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SURVEY FOR THE INCIDENCE OF BROWN SPOT CAUSED BY *BIPOLARIS ORYZAE*

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Abstract

Rice is the primary staple food crop in many countries, particularly in Asia. Like any other crop, Rice is also subjected to many diseases. Among them, the brown spot of rice caused by *Bipolaris oryzae* is the most widely occurring disease and at times attains dreadful proportions. An intensive fixed plot survey was conducted to assess the Per cent Disease Index of rice brown spot in some major rice growing areas in Cuddalore and Nagapattinam districts of Tamil Nadu during December, 2019 -March 2020 (Navarai season). In general, the results of the survey revealed endemic nature of the brown spot incidence. Among, the four major regions the maximum Per cent Disease Index was recorded in Kollidam region followed by Vaitheeswaran koil, Parangipettai and Bhuvanagiri in the decreasing order of merit. With regard to individual villages the maximum disease incidence was recorded in Puthoor village of Kollidam region and the minimum Per cent Disease index was recorded in Bhuvanagiri village of Bhuvanagiri region.

Key words: rice, brown spot, disease index, crop growth stages

Introduction

Rice is the primary staple food crop in many countries, particularly in Asia. Like any other crop, Rice is also subjected to many diseases. Among them, the brown spot of rice or *Helminthosporium* leaf spot or Helminthosporiosis or sesame leaf spot or seedling blight caused by *Bipolaris oryzae* is the most widely occurring disease and at times attains dreadful proportions. The fungus *B.oryzae* causes characteristic leaf spot on all the susceptible varieties. The pathogen is capable of infecting the rice plant at all stages of its growth. On susceptible varieties the spots are much larger and may reach one cm or more in length. Sometimes numerous spots occur and as a result the leaf withers. Also, concentric lines or zones on the spot have been observed occasionally. The disease also causes the major Bengal famine during 1942-43. Spots are formed on the blade and sheath of the leaf. They vary in shape and size of spots rang from 14mm in length and 0.5 to 3 mm in width. The pathogen affects the nodes of the culm and the base of the panicle also (Ou, 1985).

Individual spikelets are also become affected. The coleoptile is affected with yellowish brown spot or streaks and in severe cases there may be appearance of post emergence damping-off symptoms. Dark brown spots or patches are formed on the lemma and palea. Grains are formed inside the affected spikelets which are discoloured and shrivelled to varying degrees, depending on the time of infection. The infected seeds are known to give rise diseased seedlings (Vengadesh Kumar, 2005). Several reports are available that this pathogen is responsible for the grain discolouration in rice (Misra and Dharam *vir,* 1992; Savary *et al.,* 2000; Sunder *et al.,* 2014). The inherent hazards caused by the use of chemicals such as residual toxicity, development of resistance by the pathogens, environmental pollution etc., necessitated the search for alternative strategies for the management of brown spot disease. For this purpose, the survey of the disease in rice growing areas to identify the virulence and variability of the pathogen.

Materials and Methods

Field survey

An intensive fixed plot survey was conducted to assess the Per cent Disease Index (PDI) of rice brown spot in some major rice growing areas *viz*., Bhuvanagiri,

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Parangipettai, Kollidam and Vaitheeswaran koil regions from Cuddalore and Nagapattinam districts of Tamil Nadu during December, 2019 -March 2020 (Navarai season).

In each region, eight villages were selected for survey and in each village five fields of one acre size were selected. In each field, five plots of one square meter area were selected randomly and brown spot incidence was assessed from 20 randomly selected plants. The disease incidence was assessed by adopting 0-9 scale according to "Phytopathometry" by Mayee and Datar (1986) and the per cent disease incidence /index was calculated based on the formula suggested by Vidhyasekaran *et al.,* (1988).

Disease Severity	Description of Disease Index
0	No lesions
1	Affected leaf area less than 1 %
3	1-10 % affected leaf area
5	11-25 % affected leaf area
7	26 -50 % affected leaf area
9	> 50 % leaf area affected

Per cent Disease Index =

$$\frac{\text{Total ratings}}{\text{Total number of leaves graded} \times \text{Total number of in the score chart.}} \times 100$$

The infected leaves showing the typical symptoms of brown spot of rice due to infection with *B. oryzae* were collected for isolation of pathogen. Also, the other information *viz.,* location, variety and age/stage of the

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

Sl. No.	Regions	Village	Mean PDI for the regions	Per cent Disease Index (PDI) - 2019	Variety	Stage of the crop
1	Kollidam	Usupur	35.89	35.30	CO 37	Tillering stage
		Kadvacheri		34.21	IR 50	Panicle imitation stage
		Vallampadugai		36.02	ADT 36	Tillering stage
		Kollidam		38.67	ADT 36	Post tillering stage
		Puthoor		39.21	ADT 36	Post tillering stage
		A.K.Chathiram		38.26	ADT 36	Tillering stage
		Achalpuram		35.16	ADT 47	Panicle imitation stage
		Agaraelathur		30.29	ADT 36	Tillering stage
2	Vaitheeswarankoil	Kathiramangalam	29.67	27.52	ADT 36	Maturity stage
		Thirupangur		34.56	ADT 36	Tillering stage
		Kandamangalam		36.21	ADT 36	Active tillering stage
		Thirunanriur		30.28	IR 20	Panicle imitation stage
		Aathkudi		29.85	IR 50	Active tillering stage
		Natham		26.58	IR 50	Active tillering stage
		Talanayar		25.20	IR 50	Panicle imitation stage
		Vaitheeswarankoil		27.19	ADT 36	Active tillering stage
3	Parangipettai	Mitthagudi	26.25	27.35	TKM 9	Maturity stage
		Chidambaram		23.47	MDU 5	Booting stage
		Nathan pettai				
		Kodipallam		33.02	ADT 36	Tillering stage
		Annamalai nagar		34.19	ADT 36	Post tillering stage
		Kosampattai		21.14	ASD 47	Maturity stage
		Parangipettai		25.06	ADT 36	Maturity stage
		Pinnathur		23.68	ADT 45	Booting stage
		Ariyakoshty		22.07	MDU 5	Tillering stage
4	Bhuvanagiri	Keerapalayam	21.42	20.08	CO 47	Booting stage
		C.Mutlur		28.46	ADT 36	Tillering stage
		Manchakollai		25.30	ADT 39	Maturity stage
		Bhuvanagiri		15.34	TKM 9	Maturity stage
		Virallur		21.08	ASD 16	Milky stage
		Melbhuvanagiri		22.64	ADT 36	Tillering stage
		Miralur		20.08	CO 47	Maturity stage
		Ellaikudi		18.42	MDU 5	Maturity stage

crop were also recorded from the respective survey fields.

Results and Discussion

Field survey

A fixed plot survey was conducted during December 2019 - March, 2020 (Navarai season) in four regions of major rice growing areas *viz*., Bhuvanagiri, Parangipettai, Kollidam and Vaitheeswaran koil of Cuddalore and Nagapattinam districts of Tamil Nadu, India to know the extent of damage caused by brown spot disease in the farmer's fields. The data pertaining to this study are depicted in table 1.

In general, the results of the survey revealed endemic nature of the brown spot incidence. Among, the four major regions the maximum Per cent Disease Index/ Incidence was recorded in Kollidam region (35.89 %) followed by Vaitheeswaran koil (29.67 %), Parangipettai (26.25 %) and Bhuvanagiri (21.42 %) in the decreasing order of merit.

With regard to individual villages the maximum disease incidence was recorded in Puthoor village (39.21 %) of Kollidam region and the minimum percent Disease incidence was recorded in Bhuvanagiri village (15.34 %) of Bhuvanagiri region. It was found from the survey that the variety ADT 36 and the crop at tillering and post tillering stage recorded the maximum percent disease incidence.

The variation in the extent of the disease index might be due to the prevalence of the isolates of the *B.oryzae* differing in their virulence and the susceptibility of the host. Pannu *et al.,* (2006) reported that the similar such endemic nature of brown spot disease incidence in Punjab. Also, the results of the present study are similar to the findings of Ramaiah (2000) who mentioned that maximum disease incidence in Uttar Karnataka areas and attributed growing of susceptible variety as the main reason.

ADT 36, ADT 37, ASD 16, ASD 18, IR 50 are the varieties highly infected by brown spot pathogen in major rice growing areas of Tamil nadu (Harish *et al.,* 2007). In the present survey also the maximum disease index was recorded in ADT 36 variety. In the present survey, the disease incidence was maximum in tillering and post tillering stage of the crop. Similar such observation was made by Chattopadhyay (1952) who reported that secondary infection of brown spot mostly occurs in tillering and post tillering stage of the crop. Thus, these earlier reports are in line with the present observations.

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