



Status of *Colletotrichum* leaf spot of turmeric in Karnataka

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Abstract

Although turmeric is considered to be a medicinal plant, it is susceptible to various diseases, insect pests and physiological disorders. Fungi are the major group of pathogens responsible for foliar and rhizome rot diseases. Among the various diseases, the *Colletotrichum* leaf spot causes foliar damage in turmeric is one of the most serious foliar disease in all the turmeric growing regions and in Karnataka majority of the commercially grown varieties are susceptible to leaf spot. Realizing the potentiality of leaf spot disease in causing economic losses, it was found necessary to conduct survey of this disease, to understand the distribution and extent of spread and to locate the hot spots. An intensive roving survey was carried out to assess the incidence of leaf blight of turmeric. The survey was conducted during 2018 and 2019 in areas Bidar, Kalaburagi, Yadgir, Raichur, Koppala, Bagalkot, Mysuru, Kodagu, Chamarajanagar, Shivamogga, Belagavi and Uttar Kannada districts of Karnataka to assess the severity of leaf blight of turmeric in the farmer's field, when the crop is five months old the roving survey was conducted in 51 villages of 30 taluks covering 12 districts of Karnataka. The two-year survey of 2018 and 2019 revealed that the highest mean disease recorded in Ilawala of Mysuru with 40.92 PDI and least mean disease recorded was 1.24 PDI in Hipparga of Humnabad. Among the surveyed taluk the mean higher disease was recorded in Mysuru with 40.92 PDI and mean least disease recorded in Karatagi (3.17 PDI). Among the District mean highest disease of 38.10 PDI was recorded in Mysuru, whereas, mean least disease was recorded with 4.81 PDI in Bidar. Among the different agroclimatic zone surveyed, the mean higher disease of 31.84 PDI recorded in Southern transition zone (Zone 7) and mean least disease of 4.81 PDI was recorded in North Eastern transition zone (Zone 1).

Keywords: *Colletotrichum* leaf spot, PDI, status, survey, turmeric

Introduction

Turmeric (*Curcuma longa* L.) is one of the important spice crops grown in India since time immemorial known as 'Indian saffron' as well as 'spice of life'. It is extensively cultivated in China, India, Indonesia, Thailand and throughout the tropics, including tropical regions of Africa and America (Singh *et al.*, 2017). India is the world's largest producer, consumer and exporter of turmeric and accounts for 80 per cent of the world production. It occupies in an area of 3.50 lakh hectares with a production of 13.34 lakh metric tons in India. In India, major turmeric producing states are Tamil Nadu, Karnataka, Assam, Kerala, Maharashtra, Orissa and Andhra Pradesh (Anon., 2022). In Karnataka, it is grown in an area of 21.31 thousand hectares with a production of 1.31 lakh metric tons. The important major turmeric producing districts are Belagavi, Bidar, Kalburgi, Chamarajnagara, Mysuru, Uttar Kannada, Hassan, Shivamogga, Bagalkot and Chikmagalur (Anon., 2020).

Although turmeric is considered to be a medicinal plant, it is susceptible to various diseases, insect pests and physiological disorders. Fungi are the major group of pathogens responsible for foliar and rhizome rot diseases. The important diseases affecting the crop are leaf blight, leaf spot, leaf blotch, leaf blast and rhizome rot (Ravindran, 2007). There is a

quite substantial part of total harvest loss due to the diseases affecting the crop year after year. Among the foliar diseases, the leaf spot disease of turmeric caused by *Colletotrichum capsici* is more destructive and prevalent in major turmeric growing areas and losses caused by leaf spot are always considered to be a limiting factor for yield, quality of rhizomes and often results in heavy yield losses (Uma Devi, 2008). The *Colletotrichum* leaf spot is an important disease can cause yield loss vary from 20 per cent to more than 60 per cent in some cases (Nair and Ramakrishnan, 1973) ^[1]. Now the disease became more prevalent and destructive in all the turmeric growing regions of India. *Colletotrichum capsici* causing leaf spot of turmeric is reported to be responsible for major economic loss of turmeric production in India (Adhipathi *et al.*, 2013) ^[1]. The disease has been found increasing rapidly all over India over the last decade. It is a main problem at the active vegetative growth and rhizome formation stage of turmeric. Most of the turmeric cultivars available today are susceptible to this disease, causing extensive yield losses to the turmeric production. Therefore, the survey is necessary to assess incidence and severity of the disease to determine the distribution, the status of the disease.

Previous studies conducted on the assessment of disease have given the information about the wide spread

occurrence of the disease. Chidanandaswamy (2001) ^[5] carried

out survey in five districts of Northern Karnataka for the incidence and severity of leaf spot of turmeric caused by *C. capsici*. Gorawar *et al.* (2006) ^[7] surveyed the disease incidence of major foliar diseases of turmeric in North Karnataka and found that the incidence of leaf spot disease caused by *C. capsici* was more prominent than leaf blight disease. Survey of Koche *et al.* (2009) ^[8] revealed that the most prevalent foliar disease of turmeric was leaf spot. So, realizing the potentiality of leaf spot disease in causing economic losses, the survey was taken up to know the turmeric leaf spot disease, to understand the distribution, extent of

spread and to locate the hot spots in Karnataka.

Material and methods

An intensive roving survey was carried out in the farmer's field during 2018 and 2019 when the crop is five months old to assess the incidence of leaf blight of turmeric in Bidar, Kalaburagi, Yadgir, Raichur, Koppal, Bagalkot, Mysuru, Kodagu, Chamarajanagar, Shivamogga, Belagavi and Uttar Kannada districts of Karnataka. In each district, major turmeric growing taluks and in each taluk major villages with three fields were selected and surveyed randomly. Within each field, ten plants were selected randomly and disease was assessed by using 0 to 9 scales (Mayee and Datar 1986) ^[9].

Disease scoring scale for leaf spot disease of turmeric (Description of diseased rating)

Grade / Scale	Per cent infection / Disease severity
0	No symptoms on the plant
1	Small spots on leaves; less than 1 % area was infected
3	Medium spots on leaves; covering 1-10 % area of leaf
5	Bigger coalescing spots, covering 11 % to 25 % area of leaf
7	Large coalescing spots, covering 26 % to 50 % area of leaf
9	Spots covering more than 51 % to 75 % area of the leaf

The per cent disease index was calculated by using formula expressed as PDI (Wheeler, 1969).

$$\text{Per cent disease index (PDI)} = \frac{\text{Sum of numerical ratings}}{\text{No. of plants observed} \times \text{Maximum grade}} \times 100$$

Result and Discussion

An intensive roving survey was

conducted in seven different Agroclimatic zones of Karnataka during 2018 and 2019 in farmers fields of major turmeric growing areas viz., Bidar, Kalaburagi, Yadgiri, Raichur, Koppal, Bagalkot, Mysuru, Kodagu, Chamarajanagar, Shivamogga, Belagavi and Uttar Kannada districts to assess the leaf spot disease of turmeric. The results pertaining to survey are presented here under (Table 1).

Table 1: Status of disease severity of *Colletotrichum* leaf spot of turmeric in different taluks and districts across the Agroclimatic zones of Karnataka surveyed during 2018 and 2019

Agroclimatic Zone	District	Taluk	Village	Disease severity in 2018				Disease severity in 2019				Mean Disease severity (Pooled 2018 and 2019)							
				PDI	Taluk mean	District mean	Zonal Mean	PDI	Taluk Mean	District Mean	Zonal Mean	PDI	Taluk	District	Zonal				
North east transition zone (Zone 1)	Bidar	Humnabad	Nirna	5.20	2.60	4.55	4.55	6.13	4.30	5.07	5.07	5.67	3.45	4.81	4.81				
			Hipparga	0.00				2.47				1.24							
		Basavakalyana	Boshaga	6.60	6.50			8.14	5.85			7.37	6.17						
			Betegera	6.40				3.55				4.98							
North eastern dry zone (Zone 2)	Kalaburgi	Aland	Belamagi	0.40	6.85	6.43	7.13	2.96	5.85	8.58	8.13	1.68	6.35	7.84	8.29				
			Rudrawadi	3.60				3.21				3.41							
			Jawalaga	5.80				6.77				6.29							
			Mogha	17.60				10.45				14.03							
		Chincholi	Ainolli	5.20	6.74			6.87	5.57			6.04	7.51						
			Chandrapalli	1.70				3.77				2.74							
			AinolliTanda	2.20				1.33				1.77							
			Chimmanchod	8.40				4.00				6.20							
			Tajilapur	9.20				16.33				12.77							
			Kodampur	17.20				2.35				9.78							
			Degalmadi	5.60				8.66				7.13							
			Goudanahalli	4.40				1.27				2.84							
		Kalaburagi	Faratabad	3.73	3.73			10.55	10.55			7.14	7.14						
		Jewargi	Kellur	8.40	8.40			12.33	12.33			10.37	10.37						
		Yadgiri	Shahanapura	Dornahalli	4.80			4.80	4.80			11.4	11.40			11.4	8.10	8.10	8.10

								0															
	Raichur	Sindhanur	Balaganoor	14.0 0	14.80	12.50		17.5 4	18.83	11.25		15.7 7	16.82	11.88									
			Badlapur	15.6 0				20.1 1				17.8 6											
		Lingasugur	Machanur	10.2 0	10.20			3.66	3.66			6.93	6.93										
	Koppal	Karatagi	Juratagi	1.60	1.60	4.80		4.73	4.73	5.90		3.17	3.17	5.35									
		Kustagi	Dothihal	6.40	6.40			3.66	3.66			5.03	5.03										
		Yelaburga	Bewoor	6.40	6.40			9.32	9.32			7.86	7.86										
Northern Dry zone (Zone 3)	Bagalkot	Bagalkot	Achanur	1.60	3.73	9.00	9.00	3.44	7.40	9.02	9.02	2.52	5.57	9.01	8.52								
			Bewoor	6.80				10.3 3				8.57											
			Domanal	2.80				8.42				5.61											
		Mudhool	Dhavaleshwar a	6.80	8.20			6.77	8.55			6.76	8.38										
			Mallapura	9.60				10.3 3				9.97											
		Jamkhandi	Hippargi	9.33	15.07			10.8 7	11.10			10.1 0	13.09										
			Kurgodu	20.8 0				11.3 3				16.0 7											
		Southern dry zone (Zone 6)	Mysuru	Mysuru	Ilawala			49.0 0	49.00			42.97	30.68			32.8 3	32.83	33.23	26.76	40.9 2	40.92	38.10	28.72
				Piriyapatna	Piriyapatna Kasaba			37.6 0	37.60							40.3 3	40.33			38.9 7	38.97		
				Hunasuru	Hunasuru Kasaba			42.3 0	42.30							26.5 3	26.53			34.6 2	34.42		
Kodagu	Madikeri		kalooru	23.5 0	23.50	24.18	33.1 1	33.11	30.15	28.3 1	28.31	27.16											
	Somvarapete		Neergunda	32.8 0	32.80		30.0 0	30.00		31.4 0	31.40												
	Virajpete		Palangala	16.2 3	16.23		27.3 3	27.33		21.7 8	21.78												
Chamarajnagar a	Chamarajnagar a		Banahalli	12.4 0	21.80	24.90	19.5 5	18.48	16.91	15.9 8	20.14	20.91											
			Chickbegur	31.2 0			17.4			24.3 0													
	Gundlupete		Hanchipura	28.0 0	28.00		15.3 3	15.33		21.6 7	21.67												
Southern transition zone (Zone 7)	Shivamogga		Shivamogga	Harakere	30.2 5	30.25	31.13	31.13	31.1 1	31.11	32.54	32.54		30.6 8	30.68	31.84	31.84						
		Sagara	Balegaru	29.6 6	29.66	30.8 5			30.85	30.2 6			30.26										
		Thirthahalli	Devangi	33.4 7	33.47	35.6 6			35.66	34.5 7			34.57										
North transition zone (Zone 8)	Belagavi	Belagavi	Benakanahalli	5.60	5.60	10.73	10.73	6.43	6.43	10.96	10.96	6.02	6.02	10.85	10.85								
		Hukkeri	Shippur	16.0 0	16.00			17.2 3	17.23			16.6 2	16.62										
		Gokak	Bilakundi	2.40	10.60			2.10	9.22			2.25	9.91										
			Ningapura	18.8 0				16.3 3				17.5 7											
Hill zone (Zone 9)	Uttara Kannada	Mundagod	Chawdalli	18.3 3	18.33	19.16	19.16	20.1 5	20.15	21.34	21.34	19.2 4	19.24	20.25	20.25								
		Yallapura	Angod	20.1 4	20.14			22.4 1	22.41			21.2 8	21.28										
		Sirsi	Barur	19.0 0	19.00			21.4 7	21.47			20.2 4	20.24										

Colletotrichum leaf spot disease during 2018

During 2018, in seven Agroclimatic zones of the Karnataka, totally 51 villages of 32 taluks and 12 districts were surveyed. Among the villages surveyed, the maximum disease was observed in Ilwala (49.00 PDI) of Mysuru followed by Hunsuru Kasaba (42.30 PDI) of Piriyapatna, whereas, minimum disease was recorded in Hipparga (0.00 PDI) of Humnabad followed by Belamagi (0.40 PDI) of Alalnd. In Bidar district, two taluks were surveyed viz.,

Humnabad and Basavakalyana. The higher turmeric leaf spot (6.60 PDI) was recorded in Boshga followed by Betegera (6.40) of Basavakalyana and minimum of 0.00 PDI in Hipparga of Humnabad. In Kalaburagi district, four taluks were surveyed, viz., Aland, Chincholi, Jewargi and Kalaburagi. The higher disease (17.60 PDI) was recorded in Mogha of Aland followed by Kodampur (17.20 PDI) of Chincholi and least was recorded in Belamagi (0.40 PDI) of Aland. In Yadgiri district, Doranahalli of Shahapur taluk,

surveyed and recorded disease of 4.80 PDI. In Raichur district two taluks viz., Sindhanur and Lingasugur were surveyed. The higher disease of 15.60 PDI recorded in Badlapur followed by 14.00 PDI in Balaganoor of Sindhanur and lowest disease (10.20 PDI) recorded in Machanur of Lingasugur. In Koppal three taluks viz., Karatagi, Kustagi, Yelaburga were surveyed. The higher disease of 6.40 PDI was recorded in Dotihal of Kustagi and Bewoor of Yelaburga and lowest disease (1.60 PDI) recorded in Juratagi of Karatagi. In Bagalkot district, three taluks were surveyed, viz., Bagalkot, Mudhol and Jamkhandi. The highest leaf spot (20.80 PDI) was recorded in Kurgodu of Jamkhandi followed by Mallapura (9.60 PDI) of Mudhol and least disease (1.60 PDI) was recorded in Achanur of Bagalkot. In Mysuru district, three taluks were surveyed, viz., Mysuru, Piryapatna and Hunasuru. The Ilawala of Mysuru recorded the highest leaf spot (49.00 PDI) followed by Hunsur Kasaba (42.30 PDI) of Hunsur and lowest recorded in Piriapatna Kasaba (37.60 PDI) of Piriapatna. In Kodagu district, three taluks were surveyed, viz., Madikeri, Somvarpete and Virajpete. The Neergunda of Virajpete recorded highest disease with 32.80 PDI followed by Kalooru (23.50 PDI) of Madikeri and lowest of 16.23 PDI recorded in Palangala of Virajpete. In Chamarajnagar district, two taluks were surveyed, viz., Gundlupete, Chamarajnagar. The highest turmeric leaf spot (31.20 PDI) was recorded in Chickbegur of Chamarajnagar followed by Hanchipura (28.00 PDI) of Gundlupete and lowest disease recorded in Banahalli (12.40 PDI) of Chamarajnagar. In Shivamogga district, three taluks were surveyed, viz., Shivamooga, Sagara and Tirthahalli. The highest leaf spot (33.40 PDI) was recorded in Devangi of Tirthahalli followed by Harakere (30.25 PDI) of Shimoga and lowest in Balegaru of Sagara (29.66 PDI). In Belagavi district, three taluks were surveyed, viz., Belagavi, Hukkeri and Gokak. The highest disease (18.80 PDI) was recorded in Ningapura of Gokak followed by 16.00 PDI in Shippur of Hukkeri and the least disease noticed in Bilakundi (2.40 PDI) of Gokak. In Uttara Kannada district, three taluks viz., Mundagod, Yellapura and Sirsi were surveyed. The highest intensity of turmeric leaf spot (20.14 PDI) was recorded in Anagod of Yallapura followed by Barur (19.00 PDI) of Sirsi and least was recorded in Chawdahalli (18.33 PDI) of Mundagod.

Among the surveyed taluk the higher disease was recorded in Mysuru with 49.00 PDI followed by Hunsuru (42.30 PDI), Piriapatna (37.60 PDI) and Tirthahalli (33.47 PDI). The least disease recorded in Humnabad (2.60 PDI) followed by Kalaburgi and Bagalkot (3.73 PDI). Among the District highest disease of 42.97 PDI was recorded in Mysuru followed by Shivamogga (31.13 PDI) and Chamarajnagara (24.90 PDI). Whereas, least disease was recorded with 4.55 PDI in Bidar followed by Yadgir and Koppal (4.80 PDI). Among the different agroclimatic zone surveyed, the higher disease of 31.13 PDI recorded in Southern transition zone (Zone 7) followed by Southern dry zone (Zone 6) with 30.68 PDI. The least disease of 4.55 PDI was recorded in North Eastern transition zone (Zone 1) followed by 7.13 PDI in North Eastern dry zone (Zone 2).

***Colletotrichum* leaf spot disease during 2019**

During 2019, in seven Agroclimatic zones of the Karnataka, totally 51 villages of 32 taluks and 12 districts were surveyed. Among the villages surveyed, the maximum disease was observed in Piriapatna Kasaba (40.33 PDI) of

Piriapatna followed by Devangi (35.66 PDI) of Tirthahalli, whereas, minimum disease was recorded in Ainolli Thanda (1.33 PDI) of Chincholi followed by Bilakundi (2.10 PDI) of Gokak. In Bidar district, two taluks were surveyed viz., Humnabad and Basavakalyana. The higher turmeric leaf spot (8.14 PDI) was recorded in Boshga of Basavakalyana followed by Nirna (6.13) of Humnabad and minimum of 2.47 PDI was recorded in Hipparga of Humnabad. In Kalaburagi district, four taluks were surveyed, viz., Aland, Chincholi, Jewargi and Kalaburagi. The higher disease (16.33 PDI) was recorded in Tajilapur of Chincholi followed by Kellur (12.33 PDI) of Jewargi and least was recorded in Ainolli Thanda (1.33 PDI) followed by Kodampur (2.35 PDI) of Chincholi. In Yadgiri district, Doranahalli of Shahapur taluk, surveyed and recorded disease of 11.40 PDI. In Raichur district two taluks viz., Sindhanur and Lingasugur were surveyed. The higher disease of 20.11 PDI recorded in Badlapur followed by 17.54 PDI in Balaganoor of Sindhanur and lowest disease (3.66 PDI) recorded in Machanur of Lingasugur. In Koppal three taluks viz., Karatagi, Kustagi, Yelaburga were surveyed. The higher disease of 9.32 PDI was recorded in Bewoor of Yelaburga followed by 4.73 PDI in Juratagi of Karatagi and lowest disease (3.66 PDI) recorded in Dotihal of Kustagi. In Bagalkot district, three taluks were surveyed, viz., Bagalkot, Mudhol and Jamkhandi. The highest leaf spot (11.33 PDI) was recorded in Kurgodu followed by Hippargi (10.87 PDI) of Jamkhandi and least disease (3.44 PDI) was recorded in Achanur of Bagalkot. In Mysuru district, three taluks were surveyed, viz., Mysuru, Piryapatna and Hunasuru. The Piriapatna Kasaba of Piriapatna recorded the highest leaf spot (40.33 PDI) followed by Ilawala (32.83 PDI) of Mysuru and lowest recorded in Hunsur Kasaba (26.53 PDI) of Hunsur. In Kodagu district, three taluks were surveyed, viz., Madikeri, Somvarpete and Virajpete. The Kalooru of Madikeri recorded highest disease with 33.11 PDI followed by Neergunda (30.00 PDI) of Virajpete and lowest of 27.33 PDI recorded in Palangala of Virajpete. In Chamarajnagar district, two taluks were surveyed, viz., Gundlupete, Chamarajnagar. The highest turmeric leaf spot (19.55 PDI) was recorded in Banahalli of Chamarajnagar followed by Chickbegur (17.40 PDI) of Chamarajnagar and lowest disease recorded in Hanchipura (15.33 PDI) of Gundlupete. In Shivamogga district, three taluks were surveyed, viz., Shivamooga, Sagara and Tirthahalli. The highest leaf spot (35.66 PDI) was recorded in Devangi of Tirthahalli followed by Harakere (31.11 PDI) of Shimoga and lowest in Balegaru of Sagara (30.85 PDI). In Belagavi district, three taluks were surveyed, viz., Belagavi, Hukkeri and Gokak. The highest disease (17.23 PDI) was recorded in Shippur of Hukkeri followed by 16.33 PDI in Ningapura of Gokak and the least disease noticed in Bilakundi (2.10 PDI) of Gokak. In Uttara Kannada district, three taluks viz., Mundagod, Yellapura and Sirsi were surveyed. The highest intensity of turmeric leaf spot (22.41 PDI) was recorded in Anagod of Yallapura followed by Barur (21.47 PDI) of Sirsi and least was recorded in Chawdahalli (20.15 PDI) of Mundagod.

Among the surveyed taluk the higher disease was recorded in Piriapatna with 40.33 PDI followed by Tirthahalli (35.66 PDI), Madikeri (33.11 PDI) and Mysuru (32.83 PDI). The least disease recorded in Kustagi and Lingasugur (3.66 PDI) followed by Humnabad (4.30 PDI) and Karatagi (4.73 PDI). Among the District highest disease of 33.23 PDI was

recorded in Mysuru followed by Shivamogga (32.54 PDI) and Kodagu (30.15 PDI). Whereas, least disease was recorded with 5.07 PDI in Bidar followed by Koppal (4.80 PDI) and Kalaburgi (8.58 PDI). Among the different agroclimatic zone surveyed, the higher disease of 32.54 PDI recorded in Southern transition zone (Zone 7) followed by Southern dry zone (Zone 6) with 26.76 PDI. The least disease of 5.07 PDI was recorded in North Eastern transition zone (Zone 1) followed by 8.13 PDI in North Eastern dry zone (Zone 2).

Across the two-year survey of 2018 and 2019 revealed that the highest mean disease recorded in Ilawala of Mysuru with 40.92 PDI followed by Piriapatna Kasaba (38.97 PDI) of Piriapatna and Hunasuru Kasaba (34.62 PDI) of Hunsuru. The least mean disease recorded was 1.24 PDI in Hipparga of Humnabad followed by 1.68 PDI in BVelamagi of Aland and Ainilli Thanda (1.77 PDI) of Chincholi. Among the surveyed taluk the mean higher disease was recorded in Mysuru with 40.92 PDI followed by Piriapatna (38.97 PDI), Thirthahalli (34.57 PDI), Hunasuru (34.42 PDI) and Shivamogga (30.68 PDI). The mean least disease recorded in Karatagi (3.17 PDI) followed by Humnabad (3.45 PDI) and Kustagi (5.03 PDI). Among the District mean highest disease of 38.10 PDI was recorded in Mysuru followed by Shivamogga (31.84 PDI) and Kodagu (37.16 PDI). Whereas, mean least disease was recorded with 4.81 PDI in Bidar followed by Koppal (5.35 PDI) and Kalaburgi (7.84 PDI). Among the different agroclimatic zone surveyed, the mean higher disease of 31.84 PDI recorded in Southern transition zone (Zone 7) followed by Southern dry zone (Zone 6) with 28.72 PDI. The mean least disease of 4.81 PDI was recorded in North Eastern transition zone (Zone 1) followed by 8.18.29 PDI in North Eastern dry zone (Zone 2).

Survey of disease helps to gather information on the prevalence, intensity, severity and distribution of disease in particular agro-climatic zone. Survey and surveillance form the basis for any successful plant protection that depends on early detection of disease followed by timely adoption of control measures. The disease varied from location to location, and year to year. Such variation is attributed to topography and various environmental conditions. The present study supports the presence of *Colletotrichum* leaf spot existence in Karnataka. The severity of leaf blight wide spread has been reported by Gorwar (2004) and Mallikarjun (1996) [10]. The extensive survey of turmeric leaf spot done in Karnataka, Kerala and Tamil Nadu during 2011 to 2013 showed the 48.25 per cent *Colletotrichum* leaf spot severity in turmeric in South India (Adhipathi *et al.*, 2015) [2]. Chidanandaswamy (2001) [5] carried out survey in five districts of northern Karnataka for the incidence and severity of leaf spot of turmeric caused by *C. capsici* and recorded maximum disease incidence (28.00 %) in Bagalkot district. Similar type of survey was conducted by Gorwar *et al.* (2006) [7] and reported that among the major foliar diseases of turmeric in North Karnataka the incidence of leaf spot disease was higher than that of leaf blight. They also reported that the incidence was greatest in Ranna Belagali (66.60 %) of Bagalkot followed by in Salebiranhalli (50.00 %) of Gulbarga district. Study of Koche *et al.* (2009) [8] revealed that the most prevalent foliar disease of turmeric was leaf spot. Singh *et al.* (2016) [15] conducted survey for the assessment of turmeric leaf spot disease incidence in Manipur. Maximum disease incidence

of 57.00 and 75.84 per cent was observed in Bishnupur while the least disease incidence (48.37 and 69.72%) in Imphal West district. A roving survey undertaken in Kalaburgi, Belgavi and Bagalkot districts of North Karnataka and Chamarajanagara district of South Karnataka during the year 2015-16 revealed that the disease severity (Per cent Disease Index) varied from 16.25 per cent to 70 per cent. Maximum PDI of 38.89 was observed in Chamarajanagara district, whereas, it was minimum PDI (26.98) in Bagalkot district (Sangameshwar *et al.*, 2022) [13]. The *Colletotrichum* leaf spot was wide spread disease making its appearance in all the localities of Nizamabad district of Telangana. Maximum percent disease incidence was recorded in Kondapoor village (52.50%) and the minimum incidence was recorded in Ankapoor (36.36%) (Santosh and Simon, 2020) [14]. The maximum disease severity was recorded in Erode district of Tamil Nadu. The severity of disease was least in Gulbarga district of Karnataka and Karur district of Tamil Nadu (Adhipathi *et al.*, 2015) [2]. The cultivation of local varieties in a large area coupled with favourable environment renders disease outbreak and disease severity (Uma Devi, 2008).

Conclusion

Totally 51 villages of 30 taluks and 12 districts were surveyed during 2018 and 2019. The present study concludes that the leaf spot disease of turmeric is present in all the surveyed turmeric growing areas in Karnataka with varied disease intensities. During 2018, among the villages surveyed, the maximum disease was observed in Ilawala (49.00 PDI) of Mysuru whereas, minimum disease was recorded in Hipparga (0.00 PDI) of Humnabad. Among the taluk the higher disease was recorded in Mysuru with 49.00 PDI and least disease recorded in Humnabad (2.60 PDI). Among the District highest disease of 42.97 PDI was recorded in Mysuru, whereas, least disease was recorded with 4.55 PDI in Bidar. Among the different agroclimatic zone surveyed, the higher disease of 31.13 PDI recorded in Southern transition zone (Zone 7) and least disease of 4.55 PDI was recorded in North Eastern transition zone (Zone 1). During 2019, among the villages surveyed, the maximum disease was observed in Piriapatna Kasaba (40.33 PDI) of Piriapatna and minimum disease was recorded in Ainolli Thanda (1.33 PDI) of Chincholi among the surveyed taluk the higher disease was recorded in Piriapatna with 40.33 PDI and the least disease recorded in Kustagi and Lingasugur (3.66 PDI). Among the District highest disease of 33.23 PDI was recorded in Mysuru, whereas, least disease was recorded with 5.07 PDI in Bidar. Among the different agroclimatic zone surveyed, the higher disease of 32.54 PDI recorded in Southern transition zone (Zone 7) and least disease of 5.07 PDI was recorded in North Eastern transition zone (Zone 1). Thus, the *Colletotrichum* leaf spot noticed in slight humid belt topography.

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Conflict of Interest

None.

References

1. Adhipathi P, Nakkeeran S, Chandrasekaran A. Morphological characterization and molecular phylogeny of *Colletotrichum capsici* causing leaf spot disease of turmeric. *The Bioscan*,2013;8(1):331-337.
2. Adhipathi P, Nakkeeran S, Chandrasekaran A. Survey, Phenotypic and Genetic Characterization of *Colletotrichum capsici*, Incitant of Turmeric Leafspot. *Madras Agric. J.*,2015;102(1-3):62-66.
3. Anonymous. Turmeric production and area statistics in India and Karnataka. Government of India, Ministry of Agriculture and Farmers Welfare, 2020. <https://pjsau.edu.in/files/AgriMkt/2020/April/Turmeric-April-2020.pdf>
4. Anonymous. National Turmeric Board. Annual Report 2022. Government of India, Ministry of Commerce and Industry, 2022. <https://www.indiatrade.gov.in>
5. Chidanandaswamy BS. Studies on *Colletotrichum capsici* (Syd.) Butler and Bisby causing leaf spot of turmeric (*Curcuma longa* L.), M. Sc. (Agri.) Thesis, Uni. Agric. Sci., Dharwad, 2001.
6. Gorawar MM. Studies on major foliar diseases of turmeric. M. Sc. (Agri.) Thesis, Univ. Agri. Sci. Dharwad, 2004, 57.
7. Gorawar MM, Hegde YR, Lokesh NM, Rao MSL. Survey for Foliar Diseases of Turmeric in Northern Karnataka. *Ann. Agric. Bio. Res.*,2006;11(2):171-173.
8. Koche M, Kothikar RB, Patil CU. Survey and screening of turmeric cultivars against major foliar diseases of turmeric in Vidarbha Region and pathogenic behaviour of *Colletotrichum dematium*. *Ind. J. Arecanut Spices Med. Plants.*,2009;11(2):63-68.
9. Mayee CD, Datar VV. Phytopathometry. Technical Bulletin-I, Marathawada Agricultural University, Parbhani, 1986, 146.
10. Mallikarjun G. Studies on *Alternaria alternata* (Fr.) Keissler a causal agent of leaf blight of turmeric (*Curcuma longa*), M. Sc. (Agri) Thesis, Uni. Agric. Sci., Dharwad, 1996, 48.
11. Nair MC, Ramakrishnan K. Effect of *Colletotrichum* leaf spot disease of turmeric (*Curcuma longa* L.) on the yield and quality of rhizomes. *Curr. Sci*,1973;42:549-550.
12. Ravindran PN. Turmeric: the golden spice of Life. In: Nirmal Babu K, Ravindran PN, Sivaraman K (Eds.) *Turmeric: the genus Curcuma*. CRC Press, Taylor and Francis group, Boca Raton, Florida, USA, 2007.
13. Sangameshwar, Mushrif SK, Mahesh YS, Kiran Kumar KC, Meti S, Awati M. Survey and Response of different Planting Dates against Turmeric Leaf Spot Disease caused by *Colletotrichum capsici*. *Biological Forum – An International Journal*,2022;14(4):502-508.
14. Santosh B, Simon S. Survey and *In vitro* evaluation of botanicals against *Colletotrichum capsici* of Turmeric (*Curcuma longa* L.). *International Journal of Creative Research Thoughts (IJCRT)*,2020;8(10):3576-3583.
15. Singh YH, Singh NI, Devi RKT, Sinha B, Sharma SK, Singh ThS. Prevalence of leaf spot of turmeric in Manipur and *in vitro* evaluation of fungicides. *Plant Disease Research*,2016;31(2):146-149.
16. Uma Devi G. Efficacy of fungicides against *Colletotrichum* leaf spot of turmeric. *Indian J. Plant Prot*,2008;36(1):112-113.
17. Wheeler BEJ. An introduction to plant disease, London, New York: Wiley, 1969, 301.