dharwad	Rainfed	Hebbali	12.72
			Rainfed	Dharwad Farm	28.42
			Rainfed	UAS, Dharwad	24.38
	Hubli	Rainfed	Siraguppi	9.48	
		Rainfed	Nelawadi	13.67	
		Rainfed	Hebbsur	18.13	
	Navalagund	Rainfed	Tirumalakoppa	25.23	
		Rainfed	Annigeri	13.29	
		Rainfed	Annigeri ARS	15.37	
		Rainfed	Arekuratti	22.18	
			Rainfed	Navalagunda	24.29
			<b>District Mean</b>	<b>18.83</b>	
	<b>Bagalkot</b>	Badami	Irrigated	Sulikeri	13.94
Rainfed			Jammanakatti	16.46	
Bagalkot		Rainfed	Bagalkot KVK	18.13	
		<b>District Mean</b>	<b>16.18</b>		
<b>Bijapur</b>	Bijapur Sindagi	Rainfed	Hadagali	12.63	
		Rainfed	Devarahippargi	15.47	
		Rainfed	Guttaragi	16.73	
		<b>District Mean</b>	<b>14.94</b>		
<b>Gulbarga</b>	Jevaragi	Rainfed	Jeeratagi	18.12	
		Rainfed	Jevaragi	17.59	
			<b>District Mean</b>	<b>17.86</b>	
<b>Yadagiri</b>	Shahapur	Irrigated	Hothepet	16.18	
		Irrigated	Hattigudoor	19.26	
			<b>District Mean</b>	<b>17.72</b>	
<b>Raichur</b>	Lingasugur Manvi	Rainfed	Lingasugur	23.63	
		Rainfed	Kotekal	12.44	
		Rainfed	Hirehanagi	13.38	
		Rainfed	Sirivar	11.43	
		Rainfed	Attanoor	14.93	
	Raichur	Irrigated	UAS Raichur campus	21.43	
		Irrigated	Kallur	18.72	
	Sindanur	Irrigated	Potnal	14.15	
		Irrigated	Javalgeri	23.41	
		Irrigated	Maladinni	19.54	
			<b>District Mean</b>	<b>17.31</b>	
	<b>Bellary</b>	Siraguppa	Irrigated	ARS, Siraguppa	19.98
			Irrigated	Tekkalakot	17.13
Irrigated			Bailur	14.83	
Bellary		Irrigated	Koluru	19.35	
		Irrigated	Bellary	28.26	
		<b>District Mean</b>	<b>19.91</b>		
<b>Haveri</b>	Haveri	Rainfed	Guttal	17.23	
		Rainfed	Havanur	12.98	
		Rainfed	Choudadayarayanapura	16.67	
		Rainfed	Kancharagatti	18.28	
		Rainfed	Bisnalli	11.78	
		Rainfed	Beloor	17.19	
		Rainfed	Devihosoor	19.56	
		Rainfed	Aremallapur	16.49	
		Rainfed	Udagatti	17.58	
		Shiggaon	Rainfed	Shiggaon	19.81
	Rainfed		Bankapur	18.76	
			<b>District Mean</b>	<b>16.94</b>	



Fig. 1. Survey for disease severity of Alternaria leaf spot on *Bt* cotton

Gadag districts.

#### REFERENCES

**Anonymous, 2012.** Annual Report All India Co-ordinated Cotton Improvement Project, 2011-2012, CICR, Regional Station, Coimbatore.

**Chattannavar, S. N., Hosagoudar, G. N., Ammajamma, R. and Ashtaputre, S. A. 2009.** Survey for diseases of *Bt* cotton in north Karnataka. *J. Cotton Res. Dev.*, **23** : 156-58

**Chattannavar, S. N., Kulkarni Srikant and Khadi, B. M., 2006.** Chemical control of Alternaria blight of cotton. *J. Cotton Res. Dev.*, **20** : 125-26.

**Hosagoudar, G. N., Chattannavar, S. N. and Kulkarni, Srikant 2008.** Survey for foliar diseases of *Bt* cotton. *Karnataka J. Agric. Sci.*, **21** :139-40.

Received for publication : June 8, 2012

Accepted for publication : February 26, 2013