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ACTIVITIES OF *PESTALOTIOPSIS VERSICOLOR*, A RARE RICE COLLAR ROT FUNGUS AT DIFFERENT ENVIRONMENTAL CONDITIONS

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Pestalotiopsis versicolor, a fungus causing rice collar rot shows different behaviours with change of humidity, temperature, rainfall and dates of plantation. It was found that the fungus showed better response at the number of rainy days but not to the total rainfall. With the depth of the soil the viability of the fungus diminishes. Significant lower disease incidence and higher yield were observed in subsequent plantings after June.

Keywords : *Pestalotiopsis versicolor*; RH; Rice.

Introduction

Collar rot of rice is a dreadful disease causing considerable damages to the rice crop. Every year large quantity of paddy crops is destroyed by this disease reducing the production of this food grain to a great extent. The disease is brought about by the activities of 4 species as reported by Hara[1]. However, the disease is also reported to be caused by *Pestalotiopsis versicolor* from Manipur by Singh *et al.*[2]. In addition to these, recently a new fungus causing collar rot of rice, was isolated in Manipur[3].

The effect of temperature, relative humidity (RH) and rainfall on the severity of *P. versicolor* on rice crop was studied and it was observed that the number of days has better impact on the incidence of this disease over the total rainfall. It was also observed that viability of the pathogen declined with the increase of soil depth. Disease incidence was observed to be more in early plantings, however, higher grain yields were seen in subsequent plantings.

Materials and Methods

Leima phou (KD, 2-6-3) a popular high yielding and susceptible rice variety of Manipur, was used for the study. The months under study started from June to October. The meteorological data was collected from the ICAR complex stationed at Lamphel, Imphal, Manipur. The isolation of the fungus was made using Potato Dextrose Agar and incubated at 25 ± 1°C.

The diseased rice collars were collected and cut into pieces. Ten pieces made a set. Each set was wrapped in double folded nylon net and buried in field soil containing in polythene bags at different depths, viz., 0.0, 1.0, 3.0 and 5.0 cm. Then the bags were exposed to natural weather conditions for 10 months. Each treatment was replicated three times. At monthly intervals the pieces were picked up from each depth and viability of the pathogen was tested by isolating on PDA slants.

A field experiment was conducted during kharif 1999. Leima phou (KD, 2-6-3) a popular high yielding and highly susceptible rice was used as test variety. Five planting dates namely-10 June, 25 June, 10 July, 25 July and 10 August were done at 15 days interval starting from 10th June, the plot size at 5 x 1 m with three replication were made with a spacing of 15 x 20 cm. Fifty hills were randomly selected from each plot, disease incidence was recorded as percent infected collar and the grain yields were estimated as per Yoshida[4].

Results and Discussions

The minimum and maximum temperature, relative humidity and total rainfall was recorded during June 1999 from 20.4 - 32.0°C; 60.0-93.0% and 247.0 mm respectively. The number of rainy days was 23. During June disease was not observed. During the month

of July the recorded temperature, RH, and rainfall were 20.1 - 32.6°C; 75.0-97.0% and 192.1 mm respectively. The number of rainy days was 25. There was also records of disease occurrence during the last week of July. During August the minimum and maximum temperature, relative humidity ranged from 20.0 - 31.9°C; 72.0-97.0% and number of rainy days was 27 and total rainfall was 270.5 mm. The appearance of disease continued upto October, 1999 (Fig.1).

After studying the weather data along with different growth stages of rice, it is clearly shown that maximum tillering and booting stages fall during August and September during which the number of rainy days was more than other months. There was not much difference in temperature and relative humidity (Fig.1). These findings are in agreement with those of Rajkumar and Singh[3]. Allen *et al.*[5]; Ghawande[6] and Dinger and Singh[7] who reported the most important weather factors favouring disease development on various crops were the temperatures and relative humidity ranging from 27 - 30°C and 76.0 - 80.0% respectively. It can be concluded that if continuous rainfall and temperature at 22.0°C to 30.0°C and relative humidity above 85.0% during boot and grain development stages of rice, collar rot disease will be severe. It also seems that number of rainy days has better impact on the incidence of rice collar rot than the total rainfall.

The pathogen remains viable for 6 month in the infected rice collar buried upto 5.0 cm depth. The pathogen lost its viability after 6 months at 1.0 cm and 3.0 cm depth. The viability of the pathogen decreased with increasing depth and duration of burial (Table 1). However, at 5.9 cm depth the pathogen lost viability after 4 months. The present findings are in agreement with those of Devi and Singh[8], Raju and Singh[9], Punza and Jenkins[10] who reported that the viability declined with the increase of soil depth and it was due to more physical pressure exerted for long time by the weight of the soil over deeply burried sclerotia of *Sclerotium rolfsii*.

The crop transplanted on 10th June had more disease incidence (68.5%) and gave the least yield of 4.36 t/ha during the year followed by the 25th June, which had 60.01% disease incidence and grain yield was recorded as 4.65 t/ha. The crop planted on 10th July the disease incidence was 58.25% and the yield was recorded as 5.33 t/ha. It is also observed that the least disease incidence was found in the crop planted on 10th August (49.94%) and maximum yield was obtained as 6.54 t/ha followed by the crop planted on 25th July, with disease incidence 53% and yield as 5.81 t/ha.

The data presented in Table-2 indicated that planting on 10th June had the maximum collar rot infection (68% disease incidence) during kharif 1999 followed by 25th June planting which were statistically at par. A significantly lower disease incidence and higher grain yield was observed in subsequent planting. Similarly Dodan and Singh[11] reported the maximum false smut infected tillers followed by 25th June planting. A gradual increase in disease incidence was observed in subsequent planting. However, the delayed planting has been reported to favour the disease development with the agreement of Agarwal *et al.*[12]. Though, in the present study, the disease incidence was found to be more in early plantings which is in agreement with the finding of Chottarary[13] who reported that the disease incidence of false smut of rice were found to be more in the early plantings.

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Table 1. Date of planting on the occurrence of rice collar rot.

Date of planting	Disease intensity (%) in relation to weather at										Yield
	Tillering to max tillering	Weather				Flowering to maturity	Weather				t/ha
		Mean					Mean				
		Temp.	RH (%)	Rainfall (mm) amount	No. of days		Temp.	Rh (%)	Rainfall (mm) amount	No. of days	
10th June	28.46	26.088	86.022	8.758	40	69.373	25.841	85.295	3.479	19	4.36
25th June	24.63	26.753	85.33	7.289	33	52.080	24.801	87.615	6.138	24	4.85
10th July	22.70	26.05	85.90	6.789	29	51.385	23.665	86.243	6.149	21	5.33
25th July	20.58	26.189	85.840	3.998	26	45.872	21.361	81.564	4.6513	11	5.81
10th August	17.13	24.633	87.122	7.3089	28	44.808	19.002	79.743	0.813	5	6.54

Table 2. Survival of rice collar rot fungus (*Pestalotiopsis versicolor*) in the field soil.

Soil depth (cm)	Percent viability after months (Nov. 1998 to August 1999)									
	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.
0	100	100	100	80	60	30	0	0	0	0
1	100	100	84	53	25	8	0	0	0	0
3	100	90	72	42	19	3	0	0	0	0
5	100	75	39	9	0	0	0	0	0	0

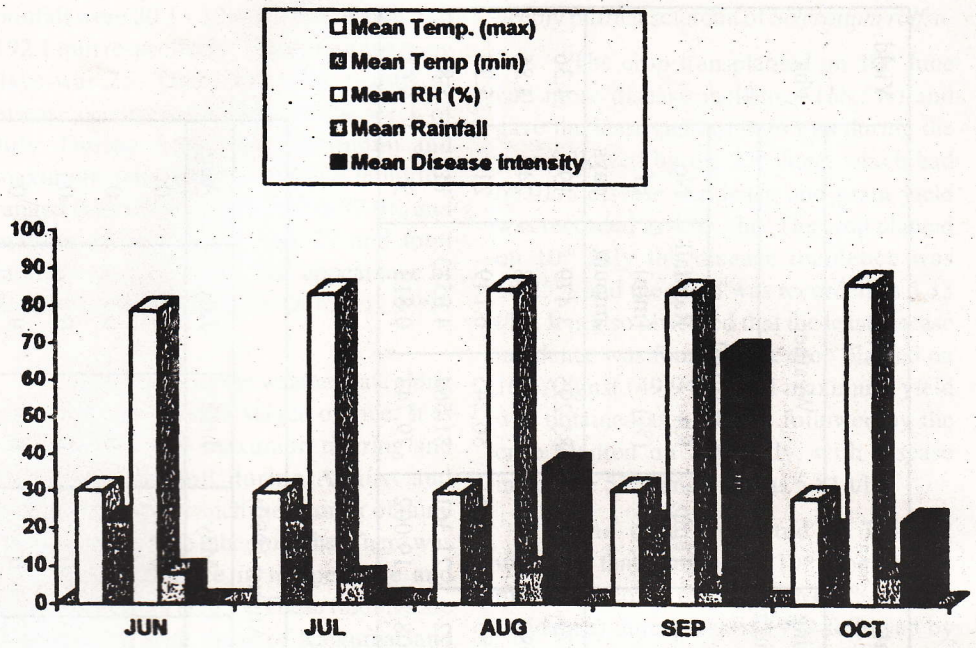

Fig. 1. Effect of weather on disease severity during 1999.

References

1. Hara K 1959, *A monograph of rice diseases*; 3rd ed. Japan (Tokyo).
2. Singh N I, Devi Tombisana R K and Nongdren Khomba S L 1995, *Pl. Disease* **79** (11) 1186.
3. Rajkumar and Singh S B 1996, *Ind. J. Mycol. Pl. Patholo.* **26**(2) 196
4. Yoshida S 1981, *Fundamentals of rice crop Science* IRRI, Loss Banos, the philippine, 296 pp.
5. Allen S J, Brown J F and Kochan J K 1983, *Phytopathology* **73** 393
6. Ghawande M P 1986, National Research Centre for Ground nut. Juagadh, Pp 30-31.
7. Dinger S M and Singh M 1985, *Ind. Phytopath.* **38** 721.
8. Devi R K Tombisana and Iboton S N 1994, *Inter. Rice Res. Note*; **19**(3) 28
9. Raju C A and Singh RA 1981, *Chemical control Pesticides* **15**(3) 26
10. Punza Z K and Jenkins S F 1984, *Phytopathology* **74** 749
11. Dodan D S and Singh R 1994, *Ind. Phytopath.* **48**(2) 185
12. Agarwal K C, Thrimurty V S and Tiwari R K S 1990, In extended summary, Proc. Intern. Symp. Rice New Frontiers, DPR, Hyderabad, India, 234 pp.
13. Chhottarary P K 1991, Ph. D. Thesis OUAR, Bhubaneshwar, 175 pp.