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Sumit Rathod

Department of Plant Pathology, Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Iruvakkki, Shivamogga, Karnataka, India.

Suresha D Ekabote

Department of Horticulture Crop Protection, Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Iruvakkki, Shivamogga, Karnataka, India

Gurudevi V Navali

Department of Horticulture Crop Protection, Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Iruvakkki, Shivamogga, Karnataka, India

Ramesh AN

Department of Plant Biochemistry, Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Iruvakkki, Shivamogga, Karnataka, India

Shruti P Gondhi

Department of Vegetable Science, Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Iruvakkki, Shivamogga, Karnataka, India

Corresponding Author: Sumit Rathod

Department of Plant Pathology, Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Iruvakkki, Shivamogga, Karnataka, India.

Incidence and distribution of basal rot of onion (*Allium cepa* L.) in Davanagere, Chitradurga and Chikkamagaluru districts of Karnataka

Sumit Rathod¹, Suresha D Ekabote², Gurudevi V Navali³, Ramesh AN⁴, Shruti P Gondhi⁵

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ABSTRACT

Basal rot is an important soil-borne disease of onion that can cause considerable yield losses under favourable environmental conditions. The present study was undertaken to assess the incidence and distribution of basal rot in major onion-growing areas of Karnataka. A random roving survey was conducted during the year 2025 in selected onion-growing areas of Davanagere, Chitradurga and Chikkamagaluru districts. Disease incidence was recorded by counting diseased plants and expressing them as a percentage of the total number of plants observed. Representative diseased samples were also collected during the survey for further laboratory studies. Basal rot was observed in all three surveyed districts, with disease incidence ranging from 20.37 to 43.64 per cent. The highest incidence was recorded at Arasinagundi village of Jagalur taluk, Davanagere district (43.64%), whereas the lowest was recorded at Arehalli village of Nyamthi taluk, Davanagere district (20.37 %). Among districts, Davanagere recorded the highest mean incidence (31.75 %), followed by Chitradurga (26.34 %) and Chikkamagaluru (22.89 %). At the taluk level, Jagalur recorded the highest mean incidence in Davanagere (41.03 %), Hiriyur in Chitradurga (27.55 %) and Kadur in Chikkamagaluru (23.67 %). Typical symptoms included yellowing, curling and wilting of leaves, basal plate rot, root decay and brown discoloration of bulbs with whitish fungal growth. The survey demonstrated that basal rot is widely distributed in the surveyed onion-growing regions of Karnataka, with comparatively higher disease incidence in Davanagere district. Regular surveillance and location-specific disease management are warranted.

Keywords: Basal rot, Disease incidence, Karnataka, Onion, Survey

1. Introduction

Onion (*Allium cepa* L.) is an important commercial vegetable crop cultivated extensively for its culinary, nutritional and economic value. Its production is affected by several diseases, among which basal rot is an important soil-borne disease that affects roots and the basal plate of bulbs. Infected plants commonly exhibit the symptoms such as chlorosis, leaf curling, wilting and progressive drying of foliage, while below-ground symptoms include root decay and rotting of the basal portion of the bulb.

Fusarium basal rot is widely distributed in onion-growing regions and its incidence varies with environmental conditions, soil characteristics, crop stage, cultivar susceptibility, pathogen inoculum and crop management practices. In India, basal rot has been reported from several onion-growing regions, and *Fusarium oxysporum* f. sp. *cepae* has historically been recognized as an important causal pathogen. Anupama *et al.* (2014) [1] reported basal rot incidence in onion-growing regions of Karnataka (Anupama *et al.*, 2014) [1], while Koppad *et al.* (2017) [2] documented the occurrence of basal rot along with other major onion diseases in northern Karnataka (Koppad *et al.*, 2017) [2]. More recently, surveys in other onion-growing regions of India have also demonstrated considerable spatial variation in disease incidence (Muthukumar *et al.*, 2022) [3]. Although previous studies have documented basal rot in Karnataka, updated information on its incidence in the important onion-growing areas of Davanagere, Chitradurga and Chikkamagaluru districts is limited. Therefore, the present investigation was undertaken to assess the incidence and distribution of basal rot of onion in these districts of Karnataka.

2. Materials and Methods

2.1 Survey for incidence of basal rot

A random roving survey was conducted during 2025 in major onion-growing areas of Davanagere, Chitradurga and Chikkamagaluru districts of Karnataka. Different taluks and villages were selected to assess the occurrence and incidence of basal rot. During the survey, onion fields were examined for plants showing

characteristic symptoms of basal rot. Diseased plant samples showing typical symptoms were collected in polythene covers and brought to the laboratory for further studies. Various Parameters like district,

taluk and village, GPS coordinates, crop stage, disease incidence and other diseases observed were recorded. Disease incidence was calculated according to Wheeler (1969) [4] using the following formula:

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

3. Results

3.1 Occurrence and incidence of basal rot

The survey revealed that basal rot occurred in the onion-growing areas of all three districts surveyed, namely Davanagere, Chitradurga and Chikkamagaluru. Disease incidence varied considerably among the surveyed locations and ranged from 20.37 to 43.64 per cent (Table 3). The highest disease incidence was recorded in Arasinagundi village of Jagalur taluk, Davanagere district (43.64 %), whereas the lowest incidence was recorded in Arehalli village of Nyamthi taluk, Davanagere district (20.37 %).

3.2 District-wise incidence

Davanagere district recorded the highest mean disease incidence of 31.75 per cent, followed by Chitradurga (26.34 %) and Chikkamagaluru (22.89 %) (Table 1, Figure 1). In Davanagere, Jagalur recorded the highest taluk mean incidence (41.03 %), followed by Nyamthi (28.20 %) and Honnali (26.03 %). In Chitradurga, Hiriya recorded the highest taluk mean incidence (27.55 %), followed by Chitradurga (26.93 %) and Challakere (24.54 %). In Chikkamagaluru, Kadur recorded the highest taluk mean incidence (23.67 %), followed by Ajjampura (22.11 %) (Table 2).

3.3 Location-wise variation

At the village level, Arasinagundi recorded the highest incidence (43.64 %), followed by Bidarakere (41.27 %) and Katigehalli (38.18 %) in Davanagere district. In Chitradurga district, Aimangala recorded the highest incidence (31.27 %), followed by Madakaripura (30.42 %), whereas Obalapura recorded the lowest incidence (22.63 %). In Chikkamagaluru district, Ballikere recorded the highest incidence (25.14 %), followed by Yagati (24.32 %), while Mallenahalli recorded the lowest incidence (20.79 %) (Table 3).

3.4 Symptoms observed during the survey

The affected plants generally showed yellowing, curling and wilting of leaves followed by drying of foliage. Below-ground symptoms included basal plate rot and root decay. Affected bulbs showed brown discoloration and in some cases, whitish fungal growth on the diseased tissues.

Table 1. District-wise incidence of basal rot of onion in surveyed districts of Karnataka

Sl. No.	District	Mean disease incidence (%)
1.	Davanagere	31.75
2.	Chitradurga	26.34
3.	Chikkamagaluru	22.89

Table 2. Taluk-wise incidence of basal rot of onion in surveyed districts of Karnataka

District	Taluk	Mean disease incidence (%)
Davanagere	Nyamthi	28.20
	Honnali	26.03
	Jagalur	41.03
Chitradurga	Chitradurga	26.93
	Hiriya	27.55
	Challakere	24.54
Chikkamagaluru	Kadur	23.67
	Ajjampura	22.11

Table 3. Village-wise incidence of basal rot of onion in surveyed districts of Karnataka

District	Taluk	Village	Disease incidence (%)
Davanagere	Jagalur	Arasinagundi	43.64
		Bidarakere	41.27
		Katigehalli	38.18
Chitradurga	Nyamthi	Arehalli	20.37
		Aimangala	31.27
		Madakaripura	30.42
		Obalapura	22.63
Chikkamagaluru	Kadur	Ballikere	25.14
		Yagati	24.32
		Mallenahalli	20.79

4. Discussion

The present survey established the widespread occurrence of basal rot in the surveyed onion-growing regions of Davanagere, Chitradurga and Chikkamagaluru districts of Karnataka. The disease incidence ranged from 20.37 to 43.64 per cent, indicating considerable spatial variation among locations. The highest incidence was recorded at Arasinagundi village of Jagalur taluk, while the lowest was observed at Arehalli village of Nyamthi taluk.

The higher mean disease incidence recorded in Davanagere (31.75 %) compared with Chitradurga (26.34 %) and Chikkamagaluru (22.89 %) suggests comparatively greater disease pressure in the surveyed areas

of Davanagere. The observed variation may be related to differences in agro-ecological conditions, soil properties, crop stage, cultivar susceptibility, pathogen inoculum potential and crop management practices.

The present findings are broadly comparable with earlier reports from Karnataka. Anupama *et al.* (2014) [1] reported basal rot incidence in onion-growing areas of Karnataka, demonstrating substantial variation among locations (Anupama *et al.*, 2014) [1]. Koppad *et al.* (2017) [2] reported basal rot severity ranging from 7.78 to 12.54 per cent in northern Karnataka (Koppad *et al.*, 2017) [2]. The incidence recorded in the present survey was higher than that reported in the latter study, particularly at locations in Davanagere district. Such differences may

be associated with differences in survey period, agro-climatic conditions, soil type, crop stage, cultivar and disease-conducive conditions. Muthukumar *et al.* (2022) [3] reported basal rot incidence ranging from 10.12 to 28.50 per cent in major onion-growing regions of Tamil Nadu (Muthukumar *et al.*, 2022) [3]. The maximum incidence observed in the present study was therefore comparatively higher. Differences among regions may reflect variation in environmental conditions, edaphic factors, cropping systems, host susceptibility and pathogen populations.

Recent studies have also demonstrated that the *Fusarium* species associated with onion basal rot can vary among geographical regions. Bhat *et al.* (2023) [5] reported *Fusarium acutatum* and *Fusarium falciforme* from basal rot-affected onion fields in Karnataka (Bhat *et al.*, 2023) [5]. These findings emphasize the importance of continued field surveillance and pathogen characterization in different onion-growing regions. Breeding for host resistance also remains an important long-term management option for *Fusarium* basal rot of onion (Cramer, 2000) [6]. The present survey provides updated information on the distribution and incidence of basal rot in three important onion-growing districts of Karnataka.

5. Conclusion

Basal rot of onion was widely distributed in the surveyed onion-growing areas of Davanagere, Chitradurga and Chikkamagaluru districts of Karnataka, with disease incidence ranging from 20.37 to 43.64 per cent. Davanagere recorded the highest district mean incidence (31.75 %), while Chikkamagaluru recorded the lowest (22.89 %). The considerable variation among locations highlights the need for regular disease surveillance and location-specific integrated disease management. The survey data provide a useful baseline for future epidemiological studies and management programmes for onion basal rot in Karnataka.

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Figures

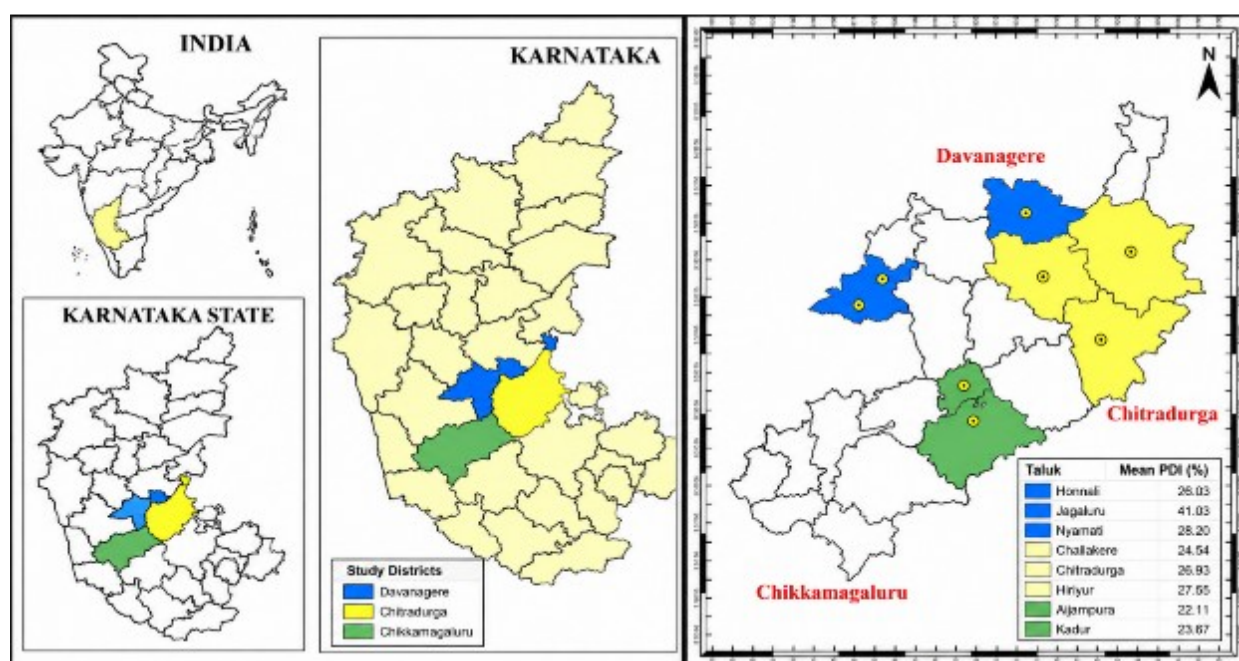


Figure 1. Survey for the incidence of basal rot of onion in Chitradurga, Davanagere and Chikkamagaluru districts of Karnataka

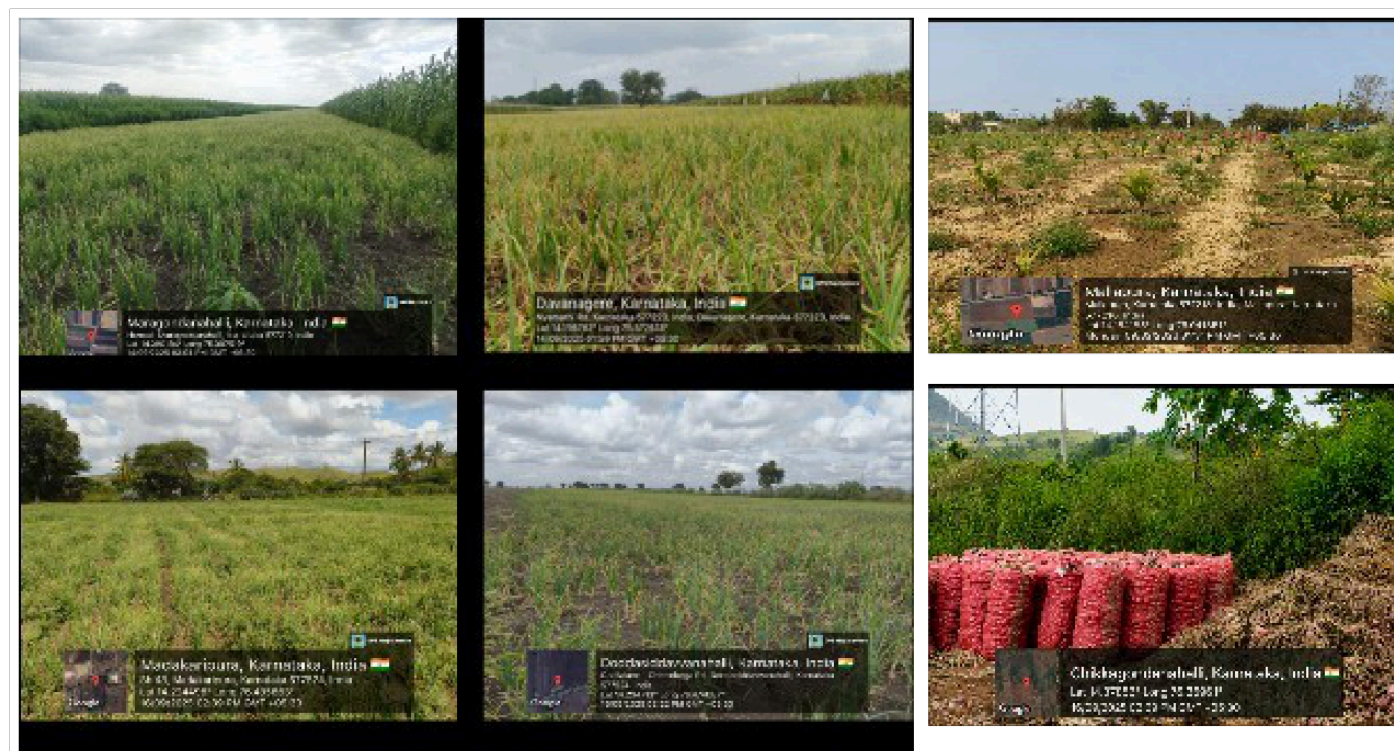


Figure 2. Survey for the incidence of basal rot of onion in Chitradurga, Davanagere and Chikkamagaluru districts of Karnataka



Figure 3. Symptomatology of basal rot of onion

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