

International Journal of Advanced Biochemistry Research



ISSN Print: 2617-4693
ISSN Online: 2617-4707
NAAS Rating (2026): 5.29
IJABR 2026; SP-10(9): 1283-1287
www.biochemjournal.com
Received: 17-07-2026
Accepted: 21-08-2026

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Occurrence and distribution of fruit rot disease of chilli in Chitradurga Davanagere and Haveri districts of Karnataka

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DOI: <https://www.doi.org/10.33545/26174693.2026.v10.i9Sp.9998>

Abstract

Fruit rot is an important disease of chilli causing considerable reduction in the quality and marketability of fruits. A roving survey was conducted during 2025-26 in major chilli-growing areas of Chitradurga, Davanagere and Haveri districts of Karnataka to assess the occurrence and severity of fruit rot and to document variation in disease severity among locations, soil types and crop growth stages. Representative chilli fields were surveyed and disease incidence and per cent disease index were recorded using a standard disease rating scale. Considerable variation in disease severity was observed among the surveyed districts and taluks. Among the districts, Haveri recorded the highest mean disease incidence (50.25%) and per cent disease index (30.61%), followed by Chitradurga (41.36 and 24.91%) and Davanagere (38.25 and 22.17%), respectively. Among the surveyed taluks, Ranebennur recorded the highest mean disease incidence (58.00%) and per cent disease index (35.78%), followed by Haveri (54.50 and 33.00%) and Byadagi (52.00 and 32.00%). Disease severity was higher in black soil, with mean disease incidence and per cent disease index of 48.71 and 29.62 per cent, respectively, compared with 42.10 and 25.25 per cent in red soil. Similarly, ripening-stage crops recorded higher disease incidence (46.88%) and per cent disease index (28.52%) than fruiting-stage crops (38.73 and 22.97%). The survey established considerable spatial and crop-stage variation in fruit rot severity and identified areas with comparatively higher disease pressure for further pathogen and disease-management studies.

Keywords: Chilli, fruit rot, roving survey, disease incidence and per cent disease index

1. Introduction

Chilli (*Capsicum annum* L.) is an important spice and vegetable crop cultivated extensively in India and is valued for its pungency, colour and wide range of culinary and industrial uses. The crop is affected by several diseases, among which fruit rot or anthracnose is one of the important diseases affecting fruit quality and marketable yield. Fruit rot of chilli is predominantly associated with species of *Colletotrichum*, and disease development may vary considerably with location, environmental conditions, crop stage and pathogen variability. The distribution and severity of chilli anthracnose can vary substantially among production regions. A survey conducted in major chilli growing areas of Andhra Pradesh and Tamil Nadu reported disease severity ranging from 8.13 to 38.66 per cent, demonstrating considerable variation among locations (Chowdary *et al.*, 2024) ^[1].

Recent investigations in Karnataka have likewise demonstrated substantial variation in chilli anthracnose severity among districts. Variation in the per cent disease index of green and red fruit rot has been reported across major chilli-growing districts of northern Karnataka, with considerable differences among taluks (Vandana *et al.*, 2025) ^[2].

Disease assessment through standardized rating scales and calculation of per cent disease index provides a useful means of comparing disease severity among locations. The 0-9 disease rating scale of Mayee and Datar (1986) ^[3] is widely used for field assessment of plant diseases, while per cent disease index can be calculated from numerical disease ratings following Wheeler (1969) ^[4].

Despite previous surveys in Karnataka, information on the occurrence and severity of chilli fruit rot in important chilli-growing areas of Chitradurga, Davanagere and Haveri districts

during the 2025-26 cropping season was limited. These districts represent important chilli-producing areas with differences in agro-ecological conditions and soil characteristics. Therefore, a systematic survey was undertaken to assess the occurrence and severity of fruit rot of chilli in these districts and to determine variation in disease severity in relation to location, soil type and crop growth stage. The survey also provided rhizosphere soil samples for subsequent studies on associated bioinoculants.

2. Material and Methods

2.1 Survey Area and Period

The investigation was conducted during 2025-26 at the Department of Plant Pathology, College of Agriculture, Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Shivamogga, Karnataka. A roving survey was conducted in major chilli-growing areas of Chitradurga, Davanagere and Haveri districts of Karnataka. In each district, representative chilli-growing taluks and fields were selected for recording the occurrence and severity of fruit rot. The survey covered different villages representing variation in crop growth stage and soil type.

2.2 Survey and Sample Collection

An intensive roving survey was conducted in major chilli-growing taluks of the three districts. Representative fields were inspected for characteristic symptoms of fruit rot. Diseased plant samples were collected in sterile polythene bags, while rhizosphere soil samples from healthy chilli plants growing in the same fields were collected separately for subsequent isolation of rhizosphere-associated bioinoculants. The samples were transported to the laboratory under aseptic conditions and processed immediately. Information on district, taluk, village, crop growth stage, disease incidence, GPS coordinates and occurrence of other diseases was recorded using a standard survey proforma.

2.3 Assessment of disease incidence and severity

Disease incidence and severity were recorded from the surveyed fields. Per cent disease incidence (DI) and per cent disease index (PDI) were calculated using the standard procedure and formula given by Wheeler (1969) [4].

$$DI (\%) = \frac{\text{Number of diseased plants}}{\text{Total number of plants observed}} \times 100$$

PDI (%)

$$= \frac{\text{Sum of individual ratings}}{\text{Number of plants examined} \times \text{Maximum disease grade}} \times 100$$

Disease severity was assessed using the 0-9 disease rating scale of Mayee and Datar (1986) [3] described below.

Description of Disease Rating Scale (0-9)

Grade	Description
0	No symptoms
1	1-10% or less infection
3	11-25% infection
5	26-50% infection
7	51-75% infection
9	More than 75% infection

2.4 Assessment According to Soil Type

The surveyed fields were categorized according to soil type. Disease incidence and PDI were calculated separately for fields under red and black soil conditions.

2.5 Assessment According to Crop Growth Stage

The surveyed fields were categorized according to crop growth stage at the time of observation. Fields at the fruiting and ripening stages were considered separately, and mean disease incidence and PDI were calculated for each stage.

3. Results

An intensive roving survey was conducted during 2025-26 to assess the occurrence and severity of fruit rot disease of chilli in major chilli-growing areas of Chitradurga, Davanagere and Haveri districts of Karnataka. The data on per cent disease incidence, per cent disease index, crop growth stage, soil type and other diseases observed, along with the GPS coordinates of the surveyed villages, were recorded using a standard survey proforma.

3.1 District-Wise Occurrence and Severity of Fruit Rot

Fruit rot was observed in the surveyed chilli-growing areas of all three districts. Disease severity varied among districts. Haveri recorded the highest mean disease incidence (50.25%) and PDI (30.61%), followed by Chitradurga with 41.36 per cent disease incidence and 24.91 per cent PDI. Davanagere recorded the lowest mean disease incidence (38.25%) and PDI (22.17%) among the three districts (Table 2).

Table 1: Survey on fruit rot disease severity of chilli in parts of Chitradurga, Davanagere and Haveri districts of Karnataka during 2025-26

Districts	Taluks	Villages	GPS Coordinates		Soil type	Stage of the crop	Mode of irrigation	Other diseases observed	DI (%)	PDI (%)
			Latitude	Longitude						
Chitradurga	Hiriyur	Inahally	14.032399°	76.692537°	Red	Fruiting	Surface	Leaf curl	52	33.33
		Onihatti	13.789688°	76.730064°	Red	Ripening	Drip	Leaf curl	68	43.33
		Ganjalagunte	13.876583	76.620873	Red	Ripening	Furrow	Leaf spot	30	16.67
		Alur	13.860526	76.644363	Red	Ripening	Drip	Leaf curl	48	30.00
		Dindavara	13.834488	76.649355	Red	Fruiting	Drip	Leaf curl	25	13.33
		Kanajanahally	14.109549	76.834961	Red	Fruiting	Drip	Leaf curl	20	10.00
	Taluk Mean								40.5	24.44
	Molakalmuru	Venkatapura	14.850612°	76.836215°	Red	Ripening	Furrow	Leaf curl	75	48.00
		Sirekola	14.927606°	76.802965°	Red	Ripening	Drip	Leaf curl	55	34.00
		Devasamudra	14.856697	76.822885	Black	Ripening	Drip	Leaf spot, Leaf curl	40	24.00
		Guddadahalli	14.770736	76.724611	Red	Ripening	Drip	Leaf spot, Leaf curl	26	13.33
	Taluk Mean								49	29.83

	Challakere	Bukkambudi	14.530416	76.705041	Red	Ripening	Drip	Leaf spot, Leaf curl	44	26.67	
		Kaluvehalli	14.363617	76.800689	Red	Ripening	Drip	Leaf spot	38	22.22	
		Haligondanahalli	14.359966	76.810251	Red	Ripening	Drip	Leaf spot, Leaf curl	49	30.00	
		Ghatparthi	14.468402	76.768842	Black	Fruiting	Drip	Leaf spot, Leaf curl	18	10.00	
		Churipapainahatty	14.32381	76.513964	Red	Fruiting	Surface	Leaf curl, Leaf curl	24	13.33	
		Taluk Mean								34.6	20.44
		District Mean								41.36	24.91
Davanagere	Channagiri	Mallapura	14.154352°	75.941934°	Red	Fruiting	Surface	Leaf curl	44	26.67	
		Santhebennur	14.157666	76.014421	Red	Fruiting	Surface	Leaf curl	31	16.67	
		Taluk Mean								37.5	21.67
	Honnali	Madanabhavi	14.180298°	75.598224°	Red	Ripening	Furrow	Leaf curl	40	23.33	
		Soratur	14.189140	75.623632	Red	Fruiting	Furrow	Leaf curl	38	22.00	
		Taluk Mean								39	22.67
		District Mean								38.25	22.17
Haveri	Ranebennur	Itagi	14.560963°	75.697998°	Black	Fruiting	Surface	Leaf spot, Leaf curl	70	44.00	
		Devagondanakatti	14.552833°	75.667629°	Black	Fruiting	Surface	Leaf curl	54	33.33	
		Halageri	14.547115	75.670093	Black	Fruiting	Furrow	Leaf curl	50	30.00	
		Taluk Mean								58	35.78
	Haveri	Devihosur	14.790500°	75.345987°	Black	Ripening	Surface	Leaf curl	74	46.00	
		Kurubagonda	14.715999°	75.388948°	Black	Ripening	Drip	Leaf curl	35	20.00	
		Taluk Mean								54.5	33.00
	Byadagi	Kaginele	14.489555°	75.409276°	Red	Ripening	Drip	Leaf spot, Leaf curl	46	28.00	
		Kadaramandalagi	14.655051°	75.508500°	Red	Ripening	Surface	Leaf curl	58	36.00	
		Taluk Mean								52	32.00
	Hirekerur	Nulageri	14.490021°	75.413105°	Red	Ripening	Drip	Leaf spot, Leaf curl	34	20.00	
		Abalur	14.516336°	75.405337°	Red	Ripening	Drip	Leaf spot, Leaf curl	39	23.33	
		Taluk Mean								36.5	21.67
		District Mean								50.25	30.61

Note: GPS: Global Positioning System; DI: Disease incidence; PDI: Per cent disease index

Table 2: District-wise severity of fruit rot of chilli during 2025-26

District	Mean DI (%)	Mean PDI (%)
Chitradurga	41.36	24.91
Davanagere	38.25	22.17
Haveri	50.25	30.61

DI: Disease incidence; PDI: Per cent disease index.

3.2 Taluk-Wise Severity

Disease severity varied considerably among the surveyed taluks. In Chitradurga district, Molakalmuru recorded the highest mean PDI (29.83%), followed by Hiriur (24.44%) and Challakere (20.44%). In Davanagere district, Honnali recorded a mean PDI of 22.67 per cent, compared with 21.67 per cent in Channagiri. Among the surveyed taluks of Haveri district, Ranebennur recorded the highest mean PDI (35.78%), followed by Haveri (33.00%), Byadagi (32.00%) and Hirekerur (21.67%) (Table 3).

Table 3: Taluk-wise severity of fruit rot of chilli during 2025-26

District	Taluk	Mean DI (%)	Mean PDI (%)
Chitradurga	Hiriur	40.50	24.44
	Molakalmuru	49.00	29.83
	Challakere	34.60	20.44
Davanagere	Channagiri	37.50	21.67
	Honnali	39.00	22.67
Haveri	Ranebennur	58.00	35.78
	Haveri	54.50	33.00
	Byadagi	52.00	32.00
	Hirekerur	36.50	21.67

DI: Disease incidence; PDI: Per cent disease index.

3.3 Effect of Soil Type on Disease Severity

Disease severity varied between the two soil types represented in the survey. Fields under black soil recorded higher mean disease incidence (48.71%) and PDI (29.62%) than fields under red soil, which recorded mean disease incidence of 42.10 per cent and PDI of 25.25 per cent (Table 4).

Table 4: Disease severity of fruit rot of chilli as influenced by soil type

Soil type	No. of fields	Mean DI (%)	Mean PDI (%)
Red	21	42.10	25.25
Black	7	48.71	29.62

DI: Disease incidence; PDI: Per cent disease index.

3.4 Effect of Crop Growth Stage on Disease Severity

Fruit rot severity was higher in crops at the ripening stage than in crops at the fruiting stage. The ripening-stage fields recorded a mean disease incidence of 46.88 per cent and PDI of 28.52 per cent, whereas fruiting-stage fields recorded 38.73 per cent disease incidence and 22.97 per cent PDI (Table 5).

Table 5: Disease severity of fruit rot of chilli as influenced by growth stage of the crop

Growth stage	No. of fields	Mean DI (%)	Mean PDI (%)
Fruiting	11	38.73	22.97
Ripening	17	46.88	28.52

DI: Disease incidence; PDI: Per cent disease index.

4. Discussion

The present survey confirmed the occurrence of fruit rot of chilli in the major chilli-growing areas surveyed in Chitradurga, Davanagere and Haveri districts of Karnataka. Considerable variation in disease severity was observed among districts and taluks, indicating heterogeneous disease pressure across locations.

Among the three districts, Haveri recorded the highest mean PDI of 30.61 per cent, followed by Chitradurga and Davanagere. The comparatively higher disease severity in Haveri is consistent with earlier surveys in Karnataka, which have documented substantial fruit-rot severity in Haveri and other northern Karnataka chilli-growing areas (Vandana *et al.*, 2025) [2]. The variation observed among taluks in the present investigation may be associated with differences in local growing conditions and disease-favouring environments. Ranebennur recorded the highest mean PDI among the surveyed taluks, while Hirekerur recorded the lowest PDI within Haveri district. Such location-specific variation has also been reported in earlier chilli anthracnose surveys (Chowdary *et al.*, 2024; Raja *et al.*, 2023) [1, 5].

Disease severity was higher in black-soil fields than in red-soil fields. Black soil recorded a mean PDI of 29.62 per cent compared with 25.25 per cent in red soil. The present survey data indicate an association between soil category and disease severity; however, because soil type was observational rather than experimentally manipulated, this

relationship should be interpreted as an association rather than a causal soil effect. Soil moisture and other environmental factors can influence infection and disease development, and differences in field moisture conditions may partly contribute to variation among soil types.

A higher disease severity was recorded at the ripening stage than at the fruiting stage. The PDI increased from 22.97 per cent at the fruiting stage to 28.52 per cent at the ripening stage. Differential susceptibility of chilli fruits to *Colletotrichum* infection at different stages of maturity, including greater vulnerability of mature fruit to certain *Colletotrichum* species, has been reported in earlier studies (Saxena *et al.*, 2014) [6], and surveys of chilli anthracnose have frequently recorded disease during fruit development and maturation (Raja *et al.*, 2023) [5]. The present observation therefore indicates that the ripening stage may represent an important period for monitoring fruit rot under field conditions.

The overall findings demonstrate that fruit rot severity was not uniform across the surveyed region. Identification of locations with comparatively higher disease pressure, particularly in Haveri district and Ranebennur taluk, provides useful baseline information for targeted pathogen collection and development of biological disease-management strategies. The rhizosphere soil samples collected during the survey also provided material for the subsequent isolation and screening of native bioinoculants in the present investigation.

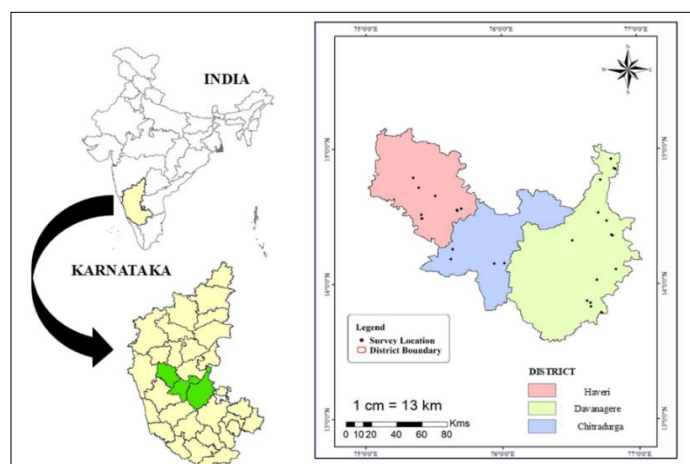


Fig 1: Map showing the distribution of surveyed locations for fruit rot of chilli in Chitradurga, Davanagere and Haveri districts of Karnataka



Fig 2: Survey for fruit rot of chilli and collection of disease and rhizosphere soil samples in parts of Chitradurga, Davanagere and Haveri districts of Karnataka



Fig 3: Characteristic symptoms of fruit rot of chilli caused by *Colletotrichum* spp.

5. Conclusion

The survey conducted during 2025-26 established the occurrence of fruit rot of chilli in the major chilli-growing areas of Chitradurga, Davanagere and Haveri districts of Karnataka. Disease severity varied considerably among districts, taluks, soil types and crop growth stages. Haveri recorded the highest mean disease incidence (50.25%) and PDI (30.61%), while Ranebennur recorded the highest mean PDI among the surveyed taluks (35.78%). Disease severity was comparatively higher in black soil (29.62% PDI) than in red soil (25.25% PDI) and at the ripening stage (28.52% PDI) than at the fruiting stage (22.97% PDI). The survey identified areas with comparatively higher disease pressure and provided baseline information for subsequent pathogen characterization and development of biological management strategies against chilli fruit rot.

6. Acknowledgments

The work was undertaken as part of the M.Sc. research programme at Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, College of Agriculture, Shivamogga, Karnataka. The author is thankful to the advisory committee for their valuable guidance, support and encouragement throughout the research programme. The author also acknowledges the cooperation of the chilli-growing farmers who assisted during the survey and sample collection. The author sincerely expresses gratitude to the seniors and friends for their constant support, encouragement, cooperation and assistance throughout the course of the research work. The authors declare that there is no conflict of interest.

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