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## Survey for the disease incidence of leaf rot a new disease of onion in Karnataka

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### Abstract

The roving survey for leaf rot disease was conducted in major onion growing districts of Karnataka viz., Chitradurga, Bagalkote, Dharwad, Vijayapura and Gadag. An intensive roving survey was conducted in major onion growing districts of Karnataka, during monsoon season of 2017-18 revealed that, the disease incidence was ranged from 6.6 to 24 percent. The average disease incidence (16.50%) observed in Gadag district followed by Bagalkote (14.78%), Dharwad (10.93%), Vijayapura (8.73%) and the average disease incidence (7.35%) was noticed in Chitradurga district. Among the five districts surveyed, average percent disease incidence of onion leaf rot was observed highest in Gadag (16.5%). Whereas least incidence at Chitradurga (7.35%).

**Keywords:** Roving survey, onion, leaf rot, disease incidence, average, range

### Introduction

Onion (*Allium cepa* L.) belongs to the family *Alliaceae* and having chromosome number  $2n=16$ . It is the most widely cultivated species of the genus *Allium*. It was commonly referred to as the "queen of kitchen" because it is used as a food, salad, spice, condiment and medicine (Shilpa *et al.*, 2017) [10]. Onion's nutritional value is primarily determined by its content of vitamin B6, vitamin C, dietary fibre, folic acid and carbohydrates. Due to the presence of volatile compounds such as allyl-propyl disulphide, onions are pungent (Shamyuktha *et al.* 2020) [9]. The south-west Asia is considered as the primary centre of domestication. In India, it is cultivated in Maharashtra, Karnataka, Gujarat, Madhya Pradesh, Andhra Pradesh, Tamil Nadu, Rajasthan and Haryana. India (288.77 lakh tons) is the largest producer of onion. In India Maharashtra is the leading producing state. In Karnataka the area under onion is 2.32 lakh hectares, with production of 38.91 lakh tons, (Anon., 2024) [12]. Onion has high value both in domestic use and export purpose, but growing of onion has some constraints such as insect pests and diseases. The pests are thrips, whiteflies, beetles etc. Now a day's bacterial leaf rot is becoming an important disease in northern part of Karnataka from past 8-10 years. There is a need to develop ecofriendly management practice for mitigating the plant diseases. The symptoms of the disease include initial small water soaked spots that appears on the leaves, then become extended irregular translucent water soaked oily lesion on the leaves, which turned to necrotic and constricted area and leaves under advanced stage become hanged down. First the lower leaves would bents down and necrotic area on the leaves formed will extend. Bending down of both leaves and neck of the plant from affected area will be seen. The leaves become shrunken at affected area even at green stage. At severe stage leaves turn yellow, all the leaves collapse to the ground and the plants were died [Plate 1]. It is the first research on leaf rot of onion a new disease in Karnataka. Hence the roving survey was conducted in the major onion growing areas of Karnataka.

### Materials and Methods

#### Survey for disease incidence

The roving survey was conducted in major onion growing districts of Karnataka viz., Chitradurga, Bagalkot, Dharwad, Vijayapura and Gadag in which from each district's minimum two taluk, from each taluk two villages and minimum of two fields per village were surveyed during *kharif* season. Which is mentioned in table no.1. Plant samples collected from the different onion fields were subjected for isolation and cultural studies.

Causal agent was isolated from collected, infected samples and purified on nutrient agar medium. Cultures were preserved and proved their pathogenicity individually on onion plants maintained in the pots.

Per cent disease incidence was assessed as per the formula given by Vernell and Hecloud (1975) <sup>[11]</sup>.

$$\text{Per cent disease incidence} = \frac{\text{Number of plants infected}}{\text{Total number of plants observed}} \times 100$$

During the survey, observations were recorded with respect to previous crop, irrigation type, soil type, cultivar, planting material used, date/month of planting, types of symptoms, agronomic practices and protection measures. Samples were collected for isolation of the pathogens and cultures of different isolates were preserved in the department of Plant Pathology. COH-Bagalkote. About 40 isolates were collected and among them ten well grown, differentiated isolates (BGE-1, BGE-5, VJE-7, VJE-6, GDE-1, GDE-7, DHE-3, DHE-5, CHE-3 and CHE-8) were taken for further study.

## Results

The roving survey has been conducted in major onion

growing districts of Karnataka. Results of the survey revealed that, the leaf rot disease of onion was noticed in all the surveyed locations with varied incidence levels. The average disease incidence (16.50%) observed in Gadag district followed by Bagalkote (14.78%), Dharwad (10.93%), Vijayapura (8.73%) and the least average disease incidence (7.35%) was noticed in Chitradurga district. Among all the surveyed locations in Karnataka, maximum disease incidence was noticed in Vasana village of Gadag district (18.20%) followed by Abbigeri and Savadi village of Gadag district (17.60 and 16.70% respectively). The lowest incidence was observed in D. S. Nagara village of Chitradurga (6.80%) followed by Honnekere village in Hosadurga taluk (7.00%).

Among the surveyed districts the lowest average leaf rot average disease incidence (7.35%) was observed in Chitradurga district, where in the disease incidence was ranged from 6.6 to 8.4 percent. The highest average disease incidence was observed in the Anivala village of Hosadurga taluk (7.9%) followed by Budnatti village of Challakere taluk (7.8%). The least average disease incidence (6.8%) was observed in D.S. Nagara village of Challakere taluk, which was followed by Honnekere village (7.00%) of Hosadurga taluk (Table 2).



**Plate 1:** Severe leaf rot symptoms in onion showing water-soaked lesions, necrosis, leaf bending, yellowing, and plant collapse.

**Table 1:** List of different isolates of leaf rot disease causing bacteria collected during the survey

Sl. No.	District	Taluk	Village	Code	Sl. No.	District	Taluk	Village	Code	Sl. No.	District	Taluk	Village	Code
1	Bagalkot	Badami	Mamatageri	BGE 1	9	Vijayapura	Muddebihala	Rudagi	VJE 1	17	Gadag	Naragunda	Vasana	GDE 1
2	Bagalkot	Badami	Mamatageri	BGE 2	10	Vijayapura	Muddebihala	Rudagi	VJE 2	18	Gadag	Naragunda	Vasana	GDE 2
3	Bagalkot	Badami	Kerakalamatti	BGE 3	11	Vijayapura	Muddebihala	Alakoppa	VJE 3	19	Gadag	Naragunda	Halakoppa	GDE 3
4	Bagalkot	Badami	Kerakalamatti	BGE 4	12	Vijayapura	Muddebihala	Alakoppa	VJE 4	20	Gadag	Naragunda	Halakoppa	GDE 4
5	Bagalkot	Bagalkot	Kesanuru	BGE 5	13	Vijayapura	Basavana bagewadi	Baluti	VJE 5	21	Gadag	Rona	Abbigeri	GDE 5
6	Bagalkot	Bagalkot	Kesanuru	BGE 6	14	Vijayapura	Basavana bagewadi	Baluti	VJE 6	22	Gadag	Rona	Abbigeri	GDE 6
7	Bagalkot	Bagalkot	Yeligutti	BGE 7	15	Vijayapura	Basavana bagewadi	Kolhara	VJE 7	23	Gadag	Rona	Savadi	GDE 7
8	Bagalkot	Bagalkot	Yeligutti	BGE 8	16	Vijayapura	Basavana bagewadi	Kolhara	VJE 8	24	Gadag	Rona	Savadi	GDE 8

Sl. No.	District	Taluk	Village	Code	Sl. No.	District	Taluk	Village	Code
25	Dharwad	Dharwad	Hebballi	DHE 1	33	Chitradurga	Hosadurga	Honnekere	CHE 1
26	Dharwad	Dharwad	Hebballi	DHE 2	34	Chitradurga	Hosadurga	Honnekere	CHE 2
27	Dharwad	Dharwad	Shivalli	DHE 3	35	Chitradurga	Hosadurga	Anadinni	CHE 3
28	Dharwad	Dharwad	Shivalli	DHE 4	36	Chitradurga	Hosadurga	Anadinni	CHE 4
29	Dharwad	Navalagunda	Kadadli	DHE 5	37	Chitradurga	Challakere	D. S Nagara	CHE 5
30	Dharwad	Navalagunda	Kadadli	DHE 6	38	Chitradurga	Challakere	D. S Nagara	CHE 6
31	Dharwad	Navalagunda	Sotakanala	DHE 7	39	Chitradurga	Challakere	Budnatti	CHE 7
32	Dharwad	Navalagunda	Sotakanala	DHE 8	40	Chitradurga	Challakere	Budnatti	CHE 8

**Table 2:** Survey for the incidence of onion leaf rot disease in Bagalkot district, Karnataka

Name of the place			Area (Acre)	Variety	Date of planting (2017)	Soil type	Previous crop	Method of planting	Irrigation	Manures and fertilizers	Cropping pattern	Protection measures/ Agronomic practices	Disease incidence (%)	
District	Taluk	Village												
Bagalkot	Badami	Mamatageri	2	Panchaganga	May 24	Clay	Sorghum	Broadcasting	Sprinkler	DAP-150 kg, Urea-150 kg, Potash-50 kg, Citrate-75 kg.	Chilli	Mancozeb, Streptocycline + CoC.	14. 8%	
			1	Panchaganga	July 2	Clay	Maize	Broadcasting	Spinkler	DAP-50 kg, Urea-40 kg	Solo cropping	-	13. 6%	
		Kerakalamatti	1 ½	Panchaganga	May 26	Clay	Ground nut	Broadcasting	Spinkler	DAP-100 kg, Urea-50 kg.	Chilli	Karate	17.4%	
			2	Panchaganga	June 30	Sandy	Sunflower	Broadcasting	Flooding	DAP-100 kg, Urea-50 kg, Citrate-50 kg.	Solo cropping	Mancozeb	13.8%	
		Taluk Mean												14.9%
	Bagalkot	Yelligutti	1	Local	June 9	Clay loamy	Cluster bean	Broadcasting	Sprinkler	DAP-50 kg, Urea-50 kg.	Solo crop	Mancozeb, Streptocycline + CoC.	15.2%	
			2	Local	June 16	Clay	Sorghum	Broadcasting	Sprinkler	Urea-150 kg, DAP-100 kg, Citrate-50 kg.	Chilli	-	12%	
		Kesanuru	4	Panchaganga	July 14	Red sandy	Onion	Broadcasting	Sprinkler + Flooding	DAP-50 kg, Urea-50 kg.	Brinjal	Karate	14.6%	
			1	Panchaganga	June 5	Red soil	Maize	Broadcasting	Sprinkler	Urea-50 kg, DAP-50 kg, Citrate-25 kg.	Solo cropping	Mancozeb	16.8%	
		Taluk Mean												14.65%
		District Mean												14.78%

**Table 3:** Survey for the incidence of onion leaf rot disease in Vijayapura district, Karnataka.

Name of the place			Area (Acre)	Variety	Date of planting (2017)	Soil type	Previous crop	Method of planting	Irrigation	Manures and fertilizers	Cropping pattern	Protection measures/ Agronomic practices	Disease incidence (%)	
District	Taluk	Village												
Vijayapura	Muddebihala	Rudagi	½	Panchaganga	August 20	Sandy	Garlic	Transplanting	Flooding	DAP-50 kg, Urea-50 kg.	Solo cropping	Score, M-45.	8.6%	
			2	Panchaganga	August 17	Sandy	Chick pea	Transplanting	Flooding	DAP-150 kg, Citrate-100 kg, Urea-100 kg.	Solo cropping	Score, Streptocycline, Coc	7.8%	
		Alakoppa	2	Panchaganaga	August 25	Sandy	Groundnut	Transplanting	Floodng	DAP-2packet, Urea-1packet	Chilli	Karate	9%	
			4	Panchaganga	August 9	Sandy	Garlic	Transplanting	Drip irrigation	DAP-500 kg, Cowdung-30 tractors, 19:19:19-21 kg	Solo cropping	M-45, Prophenophos, Lambda-Pyri thrin.	8.8%	
		Taluk Mean											8.55%	
	Basavaa Bagewadi	Baluti	2	Panchaganga	August 12	Clay	Chickpea	Transplanting	Flooding	DAP-250 kg, Potash-100 kg,Urea-150 kg	Solo cropping	Karate, Kirocron.	7.2	
			2	Panchaganga	August 17	Clay loamy	Wheat	Transplanting	Flooding	10:26:0-50 kg, DAP-150 kg.	Solo cropping	Azeel, Kerocron.	8.2%	
		Kolhara	1	Panchaganga	August 21	Red soil	Onion	Transplanting	Flooding	DAP-50 kg, Urea-50 kg, Citrate-50 kg.	Solo cropping	Kerocron	10.8%	
			1	Panchaganga	August 16	Red soil	Pigeon pea	Transplanting	Flooding	DAP-50 kg, Urea-50 kg, Citrate-25 kg	Solo cropping	Mancozeb, Karate.	9.6%	
		Taluk Mean											8.9%	
			District Mean											8.73%

**Table 4:** Survey for the incidence of onion leaf rot disease in Gadag district, Karnataka

Name of the place			Area (Acre)	Variety	Date of planting (2017)	Soil type	Previous crop	Method of planting	Irrigation	Manures and fertilizers	Cropping pattern	Protection measures/ Agronomic practices	Disease incidence (%)	
District	Taluk	Village												
Gadag	Naragunda	Vasana	½	Local	July 12	Clay	Tomato	Broadcasting	Flooding	Urea-50 kg, DAP-50 kg, SSP-25 kg packet.	Inter cropping with tomato	-	12.4%	
			1	Local	July 12	Clay	Wheat	Broadcasting	Flooding	Urea-100 kg, DAP-50 kg.	Sesame & Dill	-	24%	
		Budihala	1	Local	July 17	Sandy	Maize	Broadcasting	Flooding	Urea-100 kg, DAP-100 kg, Potash-50 kg.	Solo crop	Mancozeb	11%	
			2	Local red	July 13	Clay loamy	Sorghum	Broadcasting	Flooding	Urea-100 kg, DAP-100 kg, Cytozyme-200 ml.	Chilly	Z-78	16%	
		Taluk Mean											15.85%	
	Rona	Abbigeri	1	Local	July 15	Clay loamy	Sunflower	Broadcasting	Flooding	Urea-50 kg, DAP-50 kg, Potash-50 kg.	Cowpea	-	17%	
			3	Local	July 16	Clay loamy	Sesame	Broadcasting	Floding	DAP-100 kg, Urea-150 kg, 19:19:19-150 kg.	Chilly	Score, Fipronil, Streptommycin, Copper oxychloride	18.2%	
		Savadi	1	Local	July 11	Clay	Sorghum	Broadcasting	Flooding	Urea-50 kg, DAP-50 kg, Potash-50 kg.	Pigeon pea	-	15. 8%	
			2	Local	July 15	Clay	Maize	Broadcasting	Flooding	DAP-100 kg, Urea-100 kg, 19:19:19-150 kg.	Sorghum	---	17. 6%	
		Taluk Mean											17.15%	
				District Mean										



**Table 5:** Survey for the incidence of onion leaf rot disease in Dharwad district, Karnataka.

Name of the place			Area (Acre)	Variety	Date of planting (2017)	Soil type	Previous crop	Method of planting	Irrigation	Manures and fertilizers	Cropping pattern	Protection measures/ Agronomic practices	Disease incidence (%)	
District	Taluk	Village												
Dharwad	Dharwad	Hebballi	1 Acre	Local	July 16	Clay	Onion	Sowing with seed drill	Sprinkler	Urea-50 kg, DAP-100 kg.	Chilly	Score & Tilt	12%	
			3 Acre	Local	June 27	Clay	Sorghum	Sowing with seed drill	Sprinkler	Urea-50 kg, DAP-150 kg.	Chilly	-	11.4%	
		Shivalli	3 Acre	Local	July 18	Clay	Onion	Sowing with seed drill	Sprinkler	Urea-100 kg, DAP-100 kg, ZnSo4-25 kg	Solo crop	Propeconazole, Custodia, Fepronyl	9.18%	
			2 Acre	Local	July 1	Clay	Onion	Sowing with seed drill	Sprinkler	DAP-100 kg, Potash-100 kg, Azotobacter, Phosphate solubilizing bacteria.	Solo cropping	Score, Streptocycline	10.2%	
		Taluk Mean												10.70%
		Navalegunda	Sotakanala	3	Local	June 7	Clay	Cotton	Sowing with seed drill	Sprinkler	DAP-150 kg, Urea-100 kg, Potash-100 kg, 17:17:17-150 kg	Solo cropping	Karate, Roko.	13.4%
	1			Bheema dark red	June 13	Clay	Onion	Sowing with seed drill	Sprinkler	DAP-25 kg, 17:17:17-100 kg	Solo cropping	Karate, Streptocycline, Roko.	11.6%	
	Kadaddli		2	Local	July 15	Clay	Wheat	Sowing with seed drill	Sprinkler	DAP-100 kg.	Coriander	Score, Copper oxychloride	10.6%	
			4	Local	June 12	Clay	Onion	Sowing with seed drill	Sprinkler	DAP-100 kg, Urea-50 kg, Vermicompost-1 ton.	Solo cropping	-	9.24%	
	Taluk Mean												11.15%	
	District Mean												10.93%	

**Table 6:** Survey for the incidence of onion leaf rot disease in Chitradurga district, Karnataka.

Name of the place			Area (Acre)	Variety	Date of planting (2017)	Soil type	Previous crop	Method of planting	Irrigation	Manures and fertilizers	Cropping pattern	Protection measures/ Agronomic practices	Disease incidence (%)	
District	Taluk	Village												
Chitradurga	Hosadurga	Honnekere	3	Local	June 15	Sandy soil	Onion	Broadcasting	Sprinkler	Urea-150 kg, DAP-150 kg, Potash-100 kg, 10:26:26-75 kg	Chilli, Dolichous bean	-	7.2%	
			2	local	June 7	Sandy soil	Onion	Broadcasting	Sprinkler	Urea-100 kg, DAP-100 kg, Potash-50 kg, 10:26:26-75 kg.	Solo cropping		6.8%	
		Anivala	2	Local	June 5	Clay loamy	Onion	Broadcasting	Flooding	Urea-50 kg, DAP-100 kg, 15:15:0:13-100 kg, 10:26:0-50 kg packet.	Solo cropping	-	8.2%	
			3	Local	June 10	Clay loamy	Ragi	Broadcasting	Flooding	Urea-100 & DAP-150 kg packets.	Solo cropping	Mancozeb	7.6%	
		Taluk Mean												7.40%
		Challakere	Budnatti	1	Satara	July 10	Red sandy	Ragi	Broadcasting	Flooding	Urea-50 kg	Solo cropping	Sigma + Rocket	8.4%
	1			Satara	July 13	Red sandy	Maize	Broadcasting	Flooding	Urea-50 kg, DAP-50 kg.	Solo cropping	Mancozeb,	7.2%	
	D. S. Nagara		1	Satara	June 10	Red sandy	Ragi	Broadcasting	Flooding	Urea-50 kg, DAP-50 kg.	Solo cropping	Mancozeb, Karate, Agil.	6.6%	
			1	Satara	June 10	Red sandy	Onion	Broadcasting	Flooding	Urea-50 kg, DAP-50 kg.	Solo cropping	Karate, Kitazen, Galigon, Nimbesidine.	7%	
	Taluk Mean												7.30%	
	District Mean												7.35%	

## Discussion

The survey was conducted in 40 fields and the disease incidence was noticed in all the locations with varied

incidence levels. The average disease incidence was found to be highest in Gadag district (16.50%) followed by Bagalkote (14.78%) and the least incidence was noticed in

Chitradurga district (7.35%). Among all the surveyed locations in Karnataka, maximum disease incidence was noticed in Vasana village of Gadag district (18.20%) followed by Abbigeri and Savadi villages of Gadag district (17.60 and 16.70%) respectively. The lowest incidence was observed in D. S. Nagara village of Chitradurga (6.80%) followed by Honnekere village (7.00%) of Hosadurga taluk. The disease incidence was found to be more in north Karnataka region. When compared with the districts surveyed the highest humidity was recorded in Gadag district and the local varieties of Gadag may be susceptible rot leaf rot disease.

The relative humidity is playing major role in the disease incidence, in Gadag district the relative humidity was 76.69 (%), with congenial average temperature of 26.34 °C and average rainfall 92.76 mm from July to October. Whereas the disease incidence was less in Chitradurga, where the relative humidity was 59.72 (%), rainfall (84.90 mm) and high temperature (26.22 °C) from July to September of 2017 (Karnataka state national disaster management commission (weather data-Bengaluru, 2017).

These results are in agreement with reports of Diab *et al.*, (1982) <sup>[4]</sup> who reported that the bacterial scab of pepper (*Xanthomonas campestris* pv. *Vesicatoria*) increased with RH. Neumeister (2010) reviewed that high temperature, rainfall and humidity can increase the growth and spread of bacteria. High temperature also plays a vital role for the occurrence of bacterial diseases such as *Ralstonia solanacearum*, *Acidovorax avenae* and *Burkholderia glumea* and bacteria also proliferate in the areas where temperature dependent diseases have not been previously observed (Kudela, 2009) <sup>[6]</sup>.

## Conclusion

An intensive roving survey conducted in major onion growing districts of Karnataka revealed that, average percent disease incidence of onion leaf rot was observed highest in Gadag (16.5%). Whereas least incidence at Chitradurga (7.35%). The disease incidence was maximum during *kharif* season.

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