



## Survey for the status of sheath blight of rice in Gariaband and Dhamtari, two adjoining districts of Chhattisgarh plains

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### Abstract

A systematic survey assessed the prevalence and incidence of sheath blight disease in rice across 40 villages spanning two adjacent districts of Chhattisgarh plains, each comprising four blocks during Kharif 2023 and 2024—the survey aimed to evaluate the spatial distribution and intensity of sheath blight of rice caused by *Rhizoctonia solani*. Disease incidence was recorded through field observations using standardized scoring techniques during the peak crop growth stages. Results revealed significant variation in disease incidence among villages, blocks, and districts. The mean average PDI of both years of sheath blight was higher in Dhamtari district (55.93 %), compared to Gariaband district (47.45 %). The survey also identified commonly cultivated rice varieties in each region and their relative susceptibility to the disease. This survey provides a valuable baseline for future monitoring and contributes to developing more targeted approaches for sheath blight control in the region.

**Keywords:** Sheath blight, survey, disease incidence

### Introduction

Rice (*Oryza sativa* L.) is a staple food serving millions worldwide. Many countries rely on rice production to sustain their economies. In India, rice production plays a crucial role in the Indian economy and employs rural India. China and India are the largest rice-producing countries in the world; jointly, they account for 51.4% of the global rice production. The area under rice cultivation in India accounts for 46.38 million ha with the production of 130.29 million tonnes, and the productivity is 28.09 qt/ha (Agricultural Statistics at a glance- 2022). Chhattisgarh is referred to as the “Rice Bowl of India”, occupies 4<sup>th</sup> position in the area (3.76 million ha), 7<sup>th</sup> position in production (7.90 million tons), and 10<sup>th</sup> position in rice productivity (2.10 t/ha) and contributes 6.06 % of country’s rice requirement (Agricultural Statistics at a Glance 2022). Despite this, the crop is vulnerable to various microbial pathogens of fungal, bacterial, and viral origin.

Sheath blight of rice, caused by the fungal pathogen *Rhizoctonia solani*, is a significant challenge facing rice production worldwide (Shakeel *et al.*, 2015; Zhang *et al.*, 2023) <sup>[9]</sup>, as it can lead to substantial yield losses if left unchecked, sometimes reaching up to 50% under conducive environmental conditions, posing a significant challenge to food security (Kumar *et al.*, 2020) <sup>[3]</sup>. This is especially true of the rice variety Swarna, which is highly cultivated in rice-growing areas of Chhattisgarh. Gariaband and Dhamtari, which fall under the C.G. Plains, are the two most critical rice-producing districts. Among 28 districts in 2019, Dhamtari district had the highest productivity of 3567 kg/ha, with an area of 139.49 ha and production of 428.14 Metric Tonnes (Directorate of Agriculture 2019). Rice is the predominant crop in the region, and the majority of respondents in this study were medium-scale farmers, cultivating between 2 and 5 acres of land. Disease severity in rice varied between 5% and 50% in different varieties. In the Adsen, Baronda, and Matiya villages of Raipur district, sheath blight was observed with up to 20% severity. It was found to be another most severe disease, next to blast, which

was familiar everywhere with low to moderate severity. It reached up to 50% severity in a few fields in Kharif 2019, according to a survey conducted by NIBSM Raipur during 2016-2022 (Sridhar *et al.*, 2022) <sup>[10]</sup>.

A survey is an important tool that provides an essential understanding of the spatial distribution of disease. It also reveals region-specific data on the susceptibility of different varieties to a particular disease. Therefore present study was undertaken to assess the incidence of sheath blight of rice in region specific environment, cropping pattern, rice variety, agronomical practices and management strategy in the two adjoining districts to suggest better management practices.

### Materials and methods

An intensive survey was conducted to determine the occurrence and incidence of sheath blight disease in Gariaband and Dhamtari during Kharif 2023 and 2024. The survey covered 120 farmers from 40 villages of 8 blocks under two districts. In the district, Gariaband four blocks were selected, and out of that 20 villages namely Baharabuda, Kokdi, Patharmonda, Ganjaipuri, Asra, Kharkhara, Pathar, Onava, Gidhani, Pandripani, Kopra, Bhendri, Mudtarai, Gadahidih, Pandritarai, Bhatigarh, Hardibhata, Nahanbiri, Amad and Taurenga and 20 villages were in Dhamtari namely Karetha, Shankardah, Kharenga, Sarangpuri, Limtara, Keregaon, Raipara, Dokaal, Jampani, Khadadah, Dadesara, Bhusrenga, Chorbhatti, Bhaloojhu, Charra,, Chhipli, Kareli, Megha, Korgaon and Dudhwara was conducted as it has the highest area under rice cultivation. Visits to selected villages were made at 2-3 day intervals, and information was collected through personal interviews with 120 randomly selected farmers from 40 villages. From each village, 03 farmers were selected for individual interviews, collection of disease samples, and a recorded observation on disease incidence was calculated by using the following formula,

$$\text{Disease incidence (\%)} = \frac{\text{Number of diseased plants in the quadrant}}{\text{Total number of plants in the quadrant}} \times 100$$

Each sample was kept in a paper bag tied with a rubber band and labeled immediately. Information about the preferred rice varieties grown, the status of diseases on preferred varieties, the average dose of different fertilizers used by the farmers, crop history, and data on disease incidence was recorded from selected farmers' fields, and disease control practices were gathered and compiled. Samples and infected parts were brought to the laboratory and analyzed. The leaves and sheath of the affected plant showing sheath blight symptoms were incised, and isolation was made for the presence or absence of the causal agent.

## Result and Discussion

This study evaluated rice sheath blight disease among various rice varieties grown by farmers in the Gariyaband and Dhamtari District, a significant concern for rice growers.

### 1. Status of sheath blight of rice on preferred varieties grown by farmers

A survey was conducted during 2023-24 to know the most popular varieties of rice among the farmers of Gariyaband and Dhamtari districts and the status of sheath blight of rice. The data presented in Table 4.1 represent the survey results and show more than 10 varieties; among them, the most popular varieties were in the present investigation. It was

recorded that popular varieties grown by farmers were Swarna, Mahendra-606, OM-3, MTU-1010, Real-11, SRD-55, MTU-1001, Mahamaya, Kaveri, and hybrids. Among these, most popular was Swarna (23 %) followed by Real-11 (16 %), OM -3 (14 %), SRD-55 (13 %), Mahendra-606 (12 %), MTU-1001 (11 %), Hybrids (10 %), Kaveri (9 %), MTU-1010 (8 %) and Mahamaya (4 %). Most farmers preferred Swarna and hybrid varieties due to their high-yielding attributes. They are best suited for field areas with more extended periods of waterlogging conditions, the ability to recover under stress conditions, and economic value in the local market.

During the survey, sheath blight, bacterial leaf blight, false smut, rice blast, and brown spot were the primary contaminants of rice crops. All rice diseases are recognized by farmers in their own local Chhattisgarhi language. For sheath blight, they use (pigk fcekjh), for false smut (ykbZ QwfVI), for BLB (cgjh iku), and for Blast (CykLV) only. Among the different diseases, sheath blight was the most prevalent across all varieties in the studied area. All farmers in the surveyed areas reported encountering sheath blight disease in their rice varieties, especially in varieties like Swarna (100 %), Mahamaya (100 %), Kaveri (100 %), and Hybrids (100 %), followed by Real-11 (87.50 %), SRD-55 (84.61 %), Mahendra-606 (83.33 %), MTU-1001 (81.81 %), OM-3 (78.57 %) and MTU-1010 (75.00 %).

**Table 1:** Status of sheath blight of rice on preferred varieties grown by farmers

S. No	Rice varieties	Response from farmers			
		No. of Farmers cultivated	Adoption of variety (%)	Sheath blight	
				No. of farmers	Farmers (%)
1	Swarna	23	19.16	23	100
2	Mahendra-606	12	10.00	10	83.33
3	OM -3	14	11.66	11	78.57
4	MTU-1010	08	6.66	7	75.00
5	Real-11	16	13.33	14	87.50
6	SRD-55	13	10.83	11	84.61
7	MTU-1001	11	9.16	09	81.81
8	Mahamaya	04	3.33	04	100
9	Kaveri	09	7.50	09	100
10	Hybrids	10	8.33	10	100

### 2. Survey of sheath blight of rice in Gariyaband and Dhamtari districts

The results are presented in Tables 4.2 and 4.3, indicating that the disease has occurred in all the randomly selected 40 villages of Gariyaband and Dhamtari districts. Systematically, a roving survey was carried out during Kharif 2023 and Kharif 2024 to confirm the disease incidence in two rice-growing areas of Chhattisgarh Plains. In the Gariyaband district, during Kharif 2023, the disease incidence was documented in four blocks, out of which the highest mean sheath blight incidence was recorded in Gariyaband block (68.12 %), followed by fingshwar (61.21 %) and Chhurra (45.25 %), while the least disease incidence was noticed in Mainpur block (21.64 %). Among the different blocks and of Gariyaband villages, maximum (86.87 %) DI was seen in Zinco Rice-1 at Baherabuda followed by Mudtarai (78.40 %), Kopra (75.73 %), Patharmonda (73.5%), Kokdi (70.03 %), Asra (66.66 %), Kharkhara (59.04 %), Pandripani (58.72 %), Pandritarai (53.33 %), Bhendri, However it was least (16.66 %) recorded in Annapurna at Nahanbiri block Mainpur. Similarly, four blocks of Dhamtari district were surveyed, and the highest

mean DI was recorded in Dhamtari block (73.15 %), followed by Kurud (62.58 %), Nagari (50.72 %), and Magarload (44.44 %). Among all the villages surveyed, the highest DI was recorded in village Shankardah (92.59 %) in Mahendra-404 at Dhamtari block followed by Bhusrenga (84.03), Karetha (72.50%), Sarangpuri (72.04 %), Keregaon (70.00 %), Kharinga (68.66 %), Dadesara (61.66 %), Bhaloojhu (60.01 %), Limtara (60.00 %), Dudhwara (57.14), Chorbhatti (56.29), Chhipli (53.33 %), Khadadah (53.25 %), Charra (50.95 %), Jampani (46.42 %), Dokaal (43.80 %), Korgaon (41.26 %), Raipara (40.16 %), Megha (37.14 %), while minimum DI was observed at Kareli (33.33 %) in BPT-5204 at Magarload block.

An intensive roving survey was also done during Kharif 2024 to record disease incidence of sheath blight in previously surveyed areas of Gariyaband and Dhamtari districts, and data are presented in Table 4.3. It is evident from the data (Table 4.3) that PDI was considerably different across different locations, and it varied from 14.74 % to 85.97 %. The overall average of sheath blight was 46.02 % at Gariyaband and 54.98 % at Dhamtari. Out of four blocks from the Gariyaband district, again, the highest mean

sheath blight incidence was recorded in Gariaband block (62.68 %), followed by fingshwar (57.30 %) and Chhurra (42.88 %), with the least DI in Mainpur block (20.56 %). Among the villages maximum DI was recorded in Baherabuda (77.98 %), followed by Mudtarai (72.61 %), Kopra (72.49 %), Patharmonda (69.64%), Kokdi (68.33 %), Kharkhara (56.26 %), Pandripani (56.25 %), Asra (53.07 %), Pandritarai (50.78 %), Bhendri (46.80. %), Gidhani (44.40 %), Ganjaipuri (44.40 %), Gadahidih (43.86 %), Hardibhata (31.94 %), Onava (30.17 %), Pathar (25.82 %), Amad (21.04) and minimum DI was noticed at village Taurenga (14.74 % ) followed by Nahanbiri (16.79 %) and Bhatigarh (18.51 %). In the Dhamtari district, the highest mean DI was recorded in the Dhamtari block (68.48 %), followed by Kurud (59.30 %), Nagari (47.73 %), and Magarload (41.09 %). Among the 20 villages of the Dhamtari district, the highest DI was observed at village Shankardah (85.97 %) followed by Bhusrenga (75.96 %), Karetha (71.66%), Sarangpuri (67.57 %), Keregaon (67.04 %), Kharinga (63.05 %), Bhaloojhu (60.55 %), Dudhwara (57.14), Dadesara (55.95 %), Limtara (54.15 %), Chhipli (53.33 %), Chorbhatti (52.39), Charra (51.68 %), Khadadah (47.21 %), Jampani (44.81 %), Korgaon (41.26 %), Dokaal

(41.13 %), Raipara (38.46 %), Megha (37.14 %), Kareli (33.33).

The present investigation shows that the Dhamtari district exhibits more disease incidence than the Gariaband district. PDI significantly differed from place to place among the different locations of the surveyed areas of Gariaband and Dhamtari. This might be due to various factors, i.e., soil pH, soil type, rainfall, light intensity, types of cultivation, method of cultivation, quantity of fertilizers, and existence of pathogenic variability. Sridhar *et al.* (2022) [10] reported sheath blight as a significant disease in village Bhusrenga of Dhamtari district with 30 to 50% PDI. Pratiwi *et al.* (2021) [7] also obtained a similar result, reporting 99.48 % disease incidence in Northern Sumatra, Indonesia. Parshuram *et al.* (2017) [6] also observed 76 % PDI of rice sheath blight in the Gariyaband district of Chhattisgarh. Similarly, Jyothia *et al.* (2025) surveyed to assess the severity of sheath blight in rice in nine districts of Telangana state, and they noticed maximum severity in the Adilabad district. Reddy *et al.* (2018) [8] reported a 20 to 80 % disease incidence of sheath blight in nine districts of Telangana state. They found maximum (80 %) PDI from Miryalaguda block, while minimum (20 %) was noticed at Buddipally, Rudrur, Vangapally, and Wyra villages.

**Table 2:** Disease incidence of sheath blight in rice at Gariaband and Dhamtari districts during Kharif 2023

S. No.	District	Block	Village/ Location	Rice Variety	Crop stage	Latitude	Longitude	DI *(%)	DI ** (%)			
1	Gariaband	Gariaband	Baherabuda	Zinco Rice-1	Heading	20.639287	82.067176	86.87	68.12			
2			Kokdi	Om-3	PI	20.642498	82.077025	70.03				
3			Patharmonda	Sawrna	Tillering	20.660636	82.083099	73.50				
4			Ganjaipuri	Sliki 601	Tillering	20.678166	82.080964	43.58				
5			Asra	Swarna	Heading	20.767508	81.969846	66.66				
6		Chhurra	Kharkhara	Swarna	Tillering	20.651673	82.049056	59.04	45.25			
7			Pathar	Swarna Sub-1	Tillering	20.657394	82.036797	28.41				
8			Onava	Kaveri	PI	20.849288	82.167354	37.89				
9			Gidhani	Swarna Sub-1	Tillering	2.795006	82.185663	42.22				
10			Pandripani	Swarna Sub-1	Tillering	2.794727	82.184028	58.72				
11		Fingshwar	Fingshwar	Kopra	Swarna	PI	20.837284	81.927094	75.73	61.21		
12				Bhendri	Swarna	Tillering	20.845199	81.954832	52.94			
13				Mudtarai	Swarna	PI	20.843051	81.959062	78.40			
14				Gadahidih	Swarna	Tillering	20.837353	81.959797	45.66			
15				Pandritarai	Swarna	Tillering	20.833654	81.957567	53.33			
16				Mainpur	Bhatigarh	Nandi	Tillering	20.284979	82.221846		18.51	21.64
17					Hardibhata	Real 11	PI	20.294363	82.230572		33.33	
18					Nahanbiri	Annapurna	Tillering	20.292272	82.222628		16.66	
19					Amad	MTU-1001	Tillering	20.110073	82.26659		20.68	
20				Taurenga	MTU-1001	Tillering	20.114077	82.254496	19.04			
21	Dhamtari	Dhamtari	Karetha	Bapna-77	Dough	20.675439	81.568607	72.50	73.15			
22			Shankardah	Mahendra-404	Heading	20.714874	81.580714	92.59				
23			Kharinga	SRD-55	Tillering	20.689891	81.632516	68.66				
24			Sarangpuri	Real-11	PI	20.700284	81.657212	72.04				
25			Limtara	Swarna	Tillering	20.771814	81.597561	60.00				
26	Nagari	Nagari	Keregaon	Swarna	Tillering	20.555463	81.726577	70.00	50.72			
27			Raipara	OM -3	Milking	20.517976	81.716033	40.16				
28			Dokaal	Pan-849	Heading	20.555507	81.726592	43.80				
29			Jampani	Kaveri	PI	20.541178	81.722545	46.42				
30			Khadadah	SRD-55	PI	20.575391	81.693196	53.25				
31			Kurud	Dadesara	Swarna	Heading	20.815734	81.679692		61.66	62.58	
32				Bhusrenga	Mahendra-404	Heading	20.838614	81.664061		84.03		
33				Chorbhatti	Swarna	PI	20.831782	81.649248		56.29		
34				Bhaloojhu	Golden Samba	PI	20.833181	81.679673		60.01		
35				Charra	Swarna	Heading	20.832448	81.699885		50.95		
36	Magarload	Magarload	Megha	R.B Gold	Tillering	20.750995	81.81394	37.14	44.44			
37			Chhipli	Swarna	Tillering	20.744722	81.856666	53.33				
38			Kareli	BPT 5204	Tillering	20.744722	81.856666	33.33				
39			Korgaon	Pan 804	PI	20.740799	81.892547	41.26				
40	Dudhwara	MTU-1010	PI	20.744563	81.895915	57.14						

\*= Mean PDI from all the villages, \*\*= Mean PDI of all blocks, PI: Panicle initiation, DI: Disease incidence

**Table 3:** Disease incidence of sheath blight in rice at Gariaband and Dhamtari districts during Kharif 2024

S. No.	District	Block	Village/ Location	Rice Variety	Crop stage	Latitude	Longitude	DI *(%)	DI ** (%)	
1	Gariaband	Gariaband	Baherabuda	Mahamaya	Heading	20.639287	82.067176	77.98	62.68	
2			Kokdi	Om-3	Tillering	20.642498	82.077025	68.33		
3			Patharmonda	Kaveri-828	PI	20.660636	82.083099	69.64		
4			Ganjaipuri	Sliki 601	Tillering	20.678166	82.080964	44.4		
5			Asra	Swarna	Heading	20.767508	81.969846	53.07		
6		Chhurra	Kharkhara	Pan Swarna	PI	20.651673	82.049056	56.26	42.88	
7			Pathar	BPT-5204	Tillering	20.657394	82.036797	25.82		
8			Onava	MTU-1001	PI	20.851152	82.166032	30.17		
9			Gidhani	Swarna Sub-1	PI	2.795044	82.185751	45.94		
10			Pandripani	Swarna	Tillering	2.794727	82.184028	56.25		
11		Gariaband	Fingeshwar	Kopra	Swarna	Dough	20.835318	81.927094	72.49	57.30
12			Bhendri	Swarna	Tillering	20.833535	81.957732	46.8		
13			Mudtarai	Swarna	Tillering	20.838872	81.960748	72.61		
14			Mainpur	Gadahidih	Swarna	Tillering	20.837353	81.959797	43.86	21.23
15				Pandritarai	Swarna	Tillering	20.833648	81.957576	50.78	
16				Bhatigarh	Nandi	Tillering	20.284976	82.221856	18.33	
17			Hardibhata	Real 11	PI	20.294326	82.230543	31.94		
18			Nahanbiri	Annapura	Tillering	20.292256	82.222626	16.79		
19				Amad	MTU-1001	Tillering	20.110226	82.266654	21.04	
20				Taurenga	MTU-1001	Tillering	20.114071	82.254507	14.74	
21	Dhamtari	Karetha		Bapna-77	Dough	20.675439	81.568607	71.66	68.48	
22	Shankardah	Mahendra-404	Heading	20.714874	81.580714	85.97				
23	Kharinga	Golden Sambha	PI	20.689891	81.632516	63.05				
24	Sarangpuri	MTU-1010	Milking	20.700284	81.657212	67.57				
25	Dhamtari	Nagari	Limtara	Swarna	Tillering	20.771814	81.597561	54.15	47.73	
26			Keregaon	Swarna	PI	20.555463	81.726577	67.04		
27			Raipara	OM -3	Milking	20.517976	81.716033	38.46		
28			Dokaal	Pan-849	Heading	20.555507	81.726592	41.13		
29			Jampani	Kaveri	PI	20.541178	81.722545	44.81		
30		Khadadah	SRD-55	PI	20.575391	81.693196	47.21			
31		Kurud	Dadesara	Swarna	Heading	20.813266	81.675397	55.95	59.30	
32			Bhusrenga	Mahendra-404	Heading	20.837896	81.664321	75.96		
33			Chorbhatti	Swarna	PI	20.839925	81.652741	52.39		
34		Magarload	Bhaloojhu	Golden Samba	PI	20.833303	81.680879	60.55	44.44	
35	Charra		Swarna	Heading	20.816217	81.708488	51.68			
36	Megha		R.B Gold	Tillering	20.750995	81.81394	37.14			
37	Chhipli		Swarna	Tillering	20.744722	81.856666	53.33			
38	Kareli		BPT 5204	Tillering	20.744722	81.856666	33.33			
39	Korgaon		Pan 804	PI	20.740799	81.892547	41.26			
40	Dudhwara		MTU-1010	PI	20.744563	81.895915	57.14			

\*= Mean PDI from all the villages, \*\*= Mean PDI of all blocks, PI: Panicle initiation, DI: Disease incidence

**Table 4:** Disease incidence of sheath blight in rice during 2023 and 2024

S. No.	District	Blocks	Number of Villages and Fields Surveyed	Disease Incidence %		
				2023	2024	Mean
1	Gariaband	Gariaband	5(15)	68.12	62.68	65.41
2		Chhurra	5(15)	45.25	42.88	44.07
3		Fingeshwar	5(15)	61.21	57.30	59.26
4		Mainpur	5(13)	21.64	20.56	21.11
District Average				49.06	45.85	47.45
5	Dhamtari	Dhamtari	5(15)	73.15	68.48	70.82
6		Nagari	5(12)	50.72	47.73	49.23
7		Kurud	5(15)	62.58	59.30	60.95
8		Magarload	5(10)	44.44	41.09	42.77
District Average				57.72	54.15	55.93

The disease incidence of rice sheath blight during 2023 and 2024 was noticed at the tillering to heading stage in both years. The highest mean PDI was recorded in Dhamtari (55.93 %), of which the Dhamtari block had the highest (70.82 %) DI, followed by Kurud (60.95 %) and Nagari (49.23 %), while the lowest (42.77 %) was recorded at the Magarload block. In contrast, the mean PDI of the rice sheath blight was comparatively lower, noticed at Gariaband, than in the Dhamtari district. Among the

different blocks of Gariaband, the maximum (65.41 %) PDI was recorded at the Gariaband block; however, the Mainpur block had the least (21.11 %) PDI, followed by Chhurra (44.07 %) and Fingeshwar (59.26 %).

**Conclusion**

The survey of sheath blight across different villages of Gariaband and Dhamtari districts has revealed the widespread prevalence and varying intensity of the disease

in diverse agro-ecological conditions. The findings highlight *Rhizoctonia solani* as a significant threat to rice productivity, particularly in areas with favorable environmental conditions and intensive cultivation practices. The lack of highly resistant varieties and reliance on susceptible cultivars like Swarna and other hybrids aggravate the situation. These results concluded the urgent need for integrated disease management approaches, including tolerant varieties, appropriate agronomic practices, and timely application of fungicides or biological agents. Regular field surveys remain essential for monitoring disease trends, understanding pathogen behavior, and guiding effective control strategies to safeguard rice production and ensure food security.

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