ASSESSMENT OF OCCURRENCE, SEVERITY AND MANAGEMENT OF MAJOR DISEASES IN SCENTED RICE CULTIVARS BY THE TRIBAL FARMERS OF JASHPUR DISTRICT, CHHATTISGARH

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Abstract: Chhattisgarh is having large variability and diversity due to its topography and ecological situations. Among several crops and cultivars, farmers are generally cultivating rice with variety of practices and methods. The cultivation of scented rice varieties is one of the oldest practices. Looking to the changing consumer preferences, the demand of the scented rice is increasing day by day. The availability of scented rice in comparison to the demand is meager due to low productivity and susceptibility to several biotic and a-biotic stresses. Infestation of diseases is one of the important factor caused reduction in the productivity of scented rice. In this perspective the present study was undertaken in Jashpur district of Chhattisgarh with data collected from 144 scented rice growing farmers. The findings shows that, majority of the respondents perceived that Blast, BLB, False smut, Sheath rot and brown spot, in order are the major diseases causing yield loss in scented rice varieties. Accordingly it was found that the severity of blast was highest and brown spot was lowest. With regard to occurrence of disease, the respondents reported that blast and false smut were regularly occurred diseases than others. The yield loss caused due to these diseases is never more than 25 per cent. Remarkably, it was found that few farmers follows the disease management practices and only about 1 per cent scented rice growers were using fungicides for the management of diseases. It shows a complex situation which has to be overcome by incorporating strategic extension approaches so that the disease management can be done effectively to increase the productivity and profitability from scented rice cultivation.

Keywords: Scented rice, Disease management, Yield loss, Productivity

INTRODUCTION

Rice is the most economically important staple food crop in India, China, East-Asia, South East Asia, Africa and Latin America catering to nutritional needs of 70 per cent of the population in these countries. In several developed countries such as North America and European Union (EU) also, rice consumption has increased due to food diversification and immigration. In world the total production of rice is 463.3 million tonnes (milled basis). India is second largest producer after china and has an area of over 42.2 million hectares and production of 104.32 million tonnes with productivity of 2372 kg ha^{-1} (Thawait et al., 2014) Rice provides 30–75 per cent of the total calories to more than 3 billion Asians. To meet the global rice demand, it is estimated that about 114 million tons of additional milled rice needs to be produced by 2035, which is equivalent to an overall increase of 26 per cent in the next 20 years (Kumar et al., 2013). It has the largest area (42.9 million hectares) that accounts for about 27.1 per cent of the total rice growing area of the world. In India, Chhattisgarh state is considered as one of the centres of origin and evolution of rice and is blessed with enormous funds of rice variability and known as 'rice bowl'.

Being endowed with the most favorable climate, the Chhattisgarh state has an excellent geographical centre of diversity, particularly rice including scented cultivars. The demand for special purpose aromatic rice has dramatically increased over the past decades. The variability in rice production depends on community, area and ecosystem. The cultivation of scented rice varieties is one of the oldest practices. Looking to the changing consumer preferences, the demand of the scented rice is increasing day by day. The availability of scented rice in comparison to the demand is meager due to low productivity and susceptibility to several biotic and a-biotic stresses. Infestation of diseases is one of the important factor caused reduction in the productivity of scented rice. In this perspective the present study was undertaken in Jashpur district of Chhattisgarh.

Since the beginnings of agriculture about 10000 years ago, growers have had to compete with harmful organisms – animal pests (insects, mites, nematodes, rodents, and snails, birds), plant pathogens (viruses, bacteria, fungi) and weeds (i.e. competitive plants), collectively called pests for crop products grown for human use and consumption. Diseases are one of the serious yield reducing biotic factors for rainfed rice production, especially in scented rice in India.

Plant diseases are one of the important factors which have a direct impact on global agricultural productivity and climate change will further aggravate the situation. Combined infestation of pests and diseases in plants could result over 50 per cent losses for other major crops and if we combine these losses with post-harvest spoilage and

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deterioration in quality (Gautam *et al.*, 2013). Rice blast and brown spot were the major diseases noticed during pre independent India and before introduction of high yielding varieties. After introduction of HYV, along with them, BLB, tungro and sheath blight have become major diseases. Recently diseases like sheath rot, false smut, stem rot and grain discolouration which were minor and occurring sporadically are emerging and causing considerable yield loss. This is primarily due to climate change, crop intensification and changes in practice. The study was conducted with the following objectives:-

1. To determine the occurrence, severity and control measures of major diseases in scented rice varieties, and

2. To determine the yield loss in scented rice varieties due to major diseases.

MATERIALS AND METHODS

The study was carried out in Jashpur district of Chhattisgarh state. The study is based on the primary data, collected from the total 4 blocks namely Bagicha, Duldula, Jashpur and Pharsabahar which were purposively selected, because of higher area under scented rice cultivation. For this study, a list of villages of each selected block was prepared on the basis of area under selected rice varieties with the help of Department of Agriculture. Thereafter, 12 tribal villages namely, Garighat, Bhagora and Sikirma from Pharsabahar block; Galonda, Lodam and Rengola from Jashpur block; Bamhani, Patratoli and Sirimkela from Duldula block and Jujgu, Jurgum and Kurdeg from Bagicha block were selected for this study on the basis of maximum area under

scented rice varieties. In this way the 12 villages were selected for the study. For selection of respondents, a comprehensive list of scented rice growing farmers was prepared with the help of village sarpanch and agriculture extension personnel of respective village. Twelve respondents were randomly selected from each identified village. Thus, 144 scented rice growing farmers were selected as respondents for the study. A well structured and pre-tested interview schedule was used to collect data from the respondents by personal interview method. Collected data were processed and tabulated by using appropriate statistical scales and methods like frequency, mean, percentage, correlation coefficient, multiple regression analysis.

RESULTS AND DISCUSSION

Cultivating scented rice varieties by the respondents

The findings pertaining to respondents cultivating scented rice varieties are presented in Table 1. The data reveal that majority of the respondents (46.53%) cultivated Jau phool, followed by Jeera phool (26.39%), Kala jeera (11.80%), Gundari bhog (6.25%), Kasturi and Laung phool (4.17%), Tulsi manjar (3.47%), Shakkar chini and Dubraj (2.78%), Basta bhog and Nakul bhog (2.08%) and Basmati and Rani kajal (1.39%). It was further found that 18.75 per cent respondents were growing other scented rice varieties like Vishnu bhog, Hanuman bhog, Badshah bhog, Begam bhog, Sona phool, Bangal bhog, Pooja etc. Most of aforesaid varieties are indigenous and peculiar in the Northern Hills region.

Table 1. Distribution of respondents according to cultivation of scented rice varieties   (n=144)

S. No.	Varieties	Frequency*	Percentage
1	Jau phool	67	46.53
2	Jeera phool	38	26.39
3	Kala jeera	17	11.80
4	Gundari bhog	9	6.25
5	Kasturi	6	4.17
6	Shakkar chini	4	2.78
7	Laung phool	6	4.17
8	Basta bhog	3	2.08
9	Tulsi manjar	5	3.47
10	Basmati	2	1.39
11	Dubraj	4	2.78
12	Rani kajal	2	1.39
13	Nakul bhog	3	2.08
14	Other (scented varieties like Vishnu bhog, Hanuman bhog, Badshah bhog, Begam bhog, Sona phool, Bangal bhog, Pooja etc.)	27	18.75

Reasons for cultivating scented rice

The findings regarding the reasons for cultivating scented rice are presented in table 2. It could be concluded that majority of the respondents (96.53%) were growing scented rice varieties with a reason of high market price, followed by self consumption (95.83%), better taste (93.75%), high quality product

(80.56%), lowland/no drainage condition (63.89%), high income (60.42%) and better production in water stress conditions (52.78%) were the reasons for cultivating scented rice varieties, while 40.97 per cent of the respondents were adopted scented rice cultivation because nearby farmers also doing so.

Table 2. Distribution of respondents according to various reasons for cultivating scented rice   (n=144)

S. No.	Reasons	Frequency*	Percentage
1	High market price	139	96.53
2	Better taste	135	93.75
3	High quality product	116	80.56
4	Better production even in water stress conditions	76	52.78
5	Popular among nearby farmers	59	40.97
6	High Income	87	60.42
7	Self consumption	138	95.83
8	Lowland/No drainage condition	92	63.89

*Data are based on multiple responses

Occurrence, severity, yield loss and control measures of the diseases

Diseases are also one of the major biotic factors which affect the productivity of rice in general and scented rice in particular. In this study occurrence of disease, severity, yield loss due to diseases and adoption of control measures are considered for the study.

Occurrence of diseases

The findings pertaining to the occurrence of diseases are presented in the Table 3. The data revealed that the majority of the respondent (82.64%) perceived that blast was the major disease followed by false smut (54.86%), sheath rot (31.94%), BLB (31.25%) and brown spot (20.83%) causing yield loss in scented rice cultivars.

Table 3. Distribution of respondent with respect to occurrence of various diseases in scented rice cultivars   (n=144)

Rank	Occurring Diseases	Frequency*	Percentage
I	Blast	119	82.64
II	False smut	79	54.86
III	Sheath rot	46	31.94
IV	BLB	45	31.25
V	Brown spot	30	20.83

*Data are based on multiple responses

Occurrence, severity, yield loss and control measures for disease

The findings related to the occurrence, severity and control measures are presented in the Table 4. The farmers' perception regarding occurrence of diseases shows that blast, false smut and brown spot diseases were quite regular reported by the 85.72, 83.53 and 73.34 per cent of the respondents, respectively. The often occurred diseases were sheath rot and BLB as perceived by the 69.56 and 16 per cent of the respondents, respectively. In case of severity, some of the respondents (23.34%) perceived that blast was comparatively high severe disease than others and medium severe disease was blast (39.49%), while maximum 91.14 per cent of the respondents perceived that severity of blast disease was low. The yield losses caused due to these diseases are mostly

up to 25 per cent but comparatively higher from blast. Some of the respondents perceived that blast disease caused yield loss up to 75 per cent. Also it was reported that no other disease caused yield losses more than 25 per cent.

Regarding application of control measures the findings revealed that majority of the respondents were not using any control measure for the control of diseases. About 7 per cent of the respondents used control measures for brown spot, followed by 2.52 per cent for blast. Interestingly the finding shows that none of the respondents were using traditional control measures for any diseases. Regarding chemical control 6.67 per cent of the respondents used chemical control for brown spot, followed by 2.17 and 0.84 per cent used chemical control for sheath rot and blast, respectively.

Table 4. Distribution of respondents according to occurrence, severity, yield loss and control measures pertaining to diseases

No.	Particulars	Diseases									
		Blast (n=119)		Sheath rot (n=46)		BLB (n=45)		False smut (n=79)		Brown spot (n=30)	
		Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
1	Occurrence										
	• Regularly	102	85.72	10	21.74	8	17.78	66	83.53	22	73.34
	• Often	12	10.08	32	69.56	19	42.22	10	12.67	6	20.00
	• Sometimes	4	3.36	4	8.70	18	40.00	3	3.80	1	3.33
	• Rarely	1	0.84	0	0.00	0	0.00	0	0.00	1	3.33
2	Severity										
	• High	18	15.13	0	0.00	0	0.00	1	1.27	7	23.34
	• Medium	47	39.49	18	39.13	14	31.11	4	5.06	10	33.33

	• Low	53	44.54	26	56.52	31	68.89	72	91.14	12	40.00
	• Nil	1	0.84	2	4.35	0	0.00	2	2.53	1	3.33
3	Yield loss										
	• 0 – 25%	111	93.28	46	100.0	45	100.0	79	100.0	30	100.0
	• 26 -50%	6	5.04	0	0.00	0	0.00	0	0.00	0	0.00
	• 51 – 75%	2	1.68	0	0.00	0	0.00	0	0.00	0	0.00
	• 76 – 100%	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
4	Control Measures										
	• Apply	3	2.52	1	2.17	0	0.00	0	0.00	2	6.67
	• Not apply	116	97.48	45	97.83	45	100.00	79	100.00	28	93.33
5	Type of control measure use*										
	• Traditional	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
	• Chemical	1	0.84	1	2.17	0	0.00	0	0.00	2	6.67

*Data are based on multiple responses

Further, it was found that there were no control measures adopted by the respondents for BLB and false smut control. It was evident from the table that majority of the respondents were not using any control measure for the management of diseases. The main reason behind it may be the unawareness about the appropriate control measure or the immediate result was not visible after application of chemical control measure. Some of the respondents may think that the application of chemicals and other control measures were not economical particularly in case of terminal occurrence of diseases. These findings are similar to the findings of Shrivastava (2005), who reported that blast and sheath blight was the most serious diseases it causes 30.08 % and 24.03 per cent yield losses.

Occurrence of diseases in different stages of scented rice

The findings on occurrence of diseases in different crop stages of scented rice cultivars are presented in Table 5. It was reported by the 53.33 and 48.74 per cent of the respondents that the major affecting crop stages were tillering for BLB and blast, respectively. Milking stage is peculiar for false smut (89.87%) and brown spot (66.66%) and booting stage for sheath rot disease (78.26%).

Table 5. Percentage distribution of respondents with respect to occurrence of disease in different stages of scented rice

No.	Stages of scented rice	Diseases				
		Blast (n=119)	Sheath rot (n=46)	BLB (n=45)	False smut (n=79)	Brown spot (n=30)
		%	%	%	%	%
1	Nursery	10.93	0.00	0.00	0.00	0.00
2	Tillering	48.74	0.00	53.33	0.00	6.67
3	Booting	9.24	78.26	24.44	0.00	23.33
4	Penicle emergence	0.00	21.74	22.22	10.13	36.67
5	Milking	31.09	0.00	0.00	89.87	17.78
6	Dough	0.00	0.00	0.00	0.00	6.67

Control measures used for disease control

The findings on control measures are presented that none of the respondent used any traditional method for disease control in scented rice cultivation, while some of the respondents used chemical measures to control some diseases.

Table 6. Distribution of respondents according to use of chemicals for disease control   (n=144)

S. No.	Chemicals	Frequency*	Percentage
1	Fungicide	2	1.39
2	Urea	2	1.39

*Data are based on multiple responses

Regarding chemical methods the Table 6 indicated that only 1.39 % of the respondents used fungicides and similar number were using urea to control the diseases in scented rice cultivation.

CONCLUSION

From the above findings it can be concluded that the Blast is major and regularly occurring disease and its severity is highest in scented rice varieties followed by false smut. As regard to disease control measure, only few farmers follow disease management practices. It shows a complex situation which has to be overcome by incorporating strategic extension approaches so that the disease management can be done effectively to increase the productivity and profitability from scented rice cultivation.

REFERENCES

Anonymous (2012). Model training course on rice production technology. *Directorate of Extension Services*, IGKV, Raipur (C.G.): 1-119.

Gautam, H.R., Bhardwaj, M.L. and Kumar, R. (2013). Climate change and its impact on plant diseases. *Current Science* **105**(12): 1685.

Kumar, M.K.P., Gowda, D.K.S., Moudgal, R., Kumar, N.K., Gowda, K.T.P. and Vishwanath, K. (2013). Impact of fungicides on rice production in India, Bangalore, India.

Oerke, E.C. (2006). Crop losses to pests. *Journal of Agricultural Science* **144**: 31–43.

Shrivastava, R. (2005). Attitude of farmers regarding adoption of control measure practices of various diseases of Rice crop in Dhamtari district of Chhattisgarh state. *M.Sc. (Ag.) Thesis*, IGKV , Raipur (CG).

Thawait, D., Patel, A.K., Kar, S., Sharma, M.K. and Meshram, M.R. (2014). Performance of transplanted scented rice (*oryza sativa*) under SRI based cultivation practices; a sustainable method for crop production. *The Bioscan* **9**(2): 539-542.