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RESEARCH

OCCURRENCE AND DISTRIBUTION OF MAJOR DISEASES OF RICE IN SOUTHERN DISTRICTS OF TAMIL NADU

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Abstract: Roving survey was conducted in different blocks of Tirunelveli and Tenkasi districts during *Pishanam* 2023-24 for the occurrence of major rice diseases *viz*., blast, bacterial leaf blight, false smut, sheath blight, brown spot and grain discoloration. Among the surveyed locations of Tirunelveli district, the maximum incidence of blast (20.69 PDI) and Sheath blight (19.56 PDI) diseases were recorded in Veerava Nallur and Karukuruchi villages of Cheran Mahadevi block respectively. The maximum incidence of Bacterial Leaf Blight (30.56 PDI), False smut (28.56 PDI) and brown spot (20.85 PDI) diseases were recorded in Ayan Singampatti, Mananallur and Kela Ermal puram villages of Ambasamudram block respectively. The maximum incidence of Grain discolouration (18.78 PDI) was recorded in Kalakudi village of Mannur block. Among the surveyed locations of Tenkasi district, the maximum incidence of blast disease (12.31 PDI) was recorded in Kidarangulam village of Alankulam block. The maximum incidence of Bacterial Leaf Blight (19.56 PDI), false smut (22.47 PDI), sheath blight (11.58 PDI), brown spot (19.75 PDI) and Grain discolouration (19.58 PDI) diseases were recorded in Kalitheerthan patti, Sambankulam, Anantha Perumal Nadanoor, Keezha Kadayam and Venkatampatti villages of Kadayam Block respectively.

Keywords: Rice, Bacterial leaf blight, Blast, Brown spot, False smut

INTRODUCTION

Rice (*Oryza sativa* L.) is considered as the "global grain". It is the major staple food for more than half of the global population. Asian countries consume about 90 per cent of the rice grown and produced in the world and supplies 50 to 80 per cent calories of energy. Rice anchors food security in the world with challenges of climate change and is grown under wide range of latitudes and altitudes. In India, rice is cultivated in a wide range of ecosystems viz., irrigated (21.0 m ha), rainfed lowlands (14.0 m ha), rainfed uplands (6.0 m ha) and flood prone (3.0 m ha) [Shivakumar and Patil, 2024]. In India, the production of paddy during the year 2022-23 is 323.54 million tonnes with the productivity of 2.8 thousand kilograms per hectare. Roughly one-half of the world population, including virtually all of East and Southeast Asia, is wholly dependent upon rice. India produces rice in both the kharif and rabi seasons. Kharif rice, which is approximately 70 percent of total rice production and Rabi rice, which accounts for roughly 30 percent of total rice production. It was reported that rice production in the world was 503.27 million tonnes and in India, was to be around 124 million tonnes (milled basis) in 2022-2023 (Firdouse *et al*., 2023).

The predominant factors contributing to yield loss are both biotic and abiotic factors. Among biotic factors pests and diseases are important. Rice suffers from many diseases caused by fungi, bacteria, viruses, phytoplasmas, nematodes and other non-parasitic disorders etc. Among the fungal diseases, blast [*Pyricularia grisea* (Cooke) Sacc.], sheath blight [*Rhizoctonia solani* Kuhn] and grain discolouration are the more prevalent and destructive ones. Of the diseases, blast, sheath blight and tungro continue to cause huge crop losses in one or the other part of the country. Blast disease has long been known on paddy. Blast is generally considered as the major disease of paddy; because of its wide spread distribution and its destructiveness under favourable conditions. Sheath blight of paddy is potentially a serious threat in many paddy growing areas and this disease could reduce the grain yield by 58.60 per cent depending on environmental conditions, crop stages at which disease appears, cultivation practices, cultivars, application of high doses of nitrogen fertilizers etc (Lore *et al*., 2021). Grain discoloration results in seedling mortality and reduction in germination and seedling vigour (Raghu *et al*., 2020)

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causing significant yield loss. Thus, the pathogens causing grain discoloration have direct influence on both quantity and quality of seeds.

MATERIALS AND METHODS

Roving survey was carried out during 2023- 24 in Ambasamudram, Cheran Maha Devi, Mukkudal, Palayamkottai and Mannur blocks of Tirunelveli districts, Alankulam and Kizhapavur blocks of Tenkasi districts and recorded the incidence of major diseases of rice *viz.*, blast, bacterial leaf blight, false smut, sheath blight, brown spot and grain discolouration. For roving survey, two fields were selected in each village, 100 plants were observed in each field by walking across starting from South west corner to North east corner, scoring was done by using standard score chart (0-9) given by SES, IRRI (2013) (Table 1, Table 2, Table 3, Table 4, Table 5, Table 6) and percent disease index was calculated by using standard formula.

Percent Disease Index (PDI) =

$$\frac{\text{Sum of all disease ratings}}{\text{Total number of leaves observed} \times \text{Maximum disease grade}} \times 100$$

Table 1. Score chart for Blast

Score	Description
0	No lesions observed
1	Small brown specks of pinpoint size or larger brown specks without sporulating center
3	Small, roundish to slightly elongated necrotic sporulating spots, about 1-2 mm in diameter with a distinct brown margin or yellow halo
5	Narrow or slightly elliptical lesions, 1-2mm in breadth, more than 3 mm long with a brown margin
7	Broad spindle-shaped lesion with yellow, brown, or purple margin
9	Rapidly coalescing small, whitish, greyish, or bluish lesions without distinct margins

Table 2. Score chart for Bacterial Leaf Blight

Score	% leaf area diseased
0	No incidence
1	Less than 1%
3	1-5%
5	6-25%
7	26-50%
9	51-100%

Table 3. Score chart for Brown Spot

Score	% leaf area diseased
0	No disease observed
1	Less than 1%
2	1-3%
3	4-5%
4	6-10%
5	11-15%
6	16-25%
7	26-50%
8	51-75%
9	76-100%

Table 4. Score chart for Sheath Blight

Score	relative lesion height
0	Lesions limited to lower 20% of the plant height
1	20-30%
3	5 31-45%
5	7 46-65%
7	9 More than 65%
9	20-30%

Table 5. Score chart for Grain Discolouration

Score	Grains with discoloured glumes
0	No incidence
1	Less than 1%
3	1-5%
5	6-25%
7	26-50%
9	51-100%

Table 6. Score chart for False Smut

Score	percentage of infected florets
0	No incidence
1	Less than 1%
3	1-5%
5	6-25%
7	26-50%
9	51-100%

RESULTS AND DISCUSSION

Roving survey was conducted in different blocks of Tirunelveli and Tenkasi districts during *Pishanam* 2023-24 for the occurrence of major rice diseases *viz.*, blast, bacterial leaf blight, false smut, sheath blight, brown spot and grain discoloration. Among the surveyed locations of Tirunelveli district, the maximum incidence of blast (20.69 PDI) and Sheath blight (19.56 PDI) diseases were recorded in Veerava Nallur and Karukuruchi villages of Cheran Mahadevi block respectively. The maximum incidence of Bacterial Leaf Blight (30.56 PDI), False smut (28.56 PDI) and brown spot (20.85 PDI) diseases were recorded in Ayan Singampatti, Mananallur and Kela Ermal puram villages of Ambasamudram block

respectively. The maximum incidence of Grain discolouration (18.78 PDI) was recorded in Kalakudi village of Mannur block. Among the surveyed locations of Tenkasi district, the maximum incidence of blast disease (12.31 PDI) was recorded in Kidarangulam village of Alankulam block. The maximum incidence of Bacterial Leaf Blight (19.56 PDI), false smut (22.47 PDI), sheath blight (11.58 PDI), brown spot (19.75 PDI) and Grain discolouration (19.58 PDI) diseases were recorded in Kalitheerthan patti, Sambankulam, Anantha Perumal Nadanoor, Keezha Kadayam and Venkatampatti villages of Kadayam Block respectively (Table 1). Similarly, Singh *et al*. (2008) assessed the occurrence of rice blast in thirteen major rice growing districts of Chhattisgarh viz., Jagdalpur (Bastar), Dantewada, Narayanpur, Bilaspur, Janjgir-Champa, Kanker, Bemetara, Raipur, Dhamtari, Gariyaband, Balrampur, Surajpur, Surguja and reported the percent disease index in these districts was varied from 20 to 87.78%. The highest percent disease index (PDI) was recorded (87.78%) in Jagdalpur (Bastar)district with Swarna cultivar which is followed by Surguja (85.56%) and Balrampur (84.44%) and lowest PDI was recorded (20%) in Surajpur (Maheshwari) and Bastar (Safari).

Firdouse *et al*. (2023) conducted survey at different rice growing regions of Tamil Nadu such as Erode, Tanjore and Coimbatore. They recorded maximum disease incidence of bacterial leaf blight at Tanjore in the rice variety ADT 54 with the percent disease incidence of 50.23%. Anbazhagan *et al*. (2022) recorded maximum disease severity of false smut in Nagapattinam district (Nagapattinam block) with 27.45% and the minimum disease severity in Theni district (Bodinayakanur block) with 8%. A survey was carried out in selected areas of Allahabad to evaluate the incidence of sheath blight disease of rice. Among all blocks surveyed, the highest incidence (42%) was recorded in Bahadurpur block. (Yaduman *et al*., 2018).

CONCLUSION

This study will be useful to aware about the spatial distribution of rice diseases in districts of Tamil Nadu. This will also be useful to develop effective management practices for the rice diseases.

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AUTHORS CONTRIBUTION

NR, KE carried out the implementation and development of the work. KK and JS corrected the work and analyzed the data. All authors read and approved the final manuscript. All the authors read and approved the final manuscript.

COMPETING INTEREST:

The authors declare that they have no competing interests.

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Table 1. Surveillance of major rice diseases of rice in Tirunelveli and Tenkasi Districts

Block	Villages	Varieties	Per cent Disease Index					
			Blast	BLB	False smut	Sheath blight	Brown spot	Grain discoloration
I. Tirunelveli District								
Ambasamudram	Ayansingampatti	ADT45, Amman Ponni, Aksaya	11.32	30.56	24.32	18.32	20.51	16.14
	Sattupathu	ADT 45, Aksaya, RNR 15048	18.63	25.41	20.32	16.54	18.95	14.52
	Manimuthar	JGL1798, ADT45	19.45	15.82	24.62	14.98	19.54	12.21
	Moolachi	RNR 15048, ADT 45	10.21	12.69	20.59	12.56	10.96	11.23
	Kallidaikuruchi	JGL1798, ADT45	10.15	20.15	20.58	10.23	18.24	10.52
	Kela Ermalpuram	ADT45, Aksaya	15.32	18.54	23.85	5.61	20.85	11.96
	Maananallur	ASD 16, ADT45, RNR 15048, Aksaya	10.11	16.89	28.56	15.98	15.62	5.89
	Urkad	ADT45, RNR 15048, Aksaya, Amman Ponni	15.36	25.68	20.56	18.23	19.41	12.35
	Mannarkovil	ADT45, RNR 15048, Aksaya	9.56	18.95	18.57	11.56	12.54	14.53
	Mean		**13.35**	**20.52**	**22.44**	**13.78**	**17.40**	**12.15**
Cheranmadevi	Malayankulam	ADT45, JGL1798, RNR 15048	6.21	20.00	18.56	10.23	15.47	15.21

	Cheranmahadevi	ADT45, JGL1798, RNR 15048, Amman ponni	30.56	18.65	17.64	12.89	14.52	12.54
	Sakthikulam	ADT45, JGL1798, RNR15048	19.52	16.57	16.32	10.87	13.69	16.59
	Karukuruchi	ADT45, JGL1798, ASD16, Amman ponni	20.15	19.87	19.84	19.56	11.58	13.25
	Veeravanallur	ADT45, JGL1798, Amman ponni	20.69	19.23	17.56	10.51	14.74	12.78
	Keezhaseval	TRY3, JGL1798, ASD 16	17.23	18.65	19.56	12.96	9.56	10.57
	Mela Seval	ASD16, TPS5, JGL1798, Amman ponni	15.65	13.65	20.15	15.23	12.32	18.63
	Mean		**18.57**	**18.09**	**18.52**	**13.18**	**13.13**	**14.22**
Mukkudal	Kabalipaarai	JGL1798, ADT45, Amman ponni	8.56	18.47	18.52	2.14	19.52	13.21
	Pappakudi	JGL1798, ADT45, Amman ponni	8.59	19.52	12.54	7.54	16.23	12.61
	Kalitheerthanpatti	JGL1798, Akshaya, Amman ponni	9.78	22.56	15.23	5.21	18.59	10.21
	Ariyanayagipuram	JGL1798, ASD 16, Amman ponni	10.58	16.59	18.56	4.65	15.21	12.31
	Mean		**9.38**	**19.29**	**16.21**	**4.89**	**17.39**	**12.09**
Palayamkottai	Munnirpallam	ASD16, ADT 45, Aksaya, Amman ponni	8.21	13.59	19.63	5.78	14.32	15.23
	Moolakaraipatti	ASD16, Aksaya	6.54	11.54	21.34	9.64	12.54	16.89
	Munainchipatti	ASD16, Aksaya	12.21	10.23	19.57	7.61	16.52	18.54
	Tharuvai	ADT 45, Aksaya	10.54	13.25	13.24	8.45	18.56	13.84
	Mean		**9.38**	**12.15**	**18.45**	**7.87**	**15.49**	**16.13**
	Kalakudi	Amman, Aksaya, RNR 15048,	15.65	8.53	16.58	3.12	9.65	18.78
	Uganthanpatti	Amman, Aksaya, RNR 15048, TRY1	13.98	10.45	14.32	8.93	12.43	15.74
Mannur	**Mean**		**14.82**	**9.49**	**15.45**	**6.03**	**11.04**	**17.26**
II. Tenkasi District								
Kadayam	Adaichani	JGL1798, ADT45	6.84	15.84	19.85	4.52	19.56	10.23
	Veerasamuthram	ASD 16, TRY3, JGL1798	5.32	17.34	14.21	3.65	18.31	11.52
	Kalitheerthanpatti	JGL 1798	9.82	19.56	16.32	8.57	13.21	14.65
	Venkatampatti	ADT 45, JGL1798	10.42	11.78	12.84	10.27	12.59	19.58
	Anantha Perumal Nadanoor	ADT 45, JGL1798	11.32	16.57	17.64	11.58	18.45	16.32
	Keezha Kadayam	ADT 45, JGL1798	8.96	17.15	20.51	13.41	19.75	16.52
	Smabankulam	ADT 39, ADT 45, Amman	10.56	15.41	22.47	11.27	13.56	11.53
	Mean		**9.03**	**16.24**	**17.69**	**9.04**	**16.49**	**14.34**
Kizhapavur	Kizhapavur	Amman, Aksaya	10.21	16.98	18.62	3.54	18.62	10.56
	Mela pavur	Amman, Aksaya	8.52	10.56	19.67	5.28	15.64	9.54
	Athisayapuram	Amman, TRY 3	6.23	13.57	15.27	7.96	13.56	10.58
	Kaluneerkulam	TRY 3, Amman	8.56	13.65	19.35	6.98	19.41	14.87
	Mean		**8.38**	**13.69**	**18.23**	**5.94**	**16.81**	**11.39**
Alangulam	Nettur	JGL1798	4.98	18.64	19.74	3.21	14.65	12.24
	Rettiyaarpatti	TRY3, RNR 15048, Akshaya, Amman	7.36	16.54	16.53	5.96	12.64	10.26
	Kidarangulam	Amman, JGL 1798	12.31	17.23	15.65	6.53	18.94	11.32
	Kurippankulam	Amman	15.64	14.51	16.59	8.47	16.27	16.84

	Kavalakuruchi	JGL1798, Amman, Aksaya	10.41	18.75	13.51	6.37	19.41	18.24
	Agaram	Amman, Aksaya JGL 1798, TRY1	11.87	13.68	15.24	4.15	13.21	13.84
	Mean		**10.43**	**16.56**	**16.21**	**5.78**	**15.85**	**13.79**

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