

ORIGINAL ARTICLE

Survey for the incidence of rice brown spot caused by *Bipolaris oryzae* in Ariyalur district of Tamil Nadu, India

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ABSTRACT

The present studies were undertaken to investigate the Survey for brown spot disease severity of rice in four regions of Ariyalur district, Tamil Nadu, India during Navarai 2019. A thorough fixed plot survey was conducted to evaluate the brown spot Per cent Disease Index (PDI) of rice in some major rice cultivating areas of Ariyalur District, Tamil Nadu, India during December, 2019 – March, 2020 (Navarai season). Among, the four major regions the maximum Per cent Disease Index was recorded in Thirumanur region followed by Ariyalur, Jayankondam and Sendhurai in the decreasing order of merit. With regard to individual villages the maximum brown spot PDI was recorded in Elakuruchi village of Thirumanur region and the minimum brown spot PDI was recorded in Aandimadam village of Sendhurai region. It was found, from the Ariyalur district brown spot disease survey that the variety ADT 36 and the rice crop at tillering and post tillering stage recorded the maximum PDI.

Keywords: brown spot, rice, Percent Disease Index

Received 24.09.2023

Revised 21.10.2023

Accepted 30.11.2023

How to cite this article:

Jaiganesh V., Kannan C., Sumathra S. and Sutha Raja Kumar R. . Survey for the incidence of rice brown spot caused by *Bipolaris oryzae* in Ariyalur district of Tamil Nadu, India. Adv. Biores., Vol 15 (1) January 2024: 162-164

INTRODUCTION

Rice (*Oryza sativa* L.) is an economically, major staple food/field crop in Asian country which covers approx. 4300 million people or fifty-five percentage of Global population. India is the second major rice producer after Republic of China, as the country, annually produces 0.176 billion tonnes of rice [2]. Rice crop has been affected by more than 70 diseases incited by fungi, bacteria, viruses, *Candidatus* Phytoplasma and nematodes. Among the various mycotic infections in rice, brown spot pathogenic agent *Bipolaris oryzae* (Breda de Haan) Shoemaker (Syn: *Helminthosporium oryzae* (Breda de Haan) Subram. and Jain) (Teleomorphic stage is *Cochliobolus miyabeanus* (Ito and Kuribayashi) Drechs. ex Dastur) is found to occur in almost all rice cultivating areas [6]. The present studies were undertaken to investigate the Survey for brown spot disease severity of rice in four regions of Ariyalur district, Tamil Nadu, India during Navarai 2019.

MATERIAL AND METHODS

Field survey

A thorough fixed plot survey was conducted to evaluate the brown spot Per cent Disease Index (PDI) of rice in some major rice cultivating areas of Ariyalur District, Tamil Nadu, India viz., Thirumanur, Ariyalur, Jayankondam and Sendhurai regions during December, 2019 – March, 2020 (Navarai season). Five villages were selected for each region in this brown spot disease survey. Five rice fields of one-acre in size were selected in each village. Also, in each field, five sampling plots (one m² area) were selected randomly and disease incidence was evaluated from 20 randomly selected rice plants. The brown spot PDI was assessed by approving the grade scale 0-9, according to "Phytopathometry" by Mayee and Datar [7] and the brown spot PDI was calculated based on the formula assumed by Vidhyasekaran *et al.* [10].

Brown spot Disease grade	Explanation of brown spot index
0	No brown spot lesions
1	Affected leaf area less than 1 % brown spot
3	1-10 % brown spot affected leaf area
5	11-25 % brown spot affected leaf area
7	26 -50 % brown spot affected leaf area
9	> 50 % brown spot leaf area affected

Sum of brown spot disease Individual Ratings

$$\text{Per cent Disease Index} = \frac{\text{Sum of brown spot disease Individual Ratings}}{\text{Total number of Maximum brown spot disease grade}} \times 100$$

The brown spot infected leaves showing the typical symptoms of sesame seed shaped in rice due to the infection with *B. oryzae* were collected for isolation of an etiological agent. Also, the other rice crop cultivation information *viz.*, location, variety and growth stage were also recorded from the respective sampling fields.

RESULTS

A fixed plot survey was conducted during December, 2019 - March, 2020 (Navarai season) in four predominant rice cultivating tracts of Ariyalur district in Tamil Nadu, India *viz.*, Thirumanur, Ariyalur, Jayankondam and Sendhurai to know the extent of damage caused by sesame leaf spot disease in the progressive farmer's fields. The data pertaining to this study are depicted in table 1. In general, the results of the Navarai season survey, 2020 revealed that the endemic nature of disease incidence. Among, the four major regions the maximum Per cent Disease Index was recorded in Thirumanur region (41.88 %) followed by Ariyalur (35.73 %), Jayankondam (32.68 %) and Sendhurai (24.06 %) in the decreasing order of merit. With regard to individual villages the maximum brown spot PDI was recorded in Elakuruchi village (45.42 %) of Thirumanur region and the minimum brown spot PDI was recorded in Aandimadam village (19.28 %) of Sendhurai region. It was found, from the Ariyalur district brown spot disease survey that the variety ADT 36 and the rice crop at tillering and post tillering stage recorded the maximum PDI.

DISCUSSION

The fixed plot survey was conducted during December 2019 - March, 2020 (Navarai season) in four regions of major rice growing areas of Ariyalur district of Tamil Nadu, India *viz.*, Thirumanur, Ariyalur, Jayankondam and Sendhurai revealed that the endemic nature of brown spot incidence. Among, the four major regions of Ariyalur district the maximum PDI was recorded in Thirumanur region followed by Ariyalur, Jayankondam and Sendhurai in the decreasing order of merit. The rice variety ADT 36 and the rice crop at the stages of tillering and post tillering recorded the maximum PDI. The variation in the extent of the PDI might be due to the prevalence of the isolates of the pathogen differing in their pathogenicity or virulence and the susceptibility of the crop. Earlier similar such reports of endemic nature of brown spot in Punjab was reported by Pannu *et al.* [8]. Also, the results of the present study are similar to the findings of Ramaiah [9] who reported maximum PDI in Uttar Karnataka and attributed the growth of susceptible variety as the reason. ADT 36, ADT 37, ASD 16, ASD 18, IR 50 are the varieties highly infected by brown spot in major rice growing areas of Tamil nadu, India [3]. In the present survey also, ADT 36 variety was recorded as with maximum PDI. In the present survey, the brown spot incidence was maximum in tillering and post tillering stage of the rice. Similar such observations were made by Chattopadhyay [1] and Jaiganesh [4] who reported that secondary infection of brown spot mostly occur in tillering and post tillering stage of the crop whereas primary infection of disease occur through seeds and infected crop debris. Rice plants are highly susceptible during dough and mature stages for grain infection [5]. Hence, these earlier disease incidence reports are in line with the present findings.

Table 1. Survey for the incidence of brown spot caused by *Bipolaris oryzae* (Dec. 2019-Mar. 2020, Navarai season)

Sl. No.	Regions	Village	Mean PDI for the regions	Per cent Disease Index (PDI)	Variety	Age / Stage of the crop
1	Thirumanur	Thirumalapadi	41.88	42.11	ADT 36	Post tillering stage
		Kallur		40.71	ADT 43	Post Tillering stage
		Elakuruchi		45.42	ADT 36	Tillering stage
		<i>Kandirathitham</i>		39.65	ADT 43	Active Tillering stage
		Poyyur		41.51	ADT 36	Tillering stage
2	Ariyalur	<i>Varanavasi</i>	35.73	34.00	ASD 16	Grain Maturity stage
		Thavuthaikulam		36.11	ADT 36	Post Tillering stage
		Mallur		35.62	ADT 36	Post Tillering stage
		Ammakulam		44.68	ADT 43	Tillering stage
		Keezhapalur		30.26	IR 50	Active Tillering stage
3	Jayankondam	Udaiyarpalayam	32.68	31.79	ADT 36	Grain Maturity stage
		Thathanur		36.62	ADT 43	Booting stage
		Melur		34.02	ADT 38	Maturity stage
		Pottakollai		31.10	ADT 36	Post tillering stage
		Thularankuruchi		29.88	ADT 36	Booting stage
4	Sendhurai	Variyankaval	24.06	20.79	ADT 36	Active Tillering stage
		Aandimadam		19.28	ADT 43	Post Tillering stage
		Shrimushnam		26.11	ADT 36	Grain Maturity stage
		Paalaiyankottai		25.19	TKM 9	Grain Maturity stage
		Thennur		28.96	ADT 43	Booting stage

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