

Research Article

Prevalence of diseases in rice in the Jabalpur region

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ABSTRACT

Incidence of sheath blight, false smut and kernel smut disease was recorded on 25 rice varieties and 7 rice hybrids grown in Kharif 2008 at Jabalpur. The incidence of sheath blight ranged from 3.0 to 29.0 per cent. The incidence of false smut disease ranged from 3.0 to 12.0 per cent. Under field conditions the kernel smut infection was recorded in 9 varieties and 16 varieties were free from the rice bunt disease. With harvested seeds, kernel smut disease was recorded in the seeds of 7 varieties and rest of the varieties had no association of the fungus. In hybrids, two varieties were free from the infection of sheath blight and for false smut, 5 rice hybrids were free from the infection. Under field conditions, rice bunt was noticed in JRH 5 and JRH 4 (0.5%) infection. In rice hybrids with harvested seeds for rice bunt, a similar trend was noticed and the pathogen was observed in JRH 4 and JRH 5 (0.01%).

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INTRODUCTION

Globally, rice (*Oryza sativa* L.) is the foremost cereal food that forms an integral part of the diet. It is one of the most important grain crops in the world. Rice being a staple food crop of India, plays significant role in the food security system. Rice an integral part of daily Indian dietary, is a staple food of more than 60 per cent population. (Anonymous, 2006).

Rice crop is subjected to many diseases in its growth period (Anonymous, 1976; Ou, 1985). Many diseases are important on account of their prevalence all over the country as well as the losses associated with their occurrence. Every year 10 to 15 per cent loss in yield is caused by the important diseases. Majority of the serious diseases of rice in India are caused by fungi. Potential disease problems include blast, sheath blight, false smut, kernel smut, bacterial diseases and grain discolorations (Chahal and Pannu, 2008).

In sheath blight disease typical brown lesions are observed on the sheath of the base of culms near ground level. The lesions on the sheath initially are greenish grey, forming oval or ellipsoidal discoloration. The symptom of false smut is confined to the ears. As a result of infection, the individual seed is transformed and developed into the greenish velvety spore ball and later on the yellow greenish spore mass turn into black mass. In kernel smut, the symptoms initiated

by pathogen were recorded on kernel. The infected grains contain the black powdery mass of spores. At maturity, the spores from the infected grains are scattered on the leaves and the spore mass adhere on the other grains (Biswas, 2004; Singh, 2004; Agrios, 2004; Mew and Gonzales, 2002; Ou, 1985).

MATERIALS AND METHODS

The present study was undertaken to investigate the extent of diseases associated with rice varieties and hybrids and their distribution. The prevalence of diseases was determined at Jabalpur and other districts in different varieties and hybrids during Kharif 2008.

The prevalence of these diseases was determined through random survey method. In a field, 100 plants were randomly selected and out of these, diseased plants were counted, recorded and identified at periodical basis.

The following places were visited during survey of diseases of rice and hybrids grown in farmer's field and research fields :

Random field survey:

In random survey, farmers fields were visited at 8 districts/locations including Jabalpur, Katni, Rewa, Seoni, Balaghat, Badgoan, Chhindwara, Damoh and Shahdol. Incidences of

Random field survey	
Farmer field	Katni, Rewa, Seoni, Balaghat, Badgoan, Chhindwara, Damoh
Fixed field survey	
Research & Seed Production Unit	Jabalpur

these diseases were recorded during the visit on randomly selected 100 plants. The diseases were identified on the basis of typical field symptoms.

Fixed field survey:

The fixed field survey was conducted at Rice Research Experimental Field Seed Production Unit, JNKVV, Jabalpur, in the crop grown during *Kharif* 2008 on pre-selected 100 plants. These included different varieties, and hybrids. The following varieties and hybrids were observed for the association of the diseases under Jabalpur conditions :

Varieties (25)	Pratiksha, Kavya, Varlu, Surekha, JR 201, Sugandha 5, Sughana 3, Mahamaya, Karma Masuri, Chandra Hasini, Pusa Basmati, P 1460, P 1401, MTU 1010, WGL 14, WGL 21, WGL 32100, WGL 32183, JGL 3844, Erramallelu, MR 219, Pusa 1121, IR 64, Kranti, IR 36
Hybrids (07)	JRH 4, JRH 5, JRH 8, JRH 10, JRH 11, JRH 13, JRH 14

The symptoms, of target diseases were noticed under field conditions. Target diseases included the sheath blight false smut and kernel smut. Progressive development of disease was recorded under fixed plot conditions. The disease development was recorded at standard week interval starting from 3rd September to 28th October 2008. In all observations were made for the fixed set of plants with regard to progressive development in terms of disease incidence.

RESULTS AND DISCUSSION

The development of sheath blight, false smut and kernel smut diseases was studied on pre-selected plants under fixed plot survey and random field survey.

Incidence of sheath blight, false smut and kernel smut diseases was determined in 25 varieties and 7 hybrids, under field condition. Under field condition, the disease was identified on the basis of usual symptoms. Whereas association of *Neovossia horrida* was confirmed by standard NaOH seed soak method advocated by Agarwal and Srivastava (1981).

Incidence of sheath blight:

Incidence of the disease was recorded on 25 rice varieties. The incidence of disease ranged from 3.0 to 29.0 per

cent. Maximum disease incidence was observed in IR 36 while it was minimum in Chandra Hasini and Surekha (Table 1). Variable proportion of disease incidence was noticed. None of variety was free from the infection.

Data presented in Table 1 indicate that the incidence of disease was less than 5 per cent in Pratiksha, Surekha, Chandra Hasini while the incidence was between 6 to 15 per cent in Kavya, Varlu, Sugandha 5, Mahamaya, Pusa Basmati, P 1460, P 1401, MTU 1010, WGL 14, WGL 21, WGL 32100, WGL 32183, JGL 3844, Erramallelu, MR 219 and P 1121. Incidence of disease (more than 15%) was recorded in IR 36, Kranti, IR 64, Karma Masuri, Sugandha 3 and JR 201 (Table 1).

Incidence of false smut :

Incidence of false smut was determined in the same set of 25 varieties grown in *Kharif* 2008 during the observation period. The incidence of disease ranged from 3.0 to 12.0 per cent. During the period of observation minimum temperature was 17 while maximum temperature 31^oC with corresponding average, relative humidity was 52 to 88 per cent. Out of 25 varieties tested, 7 varieties exhibited the infection. Maximum incidence was recorded in MTU 1010 while least was in Pratiksha and Kranti (Table 1). Data presented in Table 1 indicate that 18 varieties had no infection of false smut while 2 varieties had more than 10 per cent infection of false smut.

Incidence of kernel smut:

In field conditions:

The association of the disease in rice seed was detected by careful necked eye inspection observation of 2000 plants under field conditions. Among the varieties evaluated, infection was recorded in 9 varieties. The infection ranged from 0.1 to 1.0 per cent. Maximum incidence of bunt was recorded in IR 64 (Table 1).

With harvested seeds:

The association of the fungus was recorded in the range of 0.01 (JR 201) and Kranti to 0.25 (IR 64). The disease was recorded in the seeds of Pratiksha, JR 201, Erramallelu, MR 219, IR 64, Kranti and IR 36. Rest of the varieties had no association of the fungus (Table 1).

Incidence of sheath blight, false smut and kernel smut diseases in rice hybrids:

Occurrence of sheath blight and false smut was recorded in 7 rice hybrids grown in *Kharif* 2008 at Jabalpur.

Incidence of sheath blight:

Out of 7 rice hybrids tested, JRH 13 and JRH 14 were free from the infection of sheath blight. Maximum disease was recorded in JRH 5 while least disease was noticed in JRH 8. The incidence of disease ranged from 8.0 to 19.0 per cent

Table 1 : Incidence of sheath blight, false smut and kernel smut and harvested seeds in kernel bunt in rice grown varieties at Jabalpur

Variety	Per cent disease incidence			Kernel bunt per cent association (with seeds)
	Sheath blight	False smut	Kernel bunt (Rice bunt)	
Pratiksha	04.0	03.0	0.00	0.02
Kavya	03.0	00.0	0.05	0.00
Varlu	09.0	00.0	0.00	0.00
Surekha	03.0	07.0	0.05	0.00
JR 201	19.0	00.0	0.30	0.01
Sugandha 5	15.0	00.0	0.00	0.00
Sugandha 3	17.0	00.0	0.00	0.00
Mahamaya	09.0	00.0	0.00	0.00
Karma Masuri	17.0	00.0	0.00	0.00
Chandra Hasini	03.0	00.0	0.00	0.00
Pusa Basmati	07.0	00.0	0.00	0.00
P 1460	07.0	00.0	0.00	0.00
P 1401	06.5	00.0	0.00	0.00
MTU 1010	08.0	12.0	0.00	0.00
WGL14	06.5	00.0	0.00	0.00
WGL 21	11.0	00.0	0.00	0.00
WGL 32100	06.5	00.0	0.00	0.00
WGL 32183	10.0	00.0	0.00	0.00
JGL – 3844	08.9	11.0	0.00	0.00
Erramallelu	11.0	00.0	0.50	0.02
MR 219	13.5	00.0	0.25	0.03
Pusa 1121	11.0	00.0	0.10	0.10
IR 64	18.0	07.0	1.00	0.25
Kranti	21.0	03.0	0.02	0.01
IR 36	29.0	09.0	0.05	0.02

*Observation made during II fortnight October to II fortnight of November, Average tem. 24°C, Average humidity 70%.

(Table 2).

Incidence of false smut:

Out of 7 rice hybrids tested, 5 were free from the infection of false smut. The disease was recorded in JRH 4 (9%) incidence and JRH 10 (3%) (Table 2).

Incidence of kernel smut:

In field conditions:

Rice bunt was noticed in JRH 5 and JRH 4 (0.5%) infection. The disease was not recorded in JRH 8, JRH 10, JRH 11, JRH 13 and JRH 14 (Table 2).

Table 2 : Incidence of sheath blight, false smut and rice bunt in plant and harvested seeds in rice hybrids during Kharif 2008 at Jabalpur

Hybrid	Per cent disease incidence			Kernel bunt per cent association (with seeds)
	Sheath blight	False smut	Kernel bunt (Rice bunt)	
JRH 5	19.0	0.0	0.5	0.01
JRH 8	08.0	0.0	0.0	0.00
JRH 4	17.0	9.0	0.5	0.01
JRH 10	09.0	3.0	0.0	0.00
JRH 11	11.7	0.0	0.0	0.00
JRH 13	00.0	0.0	0.0	0.00
JRH 14	00.0	0.0	0.0	0.00

Observation made during II fortnight October to II fortnight of November, Average tem. 24°C, Average humidity 70%.

With harvested seeds:

Similar trends was noticed and the pathogen was observed in JRH 4 and JRH 5 (0.01%) where as seeds of the other varieties did not show the association (Table 2).

Sources with no disease incidence:

The rice varieties (25) and rice hybrids (07) were tested for the recording of infection due to sheath blight (*Rhizoctonia solani*) and false smut (*Ustilagoidea virens*). Several sources were identified that had no disease incidence under the same set of environment. The results are presented in Table 1 and 2. It indicate that 2 hybrid were free from the infection of sheath blight pathogen whereas 5 hybrid and 18 rice varieties did not show the infection of false smut (*Ustilagoidea virens*). In kernel smut 16 varieties and 5 hybrids, did not show the association of disease under field condition where as 15 varieties, 5 hybrids, did not show the association of *Neovossia horrida* as tested by NaOH seed soak method.

REFERENCES

Agarwal, V.K. and Srivastava, A.K. (1981). A simpler technique for routine examination of rice seed lots for rice bunt. *Seed Tech. News*, **11**(3): 1.

Agrios, G.N. (2004). *Plant Pathology*. Academic Press, New Delhi. 636 pp.

Anonymous (1976). Pest control in rice. PANS manual volume 3; Centre for Overseas Pest Research, LONDON (U.K.) 295 p.

Anonymous (2006). Annual Report, ICAR All India Coordinated Rice Improvement Project, NEW DELHI (India).

Biswas, A. (2001). False smut disease of rice: a review. *Environ. & Ecol.*, **19**(1): 67-83.

Biswas, A. (2004). Diseases of hybrid rice and their management in India. *Ann. Rev. Plant Pathol.*, **3**: 397-408.

Chahal, S.S. and Pannu, P.P.S. (2008). Rice seed borne diseases and their management. *2nd International Symposium. Seed health Agricultural Development*, Mysore, India p. 20.

Mew, T.W. and Gonzales, P. (2002). *A handbook of rice seed borne fungi*. 83pp.

Ou, S.H. (1985). *Rice diseases*. CAB., (UK.) p. 109-201.

Singh, R.S. (2004). *Plant Diseases* (8th ed.). Oxford and IBH Pub. Co. Pvt. Ltd., NEW DELHI (India) 720 pp.
