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Status of potato tuber rot incidence in major potato growing districts of Karnataka

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Abstract
Potato (*Solanum tuberosum* L.) is globally important staple and starchy food crop. However, its productivity is severely constrained by several bacterial diseases, among which brown rot, soft rot, and common scab are considered the most destructive and economically damaging. To assess the prevalence of these diseases, a survey was conducted in potato fields and markets across different districts of Karnataka. Incidence ranged from 12.30 to 39.36 per cent with the highest per cent disease incidence (39.36%) recorded in Bangarpet taluk of Kolar and the lowest (12.30) was recorded in Hosayellapur village of Dharwad district. Taluk-wise, Bangarpet showed the highest mean disease incidence (36.81%) followed by Kolar taluk whereas Gokak taluk in Belagavi had the lowest (14.31%). The mean disease incidence of different districts revealed that, Kolar had the maximum disease incidence of 34.42 per cent followed by Hassan district with 30.95 per cent. Whereas, the lowest was observed in Belagavi with 16.05 per cent. Kolar district had the higher incidence of bacterial diseases due to continuous potato cultivation contaminated surface irrigation and favourable sandy loam soils with moderate temperature and moisture. The presence of multiple pathogens and large-scale tuber movement through markets also increased disease spread.

Keywords: Potato, survey, *R. Solanacearum*

Introduction
Potato (*Solanum tuberosum* L.) is an herbaceous tuber crop belonging to the family Solanaceae. The crop is widely cultivated and recognized as a popular vegetable across the tropical and subtropical regions (Hayward, 1991) [3]. Commonly known as *"*Alu*"* in local terms, the potato contributes significantly to the human diet by providing high-quality protein, essential vitamins, minerals and trace elements. *Ralstonia solanacearum* (Smith, 1896) [8] Yabuuchi *et al.* (1995) [10], the causal agent of brown rot or bacterial wilt disease is one of the most destructive pathogens of potato. The disease has a significant impact on potato production due to its widespread distribution and high severity.
Brown rot or bacterial wilt of potato is most prevalent in wet equatorial, sub-equatorial and certain temperate regions of the world (Charkowski *et al.,* 2020) [2]. Globally, it affects nearly 3.75 million acres of potato fields across about 80 countries, causing estimated annual losses exceeding $950 million (Charkowski *et al.,* 2020) [2]. Under severe conditions, yield losses may reach up to 80 per cent in potato crops (Ababa, 2024) [1]. The pathogen exhibits an exceptionally wide host range, infecting more than 450 plant species across the 54 botanical families, including potato and is distributed throughout tropical, subtropical and temperate regions of the world (Wicker *et al.*, 2007) [9].
In India, brown rot is endemic in several potato-growing states such as Karnataka, Uttar Pradesh, Western Maharashtra, Madhya Pradesh, West Bengal and the hilly and north-eastern regions. In Karnataka, where potato is a major commercial crop. The districts like Hassan, Chikkamagaluru and Bengaluru are particularly affected by bacterial wilt. The disease caused considerable yield losses reaching up to 75 per cent in certain areas under favorable environmental conditions.

Material and Methods
Survey was carried out in five districts and nine talukas of Karnataka during Kharif 2024. Potato tubers which were infected by different bacterial pathogens were collected from fields and markets in different potato growing areas of Karnataka. The samples which were collected in brown paper bags were brought to the laboratory for isolation followed by characterization of the different organisms.

The various survey locations are listed below

Sl. No.	District	Taluka
01	Chikkaballapura	Chikkaballapura
		Chintamani
02	Kolar	Bangarpet
		Kolar
03	Belgaum	Belgaum
		Gokak
04	Dharwad	Dharwad
05	Hassan	Arkalgud
		Hassan

Results and Discussion
A survey was conducted from September 2024 to March 2025 to find out the brown rot, soft rot and common scab infestation in potato fields and markets from different districts of Karnataka. Similarly, collection of samples from each of the selected districts, two taluks and within two taluks, a minimum of two villages was also done.
The incidence of potato tuber rot ranged from 12.30 to 39.36 per cent, with the maximum disease incidence (39.36 %) recorded in Bangarpet taluk of Kolar and the minimum incidence was (12.30) recorded in Hosayellapur village of Dharwad taluk
(Table 1).
The mean disease incidence of different villages was taken as taluk mean. The highest incidence was observed in Bangarpet taluk of Kolar district (36.81 %) followed by Kolar taluk. The minimum incidence was recorded in Gokak

taluk of Belagavi district (14.31 %) as represented in figure 1.

The mean disease incidence (Fig 2) of different districts revealed that, Kolar had the maximum disease incidence of 34.42 per cent, followed by Hassan district with 30.95 per cent. Whereas, the minimum was observed in Dharwad (14.65 %) and Belagavi (16.05 %).

Ismail *et al*. (2020) [5] conducted a survey across the five major potato growing regions of Pakistan. From the collected potato samples, a total of 50 *Streptomyces* isolates were obtained, which included *Streptomyces scabies*, *S. acidiscabies* and *S. griseoflavus*. The identification of these isolates was carried out based on their morphological, biochemical and molecular characteristics.

Obeid *et al*. (2018) [7] conducted a survey from 2013 to 2015 to detect potato soft rot disease in Jordan. A total of 204 rotted potato samples were collected from various potato-growing regions across different seasons, from which 131 bacterial isolates were obtained and purified on selective media. These isolates were subsequently identified as *Pectobacterium carotovorum* subsp. *carotovorum*. Similarly, Islam (2015) [4] surveyed eight major potato-growing locations in Bangladesh, namely Munshigong, Manikgong, Pabna, Bogra, Rangpur, Lalmonirhat, Panchagarh and Joypurhat and reported that, the incidence of brown rot varied between 3.33 per cent and 40 per cent. The highest incidence (40%) occurred in Munshigong district, while the lowest (3.33%) was recorded in Panchagarh district. Furthermore, Mishra (2021) [6] carried out an extensive survey from September to April during 2019-20 and 2020-21 to confirm the occurrence of three major bacterial diseases of potato. Out of 263 fields surveyed, no samples exhibited brown rot symptoms, whereas 25 tubers showed soft rot and 18 samples were affected by common scab.

Table 2: Status of potato tuber rot incidence in major potato growing districts of Karnataka

District	Taluk	Village	No. of markets	Latitude	Longitude	Incidence (%)	Taluk mean incidence	District mean incidence
Chikkaballapura	Chikkaballapura	Nandi	4	13.386107	77.699492	18.60	25.47	28.99
				13.386117	77.699485	18.18		
				13.386102	77.699515	22.37		
				13.386095	77.699487	23.30		
		Chikkaballapura	3	13.439082	77.720433	33.30		
				13.439322	77.720188	33.14		
				13.439323	77.720186	29.40		
	Chintamani	Chintamani	3	13.401284	78.055829	35.00	32.52	
				13.401327	78.055779	32.39		
				13.401314	78.055874	30.17		
Kolar	Bangarpet	Bangarpet	3	12.990722	78.175817	33.74	36.81	34.42
				13.004630	78.172819	39.36		
				13.019645	78.172328	37.33		
	Kolar	Kolar	2	13.135350	78.134214	31.51	32.04	
				13.134775	78.134482	32.57		
Belagavi	Belagavi	Kadoli	4	15.936820	74.493939	16.16	17.80	16.05
				15.937204	74.495078	15.29		
				15.937649	74.493546	25.35		
				15.937196	74.494104	19.60		
		Khakti	3	15.926426	74.523198	18.03		
				15.926096	74.521825	17.64		
				15.926592	74.523284	14.54		
	Gokak	Gokak	3	16.170064	74.821768	12.64	14.31	
				16.171008	74.822024	15.60		
				16.170949	74.821965	14.70		
Dharwad	Dharwad	Hosayellapur	2	15.461441	75.013661	12.30	14.65	14.65
				15.460328	75.014586	16.60		
		Unkal	2	15.460189	75.015960	12.08		
				15.460293	75.017269	17.64		
Hassan	Arkalgud	Padumanahalli	2	12.854451	76.066674	32.55	33.63	30.95
				12.854530	76.069575	32.25		
		Maravalalu	3	12.753755	76.144159	35.36		
				12.752691	76.144452	35.63		
				12.752736	76.14448	32.53		
		Santemarur	2	12.72948	76.11478	31.30		
				12.721277	76.122307	35.84		
	Hassan	Hassan	3	12.995561	76.089382	33.96	28.27	
				12.995525	76.089338	32.20		
				12.995516	76.089339	20.60		
		APMC	4	12.99549	76.089351	28.76		
				12.995521	76.08933	26.13		
				12.995514	76.089336	29.03		
				12.995507	76.089344	27.27		

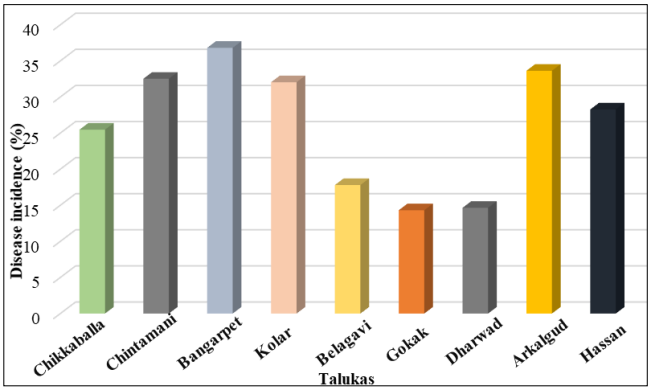

Fig 1: Incidence of potato tuber rot in different talukas of Karnataka

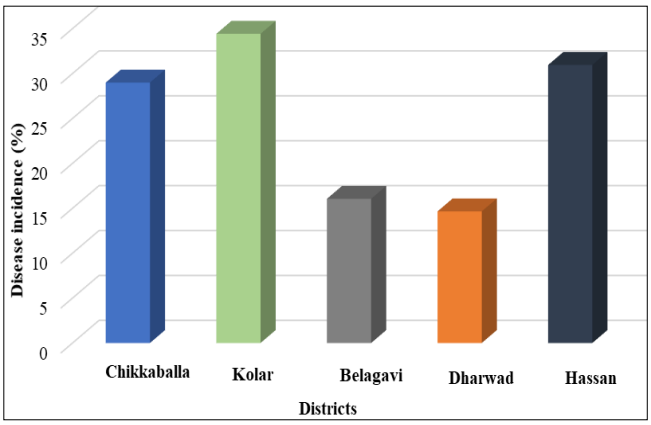

Fig 2: Incidence of potato tuber rot in different districts of Karnataka

Conclusion

A survey conducted in Karnataka revealed the prevalence of three major bacterial diseases affecting potato brown rot, soft rot and common scab-with the highest incidence recorded in Kolar district. The intensity of these diseases varied across the districts with Kolar showing the maximum disease incidence (34.42%), followed by Hassan (30.95%). In contrast, the minimum incidences were observed in Belagavi (16.05%) and Dharwad (14.65%) districts. The maximum incidence in Kolar was attributed to continuous potato cultivation, the use of contaminated irrigation water and favorable soil and climatic conditions that promoted the survival and spread of the pathogens along with extensive movement of potato tubers through local markets. The causal agents responsible for these diseases were identified as *Ralstonia solanacearum*, *Pectobacterium carotovorum* subsp. *carotovorum* and *Streptomyces scabiei*.

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