

**“Survey for the occurrence of anthracnose of field bean caused by
Colletotrichum lindemuthianum in southern Karnataka”**

ABSTRACT

Anthrachnose of field bean caused by *Colletotrichum lindemuthianum* is a serious disease in southern Karnataka. In this study, an intensive survey was conducted during kharif 2020 to record the incidence and severity of the anthracnose of field bean in major field bean growing districts of southern Karnataka. Results of the survey, indicated that disease severity ranged from 8.88 per cent to 46.66 per cent. Madanahalli cross of Kolar district recorded the highest severity of 46.66 per cent and the least anthracnose severity was observed in Vajarahalli of Nelmangala taluk, Baavarahalli of Bangarpete taluk, Tagachagere of Channapattana taluk and Ballekere of Kadur taluk (8.88%). Among the six surveyed districts the highest mean disease severity of 32.29 per cent was recorded in Kolar district and the least was observed in Chikkamagalru district with 12.91 per cent.

Key words: Field bean, anthracnose, survey and severity

1. INTRODUCTION:

Field bean (*Lablab purpureus* L.) belongs to the family *Fabaceae*, commonly known as Hyacinth bean, Lablab bean, Egyptian bean, Bonavista vine, Australian pea, Indian bean, dolichos bean and poor man's bean. Field bean is an important herbaceous multipurpose legume crop grown for pulse, vegetable and forage purposes. It is used for human consumption as a good source of protein and vegetable in the form of immature pods, immature and mature seeds (Mihailovic *et al.*, 2010). Field bean is generally considered to be originated in South-east Asia. Presently, it is cultivated throughout the world with major area in tropical Africa and Asia. Within India, field bean as a field crop is mostly confined to the peninsular region and cultivated to a large extent in Karnataka, Tamil Nadu, Andhra Pradesh and Maharashtra (Manjunath *et al.*, 2012).

India is the leading producer of field bean in the world with cultivated area of 0.085 million hectares and production of 0.030 million tones with productivity of 236 Kg/ha. Karnataka state alone contributes about 90 per cent both in terms of area and production of field bean in India with an area of 0.38 lakh hectares with production of 0.29 lakh tonnes and productivity of 649 kg/ha (Anon 2019). Even though the area under this crop is increasing in the state, the productivity is considerably low (Rekha and Mallapur 2007).

The crop is affected by many diseases, among them the anthracnose caused by *Colletotrichum lindemuthianum* (Sacc. and Magnus) Briosi and Cavara is an important disease throughout the world but severe in tropical and subtropical regions (Corrales *et al.* 1995).

Survey to study the severity of anthracnose on field bean has been conducted in different regions of India. Mohammed, (2013) reported that bean anthracnose is prevalent in areas that experience cool and wet weather conditions, causing up to 100 per cent yield loss. The data on the

severity of anthracnose in recent days would help to assess the yield loss and also in formulating management strategies to reduce the crop losses. Hence, the present study is focused on to study the occurrence of field bean anthracnose in major field bean growing districts of southern Karnataka. **This study contributes to the identification of high-risk locations of field bean anthracnose and the factors that affect the severity of the disease. This information helps to manage the disease effectively and reduce yield losses. In the end, it promotes increased production and sustainable field bean farming.**

2. MATERIALS AND METHODS:

A roving survey was carried out as part of the inquiry to track the prevalence and severity of the anthracnose disease in several field bean growing regions of southern Karnataka districts in 2020. Devanahalli, Doddaballapura and Nelmangala taluks of Bengaluru rural district, Chikkaballapura, Chintamani and Bagepalli taluks of Chikkaballapura district, Kolar, Bangarpete and Srinivasapura taluks of Kolar district, Ramnagara and Channapattana taluks of Ramnagara district, Shivamogga taluk of Shivamogga district and Kadur taluk of Chikkamagalru district were selected. In each taluks important field bean growing villages were selected. The fields were selected randomly in a village on the survey route. The observations on leaves and pods in each field were recorded randomly at flowering and pod initiation stage to calculate the disease severity of anthracnose. The foliar infection severity of anthracnose disease was scored by following 0-9 scale (Mayee and Datar, 1986).

Table 1: The disease scoring scale of anthracnose of field bean

Score	Per cent leaf area infected
0	No symptoms on leaf
1	Small pinhead sized lesions covering less than 1 % of leaf area
3	Small pinhead sized lesions covering less than 1-10 % of leaf area
5	Lesions big but not coalescing covering 11-25 % of leaf area
7	Lesions on leaves covering 26-50 % leaf area.
9	Lesions on leaves covering 51 % or more area and defoliation of leaves.

Further, these scales were converted to per cent disease index (PDI) using the formula given by Wheeler (1969).

$$\text{Per cent Disease Index (PDI)} = \frac{\text{Sum of all individual disease ratings}}{\text{Total number of leaves observed} \times \text{Max. disease grade}} \times 100$$

3. RESULTS AND DISCUSSION:

Fields distributed over six districts of southern Karnataka were surveyed in order to record the severity of the disease. Data pertaining to survey is presented in Table 2, which revealed that,

anthracnose of field bean was noticed in all the surveyed fields with severity ranged from 8.88 per cent to 46.66 per cent. Among the different places surveyed in Bengaluru Rural District, the maximum disease severity was observed in Harohalli of Devanahalli taluk and Linganhalli of Doddaballapura taluk. Both recorded the maximum severity of 37.77 per cent followed by Vijayapura (33.33%) of Devanahalli taluk. Next in the order was Devanahalli, Doddaballapura and Nelamangala with disease severity of 28.88 per cent. The least disease severity was noticed in Vajarahalli (8.88%) of Nelamangala taluk. Among the places surveyed in Chikkaballapura district, the highest disease severity was observed in Chintamani (42.66%) followed by Chigaregundlapalli and Pathapalya of Bagepalli taluk and Kachalli of Chintamani taluk which recorded the disease severity of 35.99 per cent. The lowest disease severity was recorded in Dibbur, Kathariguppe of Chikkaballapura taluk and Hadigere of Chintamani taluk with mean disease severity of 18.33 per cent. In Kolar district the maximum severity was recorded in Madanahalli cross (46.66%) of Kolar taluk followed by Srinivasapura of Srinivasapura taluk and Chitnahalli of Kolar taluk with 42.22 per cent of disease severity. Next in the order was Thotli (37.77%) of Kolar taluk. The least severity was recorded in Baavaralli (8.88%) of Bangarpete taluk. In Ramanagara district highest severity was observed in Yerehalli (33.33%) of Ramanagara taluk followed by Chakkere of Channapattana and Ramanagara of Ramanagara taluk with disease severity of 19.99 per cent and 18.33 per cent respectively. Lakshmpura, Keshavapura of Ramanagara taluk and Elekeri of Channapattana taluk reported disease severity of 15.55 per cent. The least disease severity was recorded at Govindanahalli (8.88%). Among the places surveyed in Shivamogga taluk, the highest disease severity was recorded in Haranalli with 22.22 per cent severity followed by Gajanuru and Shivamogga with 19.99 and 18.33per cent, respectively. Least disease severity was observed in Javalli with 15.55 per cent. In Chikkamagalru district highest severity was noticed in Kadur (18.33%) followed by Geddalhalli (15.55%) and least in Ballekere and Nandisiddanahalli (8.88%) of Kadur taluk.

Table 2: Survey for severity of anthracnose disease on dolichos bean in southern Karnataka

Districts	Taluk	Village	PDI
Bengaluru rural	Devanahalli	Vijayapura	33.33%
		Devanahalli	28.88%
		Harohalli	37.77%
		Timmanahalli	15.55%
	Mean		28.88%
	Doddaballapura	Aalahalli	19.99%
		Bayyappanahalli	15.55%
		Linganhalli	37.77%
		Doddaballapura	28.88%
	Mean		25.55%
	Nelamangala	Vajarahalli	8.88%
		Koolipura	15.55%
		Basavanahalli	19.99%
Nelamangala		28.88%	
Mean		18.33%	
Chikkaballapura	Bagepalli	Chigaregundlapalli	35.99%
		Mallasandra	33.33%
		Pathapalya	35.99%
		Cheluru	28.88%

	Mean		33.54%
	Chintamani	Kachalli	35.99%
		Chintamani	42.66%
		Hadigere	18.33%
		Doddabommanalli	33.33%
	Mean		32.58%
	Chikkaballapura	Kathariguppe	18.33%
		Banniguppe	22.22%
		Dibbur	18.33%
		Chikkaballapura	33.33%
Mean		23.05%	
Kolar	Srinivasapura	Shivapura	33.33%
		Srinivasapura	42.22%
		Kotaballapalli	35.99%
		Gownipalli	22.22%
	Mean		33.44%
	Bangarpete	Dimba	15.55%
		Baavaralli	8.88%
		Allikallu	33.33%
		Chikkahosalli	35.99%
	Mean		23.44%
	Kolar	Thotli	37.77%
		Chitnahalli	42.22%
		Mullahalli	33.33%
		Madanahalli cross	46.66%
Mean		40.00%	
Ramanagara	Channapattana	Tagachagere	8.88%
		Chakkere	19.99%
		Elekeri	15.55%
		Govindanahalli	8.88%
	Mean		13.32%
	Ramanagara	Lakshmipura	15.55%
		Yerehalli	33.33%
		Keshavapura	15.55%
Ramanagara		18.33%	
Mean		20.69%	
Shivamogga	Shivamogga	Haranalli	22.22%
		Shivamogga	18.33%
		Gajanuru	19.99%
		Javalli	15.55%
	Mean		19.02%
Chikkamagalru	Kadur	Ballekere	8.88%
		Geddalahalli	15.55%
		Nandisiddanahalli	8.88%
		Kadur	18.33%
	Mean		12.91%

The disease severity among the taluks varied from 12.91 to 40.00 per cent (Table 3). The highest mean disease severity of 40.00 per cent was recorded in Kolar taluk of Kolar district followed by Bagepalli (33.54%) of Chikkaballapura district and Srinivasapura (33.44%) of Kolar district, Chintamani taluk of Chikkaballapura district (32.58%) followed by Devanahalli and Doddaballapura taluk of Bengaluru rural district with 28.88 and 25.55 per cent, respectively. Bangarpete taluk of Kolar

district and Chikkaballapura taluk of Chikkaballapura district recorded the disease severity of 23.44 and 23.05 per cent respectively. Next in the order was Ramanagara taluk of Ramanagara district with 20.69 per cent, Shivamogga taluk (19.09%), Nelamangala taluk (18.33%) and Channapattana taluk (13.32%) and least disease severity was recorded at Kadur taluk of Chikkamagalru district. Among the three taluks surveyed in Bengaluru Rural district Devanahalli taluk recorded the maximum disease severity of 28.88 per cent followed by Doddaballapura taluk (25.55%) and the least was observed in Nelamangala taluk with severity of 18.33 per cent. Among the taluks of Chikkaballapura district the highest disease severity was noticed in Bagepalli taluk with 33.54% followed by Chintamani taluk (32.58%) and the lowest disease severity was observed in Chikkaballapura taluk with 23.05 per cent of disease severity. In Kolar district the maximum disease severity of 40 per cent was recorded in Kolar taluk followed by Srinivasapura (33.44%) and the least was in Bangarpete taluk with 23.44 per cent of disease severity. Among the two taluks surveyed in Ramanagara district the highest severity was observed in Ramanagara taluk with 20.69 per cent followed by Channapattana with 13.32 per cent. In Shivamogga district the mean disease severity recorded in Shivamogga taluk was 19.02 per cent and in Chikkamagalru district the mean disease severity of 12.91 per cent was observed in Kadur taluk (Fig.1). Such variations in anthracnose severity and wide spread nature have been reported by earlier workers in pulse crops (Manjunath *et al.*, 2012, Altaf *et al.*, 2018, Verma *et al.*, 2019, and Kiptooet *et al.*, 2020).

Table 3: Survey to assess the severity of anthracnose disease on dolichos bean in taluks of southern Karnataka

Sl.no	District	Taluks	Mean PDI		Overall mean PDI
			Taluk	District	
1	Bengaluru rural	Devanahalli	28.88%	24.55%	22.58%
		Doddaballapura	25.55%		
		Nelamangala	18.33%		
2	Chikkaballapura	Bagepalli	33.54%	29.72%	
		Chintamani	32.58%		
		Chikkaballapura	23.05%		
3	Kolar	Srinivasapura	33.44%	32.29%	
		Bangarpete	23.44%		
		Kolar	40.00%		
4	Ramanagara	Channapattana	13.32%	17.00%	
		Ramanagara	20.69%		
5	Shivamogga	Shivamogga	19.02%	19.02%	
6	Chikkamagalru	Kadur	12.91%	12.91%	

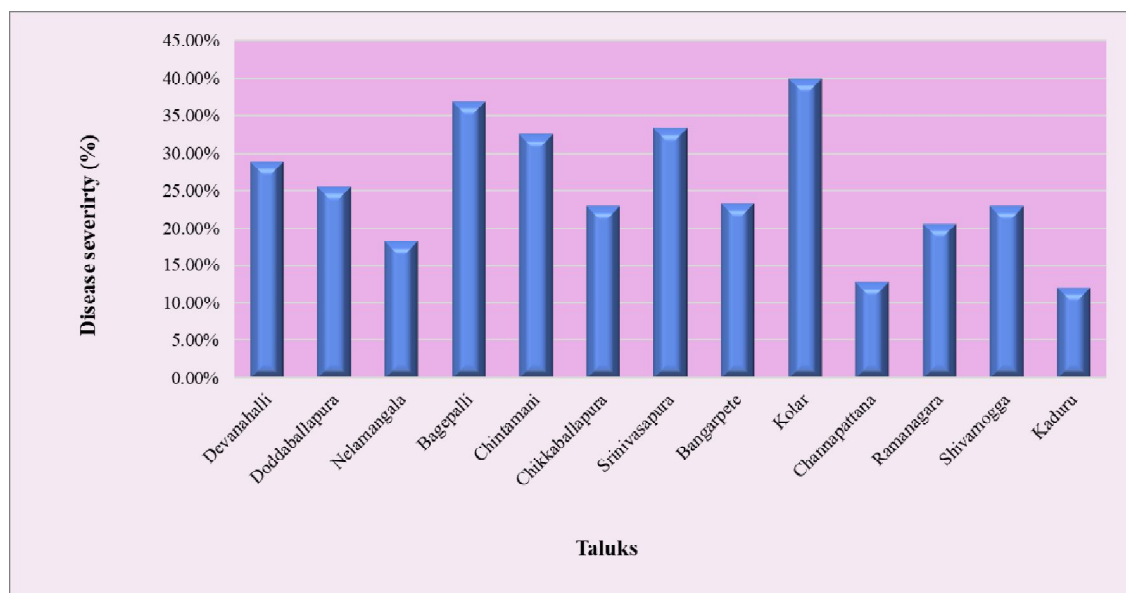


Fig. 1: Taluk wise mean severity of anthracnose of field bean in different districts of Southern Karnataka during *kharif* 2020

Among the six districts of southern Karnataka surveyed, mean disease severity ranged from 12.91 to 32.29 per cent. The mean maximum anthracnose severity was recorded in Kolar district with 32.29 per cent followed by Chikkaballapur, Bengaluru rural, Ramanagara and Shivamogga district with mean disease severity of 29.72, 24.55, 17.00 and 19.02 per cent respectively. However, the least mean disease severity was recorded in Chikkamagalru district with 12.91 per cent mean disease severity. The survey results depicted that, the overall mean severity of anthracnose disease in Southern Karnataka was 22.58 per cent (Table 3). High disease severity of Kolar district was probably due to the cool and humid weather which prevailed in that areas, thus provided the congenial condition for the pathogen for the survival and increased the disease development.

Environmental variables that promote fungal growth, such as temperature and humidity, are the cause of the regional variations in anthracnose severity. Higher infection rates are a result of poor crop management practices such as inappropriate fungicide application and a lack of crop rotation. Disease severity is also influenced by soil nutrient levels, pathogen diversity, and vulnerable field bean variety selection. The distribution of the disease is further impacted by the transmission of fungal spores by wind, rain, and contaminated debris, which causes regional variations in disease severity. The similar results were observed by the survey conducted by Manjunath *et al.* (2012) in the major field bean growing areas of Southern Karnataka, revealed that the anthracnose disease severity on pods in Southern districts of Karnataka ranged from 23.36 per cent to 47.54 per cent in which maximum severity of 47.54 % was reported in Mysore district and the minimum severity of 23.57 was observed in Ramanagara district of Southern Karnataka. The current study is also supported by the findings of Mohammed (2013), who reported that bean anthracnose is prevalent in areas that experience cool and wet weather conditions, causing up to 100 per cent yield loss. Similar results

were also observed by Altaf *et al.* (2018), Verma *et al.* (2019), Kiptoo *et al.* and (2020) Choudhary *et al.* (2024).

4. CONCLUSION:

The survey data revealed that the severity of anthracnose of field bean varied among the different places surveyed. The variations in the severity among the different localities was probably due to environmental conditions, different varieties used, presence of inoculum and the inoculum potential and use of infected seed materials. The higher incidence of anthracnose during *kharif* was may be due to the low temperature and high relative humidity which was prevailing during the crop periods. Continuous drizzling with high relative humidity increases the sporulation and spread of the fungus thus provides congenial condition for progression of the disease and increases the disease severity.

Disclaimer (Artificial intelligence)

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Details of the AI usage are given below:

- 1.
- 2.
- 3.

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