



Integrated Approach to Manage False Smut in Paddy (*Oryza sativa* L.)

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ABSTRACT

In most part of the Uttar Pradesh including Jaunpur district false smut caused by *Ustilaginoidea virens* is becoming a major disease of rice causing yield losses where rice is cultivated. Krishi Vigyan Kendra, Jaunpur conducted on farm trial on the integrated approach for management of false smut in paddy on 10 farmers' fields in two village viz. Alhadiya and Utreejpur of the district Jaunpur during *kharif* 2018 and 2019. Technological gap between improved management practices and farmers practices were studied based on survey and group discussion with farmers interactive group (FIG) of rice growers. The integrated approaches *i.e.*, seed and soil treatment with Trichoderma (6g/kg seed and 2.5 kg/ha), recommended dose of nitrogen (120kg/ha), weed management with Bispyribac-sodium 10% EC @ 200ml/ha at 25 days after transplanting (DAT), removal of infected panicle carefully and spraying of fungicide Propiconazole 13.9 + Difenconazole 13.9 % EC @ 500ml/ha at booting stage. On an average disease reduction was 75.41 per cent recorded with the use of integrated disease management approach. There was 34.29 per cent more yield in recommended practices plots than control and the highest net return and benefit to cost ratio was also obtained by application of recommended practices.

Key Words: Benefit Cost Ratio, False smut, Fungicide, Paddy, *Ustilaginoidea virens*.

INTRODUCTION

Rice (*Oryza sativa* L.) is the main staple food of around half of the world's population. It accounts for about 43 per cent of total food grain production and 46 per cent of total cereal production in India. It is also one of the most important food crop of Uttar Pradesh and mostly grown in Indo-Gangetic plains in rice-wheat cropping system. Uttar Pradesh achieved 14.64 million tons of rice from an area of 5.98 million hectares with productivity of 2447 kg/ha in 2013-14 (ASG, 2015). The area, production and productivity of rice in Jaunpur district of Uttar Pradesh are 157.28 (000'ha), 362.68 (000' t) and 2308kg/ha, respectively. False smut (*Ustilaginoidea virens*) is emerging as one of the potential threats to rice cultivation under Indo-Gangetic plains in rice-wheat cropping system. The incidence of this disease is becoming a major constraint to adoption of modern rice cultivars in Jaunpur district which

is situated in Indo-Gangetic plains regions. Earlier it was recorded as a minor disease, occurring sporadically in certain regions, but now epidemics of the disease are also being reported in different parts of the world including in India (Rush et al, 2000 and Anonymous, 2016). It is an important devastating disease causing yield losses from 1.01 to 10.91 per cent (Atia, 2004). Disease incidence of 10-20 per cent and 5-85 per cent respectively has been reported from Punjab and Tamil Nadu on different rice cultivars (Ladhalakshmi et al, 2012). In recent years, its outbreak is anticipated due to high input cultivation, increased use of hybrid varieties and climate change (Lu et al, 2009). The efficacy of several fungicides against false smut has also been reported by various workers from different parts of the world. Mohiddin et al, (2012) reported that prochloraz + carbendazim was effective against false smut. Pannu et al,

Table 1: Technological gap between improved production technology and farmers' practices in paddy.

Sr. No	Practice	Recommended Practice	Farmer's practice	Gap
1.	Preparation of field	Summer ploughing with mould board plough and proper puddling	No summer ploughing and proper puddling	Full gap
2.	Cultivars	HUBR-2-1, PRH 10, MTU 7029, BPT 5204, Pusa 1509, Arize 6444, Swarna	Moti, Damini, Sarju 52, Arize 6444. Swarna	Partial gap
3.	Time of transplanting	Third week of June to 2 nd week of July in irrigated condition	Third week of June to 2 nd week of July in irrigated condition	Nil
4.	Transplanting method (Line transplanting)	20 x 15 cm (R x P)	Improper transplanting 30 x 20 cm (R x P)	Partial gap
5.	Number of hill/m ²	32/m ²	20-22/m ²	Partial gap
6.	Seed/seedling treatment	Carbendazim 50% WP/Vitavax power 75% WP @ 2 g/kg seed or Carbendazim 50% WP + Thiram 75% WP @ 1:2 2g/kg seed Trichderma powder 1% WP @ 10g/ liter water for seedling treatment	No seed treatment	Full gap
7.	Fertilizer application	120:60:40:25 kg/ha	Use of imbalance fertilizer	Partial gap
8.	Weed management	Pretilachlor 50% EC @ 1500ml/ ha at 3-7 DAT and Bispyribac-sodium 10% EC @ 200ml/ha at 25 DAT	Improper chemical weed management	Partial gap
9.	Plant protection	Propiconazole 25%EC or Azoxystrobin 18.2 % + Difenconazole 11.4 % SC @ 500ml/ha at booting stage	Injudicious use of fungicides	Partial gap

(2010) obtained reduction in false smut by spraying of fungicide copper oxychloride 50 WP (0.25%) at booting followed by propiconazole 25 EC (0.1%). The yield loss estimates ranged from 0.2 to 49 per cent in different regions with different rice varieties (Biswas, 2001). Keeping this in view, a study was conducted with farmers' participation by Krishi Vigyan Kendra Jaunpur, Uttar Pradesh regarding to assess the site specific integrated approach for management of false smut in paddy.

MATERIALS AND METHODS

Krishi Vigyan Kendra, Jaunpur conducted the on farm trials (OFTs) at 10 farmers' field in two village viz. Alhadiya and Utreejpur of the district. In selected villages of the district, technological gap between improved management practices and farmers practices were studied based on survey and group discussion with farmers' interactive group (FIG) of rice growers. Out of 100 farmers, 25 farmers were selected randomly and discussions were held

Integrated Approach to Manage False Smut

Table 2: Effect of integrated approach on yield and false smut disease in paddy during *kharif* 2018 and 2019.

Year	Av. infected panicle/hill		Av. infected panicle/m ²		Disease incidence (%)		Reduction in disease incidence (%)	Yield (q/ha)		Yield increase over FP (%)
	RP	FP	RP	FP	RP	FP		RP	FP	
2018	0.92	2.98	2.25	7.52	7.67	31.33	75.51	54.57	40.44	34.94
2019	1.02	3.27	2.85	8.27	8.50	34.45	75.32	55.25	41.34	33.64
Avg.	0.97	3.12	2.55	8.26	7.89	32.89	75.41	54.91	40.89	34.29

RP = Recommended Practice; FP= Farmer's Practice; Avg.= Average

on nine improved management package to study the technological gap. The gap between demonstration technologies and existing technologies was identified and categorized into three levels *viz.*, full (8-12), partial (4-7) and non-adoption (less than 3). The integrated approaches *i.e.*, seed and Soil treatment with *Trichoderma* (6g/kg seed and 2.5 kg/ha) recommended dose of nitrogen (120kg/ha), weed management with *Bispyribac-sodium* 10% EC @ 200ml/ha at 25 days after transplanting (DAT), removal of infected panicle carefully and spraying of *Propiconazole* 13.9 + *Difenoconazole* 13.9 % EC @ 500ml/ha at booting stage were tested under on farm trial. The control plots were farmers' practices (use of hybrid varieties and most susceptible variety *Moti*, no seed treatment, improper transplanting methods, injudicious use of pesticides and poor crop management practices). Performance of yield and economics of rice crop was observed in terms of yield parameter, net returns and benefit cost ratio. Farmers reactions were observed with the help of personal interview and data on quantitative parameters were also recorded.

RESULTS AND DISCUSSION

The gap between improved technology and farmers' practices of rice cultivation is presented in table 1. Full gap was observed in case of field preparation and use of seed/seedling treatment. Partial gap were in use of varieties, method of transplanting, number of hill/m², use of fertilizers, weed management and plant protection measures,

which definitely was the reason of not achieving potential yield. Farmers' are used most susceptible hybrid variety in their cultivation practices instead of high yielding resistant cultivars.

The farmers were much concerned about importance of time of transplanting. The results were similar with the findings of Mubarak and Shakoor (2019).

The minimum infected panicle/hill, infected panicle/m² and disease incidence were recorded in demonstrated technology as compare to farmers practice. Average incidence of false smut in paddy was recorded 7.89% in demonstrated plot while it was 32.89% in farmers' practice. The maximum disease incidence *i.e.* 34.45 per cent was noticed during *kharif* 2019 due to prevailing high humidity (>90%) with cloudy weather, medium temperature (25-30°C) and high dose of nitrogenous fertilizer. On an average disease reduction was 75.41 per cent received with the use of integrated disease management approach. During both years, the average yield was recorded 54.91q/ha in recommended practices whereas in farmers' practice it was found to be 40.89 q/ha. There was 36.64 per cent more yield was recorded in recommended technology demonstrations plots than farmers practice. The loss of yield due to improper management of paddy crop like imbalance use of fertilizer, no seed treatment, improper spacing, injudicious use of fungicides and other pesticides resulting increased in cost of cultivation.

Table 3: Economic performance of paddy crop with recommended practices and farmers' practices.

Year	Gross cost (Rs/ha)		Gross return (Rs/ha)		Net returns (Rs/ha)		BCR	
	RP	FP	RP	FP	RP	FP	RP	FP
2018	36225.00	37125.00	98226.00	72792.00	62001.00	35667.00	2.71	1.96
2019	37150.00	38210.00	99450.00	74412.00	62300.00	36202.00	2.67	1.94
Av.	36687.50	37667.50	98838.00	73602.00	62150.50	35934.50	2.69	1.95

RP = Recommended Practice; FP= Farmer's Practice; BCR= Benefit Cost Ratio; Avg.= Average

The results are in conformity with the findings of Mubarak *et al* (2012).

The economic analysis reveals that the average net returns of demonstrated plots was Rs. 62150/ha in comparison to farmers practice Rs. 35934/ha. The higher net returns obtained under demonstrations could be due to improved technology, non-monetary factors, timely operations of crop cultivation and scientific monitoring. Benefit cost ratio range 1.94-2.71 and an average 2.69 were found under demonstrated technologies while it was 1.95 in farmer's practices. These results are in accordance with the findings of Balai *et al* (2013).

CONCLUSION

The results of present study led to conclusion that false smut is a major disease of paddy in irrigated and rain fed lowlands rice. The yield losses due to this disease can be managed by the application of improved technology. It was also concluded that the demonstrated technology is eco-friendly and safer to non-targeted organism. Based on farmer's feedback, it was noticed that the use of improved technology for false smut management in rice was highly acceptable, easily compatible in existing production and cropping systems.

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