

RESEARCH ARTICLE

Occurrence of rice false smut in Bundelkhand region

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ABSTRACT

False smut of rice caused by *Ustilaginoidea virens* (Cke.) Tak., once considered as a minor disease, has now become a serious disease in rice growing area of M. P. For the past three years, the disease incidence has been reported at many places in an alarming proportion. It appeared for the first time in moderate to severe form at district Datia in 2009. A survey was carried out by KVK Scientists in October 2009 to assess the extent of false smut infection in the district. About 800 ha area of paddy fields were severely affected due to this disease. The highest disease incidence (61.20%) and yield loss (14.18%) was observed in late transplanted paddy fields when the relative humidity was around 90 per cent. Disease incidence and yield loss was higher in scented variety (Pusa 1121 and Pusa Sugandha-3) in comparison to coarse grain variety, Kranti. At severe infection, most of the grain in the panicle is affected by the disease. The disease not only reduces the yield but also affects the quality of grain or seed.

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INTRODUCTION

False smut of rice caused by *Ustilaginoidea virens* (Cke.) Tak. (Rush *et al.* 2000) has been recorded in all rice-growing countries all over the world. It has been reported in Louisiana in 1906 and since that time the disease occurred sporadically. The disease is favoured by high relative humidity (around 90%) and increased by even higher humidity (Singh *et al.*, 1987; Bhagat and Prashad, 1996; Yashoda *et al.*, 2000) and rainfall, temperature between 25 to 30°C (Yashoda *et al.*, 2000), late sowing and high soil fertility (Ahonsi *et al.*, 2000). The disease affects the grain and induces serious losses. *U. virens* infects rice during the flowering stage, inhibits flower fertility and development of adjacent spikelets and decreases grain weight, and these were positively co-related with the yield loss.

The aim of this investigation was to survey the occurrence of false smut in the growing season in most of the rice cultivation area, to assess the yield losses as well as reaction of rice variety against the disease and role of planting

time in disease development in district Datia.

MATERIALS AND METHODS

A survey was conducted in *Kharif* 2009 in rice cultivation block (Indergarh) of district Datia for the occurrence of rice false smut disease. The KVK scientists visited the fifteen villages of the rice growing areas in the month of October to find out the incidence and yield loss caused by the disease. Each rice cultivar represented five fields. At the time of harvesting, random sampling of 50-100 hills were selected and collected from every field as described by Dodan and Singh (1994). Disease assessments were carried out as mentioned by Singh and Dubey (1978). Number of infected tillers and infected grains in the panicles were recorded. During the survey studies, percentage of smutted tillers collected separately at random in different rice varieties. Fifty panicles from smutted and un-smutted tillers were collected separately for each variety to record the total grain weight, percentage of smutted balls and 1000-grain weight. The total number of grain

and smutted balls were counted from 50 smutted panicles separately to calculate the number of smutted balls. The grain weight of 50 smutted panicles (excluding smutted ball) was subtracted from the total grain weight of 50 un-smutted panicles and per cent loss in yield was calculated as follows:

$$\text{Yield loss (\%)} = \frac{100 \times \text{the reduction in grain weight x per cent in fected tillers}}{\text{Grain weight of un - smutted panicles}} \times 100$$

RESULTS AND DISCUSSION

Rice false smut is considered as a minor disease in Bundelkhand region. It appeared for the first time in moderate to severe form at district Datia in the year 2009. False smut of rice infection occurred in about 1-22 grain per panicle and could occupy any part of panicle. The infected grains were transformed into large, velvety, green masses which exceeded more than twice the diameter of the normal grain. The chlamydospore in the initial stages of development are orange yellow, then they turn dark green or almost black. The typical symptoms of RFS disease was described by Verma and Singh (1998.)

Survey was conducted to assess the disease incidence and yield loss in three major varieties namely, Pusa Sugandha-3, Pusa 1121 (scented long grain variety) and coarse grain variety, Kranti. During the course of survey highest yield loss (14.18%) and disease incidence (61.2%) were recorded in variety Pusa 1121 in late sown condition followed by late sown Pusa Sugandha (13.55%, 58.40%) and timely sown Pusa 1121 (11.01%, 48.60%) when the relative humidity was around 90 per cent. The infection is favoured by high relative humidity (around 90%) and is increased by even higher humidity (Bhagat and Prashad 1996). Biswas (1999) reported that the RFS incidence in India was 27 per cent while in China it ranged from 1-10 per cent until 50-60 per cent in ear of severe disease occurrence (Li *et al.* 1986). It was also observed that grain weight of smutted panicle was invariably less than grain weight of healthy once (Table 1). Singh and Dubey (1978) observed a decrease in grain weight with the increase in the number of spore balls. Data in table represent that the loss in the yield occurs due to high per cent of disease incidence and decrease grain weight.

Rice cultivar may differ in the disease incidence, which appeared at different degrees of infection with false smut. Scented long grain varieties Pusa 1121 and Pusa Sugandha-3 showed the higher disease incidence and grain weight loss per cent during the survey (Table 1). On the other hand, coarse grain variety, Kranti showed the lowest disease incidence with grain weight loss in both condition (timely-10.6%, 13.08% and late 20%, 15.02%) during the growing season.

Rice plants of variety Kranti followed by Pusa Sugandha-3 and Pusa 1121 transplanted in the month of July (up to 20th)

Year	Disease Incidence (%)	Yield loss (%)	Grain weight (g)	Grain weight loss (%)	Grain weight (g)	Grain weight loss (%)
2009						
July						
Timely	11.01	10.6	38.38	4.38	34.00	11.25
Late	48.60	13.55	31.72	3.72	28.00	11.68
July						
Timely	10.6	13.08	31.59	3.59	28.00	11.39
Late	61.2	14.18	31.28	3.28	28.00	11.71
August						
Timely	15.02	10.6	22.98	2.98	20.00	14.90
Late	58.40	13.55	25.51	2.51	23.00	10.91
Mean	27.00	12.00	33.3	3.3	30.0	9.9
C.D. for Variety (V)	5.55 (2.565)	0.555	0.555	0.555	0.555	0.555
C.D. for Sowing Time (S)	1.25 (2.09)	0.731	0.731	0.731	0.731	0.731
C.D. for V x S	NS	0.758	0.758	0.758	0.758	0.758

exhibited the lower disease incidence and yield loss per cent which disease incidence and yield loss per cent increased found in late transplanted variety. Singh *et al.* (1987) and Singh and Khan (1989) reported similar results.

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