

Original Research Article

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Assessment of IDM Modules with some Fungicides for Rice False Smut Disease in Chhattisgarh, India

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ABSTRACT

False smut disease caused by *Ustilaginoidea virens* (Cooke) (Takahashi) is a grain disease of rice that converts whole grain into powder (smut balls) form. Disease infestation leads to sterile spikelets and reduction in 1000 grain weight. Considering the importance of disease the experiment was carried out to assessment of IDM module with Propiconazole and Carbendazim in rice through on field trials (OFT) against false smut disease in Kabirdham district of Chhattisgarh. The experiment was conducted in two consecutive years Kharif season 2014-15 and 2015-16 at different location of farmer's field by supervision of Indira Gandhi Krishi Vishwavidyalaya, Krishi Vigyan Kendra, Kabirdham (Chhattisgarh) as an on farm trial for control the false smut of rice. The experiment was observed by calculation of No. of infested Panicle/m², Disease Incidence (%), No of smut bolls/ infested panicle and yield data with cost: benefit ratio. The use of Propiconazole 25 EC @ 0.1% at heading stage (50% Panicle emergence) stage increased yield by 8.45 % with reduced the No. of infested Panicle/m², by 4.10% compare to farmer practices(Carbendazim and others fungicides used at recommended dose) no yield changes with 83.25 % panicle infestation. Propiconazole gave good result in all respective parameters with low cost and high benefit compare to farmer practices.

Keywords

IDM, False smut, Rice, Propiconazole, Carbendazim, Chhattisgarh

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Introduction

Rice is one of the chief and staple food grains in India because it is one of the world's largest producer's countries, accounting for 20 % of all world rice production. In which, Chhattisgarh is currently one of the main states for production and exporter of rice in India with occupies on average an area of 3.6 million hectares and the productivity range between 1.2 to 1.6 tonnes/ha. It is therefore these reasons that CG is called the "Rice

Bowl" of Central India and it has won Krishi Karman award for achieving high rice production during the crop year 2012-13. The rice crop in CG can give much more production but the main problem high yielding variety show the susceptibility against disease pest due to cultivation of high fertilizer responsive cultivars and hybrids, heavy application of nitrogenous fertilizer, apparent change in climate, improper untimely and defective method of fungicides use. Around 75 types of rice diseases are occurred in India

that caused by fungus, bacteria, virus, nematode, mycoplasma and nutritional deficiency. Of which Tungro, Bacterial leaf blight, sheath blight and blast are of major economic importance (Ahuja, and kandhari, 2000). At present, blast, false smut, bacterial leaf blight and sheath blight are important diseases on basis of severity and prevalence and therefore, of major economic importance. Among the Chhattisgarh occurring fungal diseases of rice, false smut (*Ustilaginoidea virens*) is one of the most important problem in all rice growing area which earlier, it was considered as an economically minor disease due to its sporadic occurrence (Nessa *et al.*, 2015b).

However at present time it has been emerged as the most devastating grain disease in majority of the rice growing areas of India including Chhattisgarh directly affect the yield during infestation. Since the disease causes direct economic loss to the farmers, development of suitable management practices is need. Disease management strategy mostly depends upon the stage of pathogen responsible for carrying over a particular disease from one season to another and role of various agencies such as seed, soil, stubbles and weeds in its perpetuation. Thus, to evolve a suitable and efficient system for disease control, prerequisite is information availability on various aspects such as diagnosis, measurement and appraisal *i.e.* economic significance epidemiology and influence of cultural practices on intensity of disease initiation and development. IDM approach seems to be most appropriate and suitable to control diseases in rice crop. IDM is combination of different methods viz. cultural, chemical, biological and resistance variety use to control the diseases in cost- effective way based on sound environmental management. In IDM, chemical control is secondary element that consists of using preventive or curative products to treat the crop because it's justified when no other method available.

Keeping in the view of crop the present study was carried out to assess the efficacy of Propiconazole and Carbendazim in Kabirdham district of Chhattisgarh during Kharif season 2014-15 and 2015-16 at different location of farmer's field by supervision of Indira Gandhi Krishi Vishwavidyalaya, Krishi Vigyan Kendra, Kabirdham (Chhattisgarh) as a on farm trial for control the false smut of rice.

Materials and Methods

Assessment of IDM module with some systemic group of fungicides (Propiconazole and Carbendazim) in rice crop for false smut disease (*Ustilaginoidea virens*) was conducted through on field trials (OFT) in different location of farmer field during 2014-15 and 2015-16 under supervision of Indira Gandhi Krishi Vishwavidyalaya, Krishi Vigyan Kendra Kabirdham District of Chhattisgarh. Most of the IDM approaches were applied including chemical application with some cultural methods, to reduce the use of agriculture chemicals in rice crop. The experimental observation like No. of infested panicle/m², Disease Incidence (%), No. of smut bolls/ infected panicle and yield data with cost: benefit ratio etc., was calculated by using the methods of Mubarak *et.al.* (2016). The yield loss was estimated according to Nessa *et al.*, (2015a) as below:

Yield loss (%) =

$$(DI/100) \times [0+100 \times (1-e^{0.03 \times bp})]$$

Where, DI is the disease incidence and bp is the number of smut balls per infected panicle.

All the agronomic practices of rice crop were used as per recommendation. Chemicals fungicides were used as per recommendation as protective and need base at heading/booting stage (50% Panicle emergence) for disease control.

Results and Discussion

Two systemic fungicides (Propiconazole 35 EC 4 @ 0.1% and Carbedazim 50 WP @ 0.1%) were assessed with IDM modules against false smut disease (*U. virens*) at booting stage in rice indicated as T₁ & T₂ Treatments (Table 1).

The results indicate that T₂ is highly acceptable performance increased by 278.55 No. of Panicle/m², yield 8.45 %, with reduced the No. of infested Panicle/m², by 4.10 %, Disease Incidence 1.55% and smut bolls/infected panicle 1.1 respectively an average of both the year (i.e. 2015 & 2016) compare to farmer practices. The average net income and B: C Ratio increased due to increment of yield is 40761.5 Rs/ha. (Table1) Graphical representation of results for T₁ and T₂ showed

similar trends as per table data is given in Fig 1 and Fig 2 respectively.

Similar results were reported previously for bioefficacy of fungicides under field condition such as carbendazim and propiconazole (Dodan and Singh, 1997), carbendazim (Hegde *et al.*, 2000), propiconazole, carbendazim and tebuconazole (Bagga and Kaur, 2006), propiconazole, carbendazim, tebuconazole and carbendazim + mancozeb (Paramjit *et al.*, 2006), rifloxystrobin + tebuconazole, propiconazole (Chen *et al.*, 2013; Ladhakshmi *et al.*, 2014; Shivamurthy, 2017). Therefore, the results of present study it was concluded that Propiconazole should be adopted in IDM modules, which would increase the yield by reducing the disease with acceptable B: C ratio.

Table.1 Assessment of IDM modules with some fungicides for False Smut disease in Paddy

S. No.	Observed Parameters	Treatments					
		T ₁ – Carbendazim Spray @ 1gm / Lit. of water at Booting stage			T ₂ - Propiconazole Spray @1ml /Lit. of water at Booting stage		
	Year & Average	2015	2016	Average	2015	2016	Average
1.	Total No. of Panicle/m ²	255.3	271.3	263.3	265.1	292.0	278.55
2.	No. of infested Panicle/m ²	72.2	94.3	83.25	3.1	5.1	4.1
3.	Disease Incidence (%)	28.3	38.1	33.2	1.2	1.9	1.55
4.	No. of smut bolls/ infected panicle	6.3	8.6	7.45	1.1	1.1	1.1
5.	Yield(q ha-1)	45.3	45.2	45.25	49.5	48.7	49.1
6.	% change in Yield	-	-	-	9.3	7.6	8.45
7.	Net Income Rs/ha	34748	35323	35035.5	39928	41595	40761.5
8.	B:C Ratio**	2.2:1	2.3:1	2.25:1	2.3:1	2.4:1	2.35:1

Fig.1 Assessment of IDM module with Carbendazim spray @ 1 gm./lit. of water for false smut at booting stage (T₁)

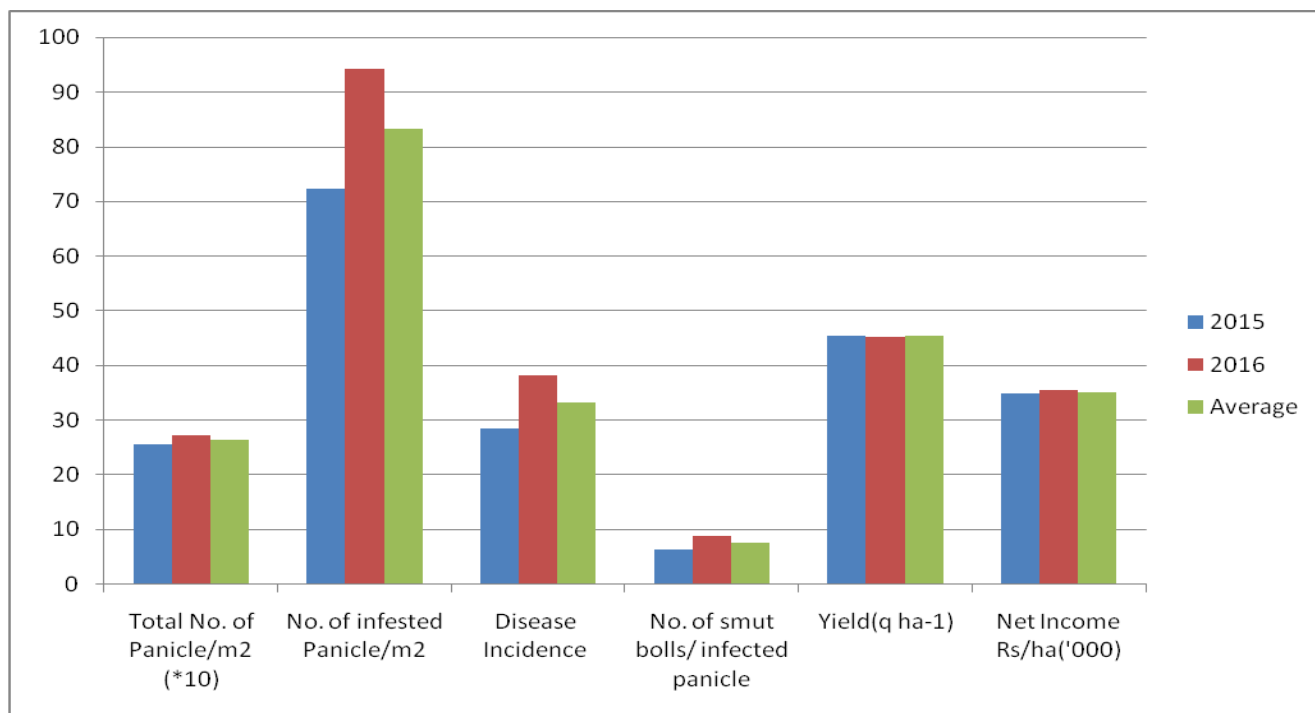
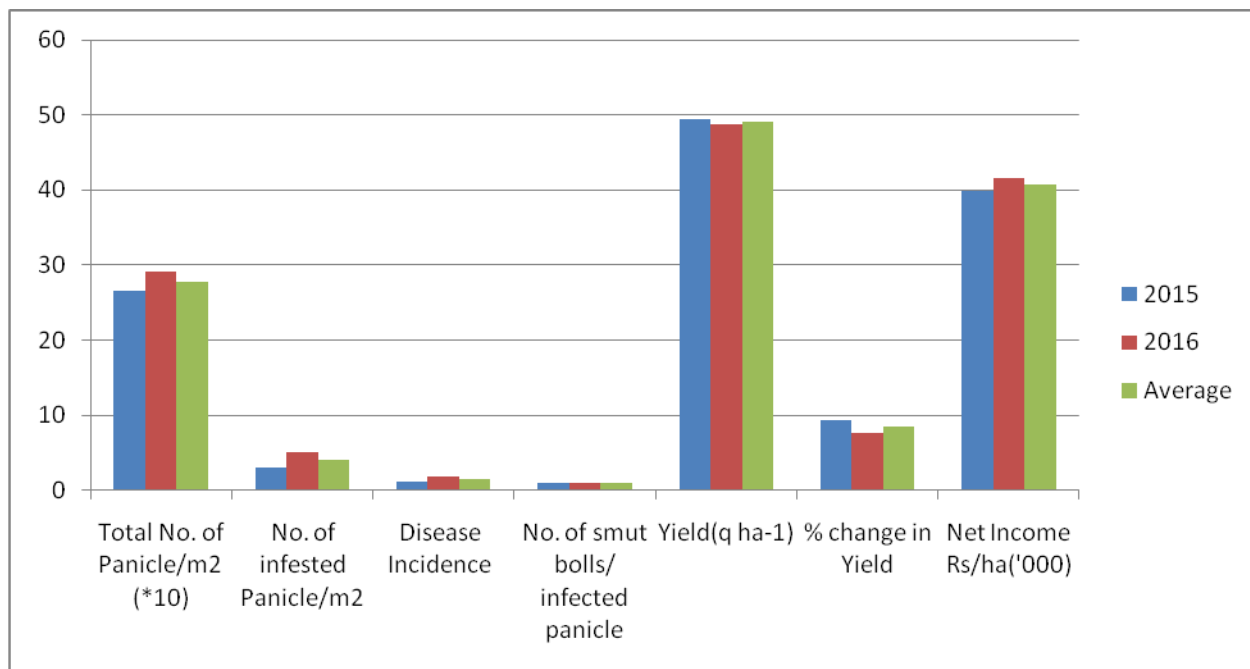


Fig.2 Assessment of IDM module with Propiconazole 25 EC @ 0.1% at Heading stage (50% Panicle emergence)



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