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Original Research Article

Field Studies on Compatibility of New Insecticides and Fungicides against Stem Borer and Leaf Blast under Semi Deep Water Rice Condition

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ABSTRACT

Field experiments were conducted on semi deep water rice variety, NDGR 201 during *kharif* seasons 2013-14 and 2014-15 to study the compatibility of insecticides, viz. Flubendiamide+buprofezin 24 SC and Triazophos 40 EC and; and fungicides, viz. Hexaconazole 5 SC and Tricyclazole 75 WP alone and tank mixed in all possible combinations against rice stem borer and leaf blast disease. The infestation of stem borer and leaf blast varied from 2.19 to 10.05% and 4.00 to 16.52%, respectively during the period. The results of two *kharif* seasons indicated that insecticidal and fungicidal treatments alone were effective against stem borer and leaf blast, respectively, whereas the combination treatments were effective against both stem borer and leaf blast. The combination of Flubendiamide+buprofezin 24 SC @ 1.75 g l^{-1} and Tricyclazole 75 WP @ 0.6 g l^{-1} was most effective against both stem borer and leaf blast with 3.22 and 5.01% infestation, respectively and fetched average grain yield of 30.39 q ha^{-1}. It was closely followed by the combination Flubendiamide+buprofezin 24 SC @ 1.75 g l^{-1} and Hexaconazole 5 SC @ 2.0 ml l^{-1} with 3.16% average stem borer infestation, 4.06% average leaf blast disease severity and 30.26 q ha^{-1} average grain yield.

Key words: field evaluation, compatibility, stem borer, leaf blast, semi deep water rice.

INTRODUCTION

The deep water/ semi deep water rice is adapted to *chaurs* and *tals* etc. in rainfed lowland ecosystem in different parts of eastern India. The low production in this ecosystem is a recurring feature. One of the major reasons for low production of deep water rice in Asia is insect pests and diseases. Among the insect pests, the yellow stem borer, *Scirpophaga incertulas* (Walker) is the most devastating pest of deep water rice causing up to 76% damaged stem at late ripening stage and ultimately reducing yield to the tune of 27.34% (Catling *et al.*, 1987 and Prasad *et al.*, 1988). Among the diseases, blast caused by *Pyricularia oryzae* is the most damaging causing up to 38.10% leaf blast disease severity and 70.25% neck blast severity; and ultimately causing yield losses to the tune of 35.65% under semi deep water condition (Upadhyaya *et al.*, 2004). As there is no full proof method to get rid of insect pests and diseases either through a resistant variety or through certain biological agents, the use of pesticides becomes unavoidable. Effective insecticides and fungicides are available against stem borer and blast. Bhatnagar (2004) has studied the

compatibility of pesticides against rice leaf folder and blast. Earlier, we have studied the compatibility of insecticides and fungicides against rice stem borer and leaf blast and observed that the combination of flubendiamide 20 WDG @ 0.25 g l^{-1} + isoprothiolane Fugi 1 @ 1.5 ml l^{-1} was most effective (Prasad et al., 2012). Since then a number of new insecticides and fungicides have come in the market, hence, in present study, an attempt has been made to evaluate the compatibility of selected new insecticides and fungicides as tank mix as reflected by their effectiveness against rice stem borer and leaf blast.

MATERIALS AND METHODS

The field experiments have been conducted in randomized block design with three replications during *kharif* seasons 2013-14 and 2014-15. The plot size was (5x4) m^2 with 1.0 m replication border and 0.5 m treatment border between the plots. The experimental plots have been separated by raising bunds of about 0.6 m height all around each plot. The semi deep water rice variety used in the present study was *NDGR 201* of 155 days duration. Thirty five days old seedlings were transplanted at a spacing of 20x15 cm during last week of July. The crops were raised adopting a standard package of practices.

Though semi deep water rice is grown in a water depth of 30-50 cm at least for one month, the experimental field remains flooded with accumulated rain water from 3rd week of August to 3rd week of October with maximum water depth of 39 cm in 2nd week of September during the year 2013-14 and from 2nd week of August to 1st week of December with maximum water depth of 43 cm in last week of September during the year 202014-15.

The treatments included 2 insecticides, viz. Flubendiamide + buprofezin 24 SC @ 1.75 g l^{-1} and Triazophos 40 EC @ 1.5 ml l^{-1} and 2 fungicides, viz. Hexaconazole 5 SC @ 2.0 ml l^{-1} and Tricyclazole 75 WP @ 0.6 g l^{-1}; 4 possible combinations of these pesticides besides untreated control. In all 2 sprayings of each treatment at 10 and 70 DAT has been conducted. The stratified random sampling was followed to record the infestation of stem borer. For recording the infestation of leaf blast, 2 sampling units of one square meter each have been fixed in each plot at random. The disease intensity on top 5 leaves in each unit has been recorded based on percentage of leaf area affected. Harvesting was done by the end of November.

RESULTS AND DISCUSSION

Infestation of stem borer. The stem borer infestation varied from 2.19 to 7.98 and 3.36 to 10.05% during *kharif* seasons 2013-14 and 2014-15, respectively (Table 1). The results revealed that all the insecticidal treatments alone or in combination with fungicides were at par and significantly superior to untreated control and fungicidal treatments alone. However, the combination of Triazophos 40 EC @ 1.5 ml l^{-1} and Hexaconazole 5 SC @ 2.0 ml l^{-1} was most effective with 3.16% average stem borer infestation, in comparison to 9.02% in untreated control. It was insignificantly followed by combination of Flubendiamide+buprofezin 24 SC @ 1.75 g l^{-1} and Tricyclazole 75 WP @ 0.6 g l^{-1} with 3.22% average stem borer infestation.

Infestation of leaf blast. The leaf blast disease severity varied from 4.00 to 11.33 and 4.12 to 16.52% during *kharif* seasons 2013-14 and 2014-15, respectively. The results clearly indicated that all the fungicidal treatments alone or in combination with insecticides are not significantly different from each other in relation to leaf blast disease severity. However, these were significantly different to untreated control and insecticidal treatments. On an average, the combination of Triazophos 40 EC @ 1.5

ml l^{-1} and Hexaconazole 5 SC @ 2.0 ml l^{-1} followed by combination of Flubendiamide+buprofezin 24 SC @ 1.75 g l^{-1} and Hexaconazole 5 SC @ 2.0 ml l^{-1} were effective with 4.06 and 4.08% leaf blast disease severity, respectively.

Yield. The yield data indicated that the insecticidal treatments and combination treatments significantly superior to fungicidal treatments and control (Table 1). The average grain yield of two *kharif* seasons indicated that the combination of. Flubendiamide + buprofezin 24 SC @ 1.75 g l^{-1} and Tricyclazole 75 WP @ 0.6 g l^{-1} followed by the combination Flubendiamide + buprofezin 24 SC @ 1.75 g l^{-1} and Hexaconazole 5 SC @ 2.0 ml l^{-1}, & Triazophos 40 EC @ 1.5 ml l^{-1} and Hexaconazole 5 SC @ 2.0 ml l^{-1} with 30.39, 30.26 & 29.54 q ha^{-1} average grain yield, respectively, were promising in comparison to 19.55 q ha^{-1} average yield in untreated control.

On the basis of overall results, it is clear that insecticidal and fungicidal treatments alone were effective against stem borer and leaf blast, respectively, whereas the combination treatments were effective against both stem borer and blast. However, the combination of Flubendiamide+buprofezin 24 SC @ 1.75 g l^{-1} and Tricyclazole 75 WP @ 0.6 g l^{-1} was most effective against both stem borer and leaf blast with 3.22 and 5.01% infestation, respectively and fetched average grain yield of 30.39 q ha^{-1}. It was closely followed by the combination Flubendiamide+buprofezin 24 SC @ 1.75 g l^{-1} and Hexaconazole 5 SC @ 2.0 ml l^{-1} with 3.16% average stem borer infestation, 4.06% average leaf blast disease severity and 30.26 q ha^{-1} average grain yield. Comparatively, in untreated control on an average 9.02% stem borer, 16.52% leaf blast and 19.55 q ha^{-1} grain yields has been observed. Earlier, Bhatnagar (2004) has observed that the combination of cartap and tricyclazole was most effective in reducing the damage by leaf folder and blast and resulted in higher grain yield. Recently, we have observed that the combination of imidacloprid 200SL @ 0.25 ml l^{-1} + propiconazole 25 EC @ 1.0 ml l^{-1} was most effective against both stem borer and leaf blast with 5.05 and 6.80% infestation, respectively, and fetched average grain yield of 21.47 q ha^{-1} (Prasad *et al.*, 2009). Hence, the tank mixing of Flubendiamide+buprofezin 24 SC @ 1.75 g l^{-1} with Hexaconazole 5 SC @ 2.0 ml l^{-1} or Tricyclazole 75 WP @ 0.6 g l^{-1} was most effective in reducing the stem borer and leaf blast infestation and increasing the rice grain yield.

Table 1: Effect of promising new insecticides and fungicides (alone/ tank mixed) against rice stem borer and leaf blast on variety *NDGR 201* during *kharif* 2013-14 and 2014-15

Treatments	Stem borer infestation (% WE)			Leaf blast intensity (% disease severity)			Yield (q ha^{-1})		
	2013-14	2014-15	Average	2013-14	2014-15	Average	2013-14	2014-15	Average
T_1. Flubendiamide+buprofezin 24 SC @ 1.75 g l^{-1}	2.19a	3.87a	3.03	11.33b	15.26b	13.30	29.75a	28.37a	29.06
T_2. Triazophos 40 EC @ 1.5 ml l^{-1}	2.58a	3.95a	3.27	11.00b	14.85b	12.93	29.16a	27.52a	28.34
T_3. Hexaconazole 5 SC @ 2.0 ml l^{-1}	6.74b	9.21b	7.98	4.00a	4.48a	4.24	22.95c	22.26b	22.61
T_4. Tricyclazole 75 WP @ 0.6 g l^{-1}	6.58b	9.29b	7.94	4.33a	4.51a	4.42	21.77c	21.97b	21.87
T_5. Flubendiamide+buprofezin 24 SC @ 1.75 g l^{-1} Hexaconazole 5 SC @ 2.0 ml l^{-1}	2.49a	3.36a	2.93	4.00a	4.15a	4.08	31.13a	29.39a	30.26
T_6. Flubendiamide+buprofezin 24 SC @ 1.75 g l^{-1} Tricyclazole 75 WP @ 0.6 g l^{-1}	2.70a	3.73a	3.22	4.67a	5.35a	5.01	30.04a	30.73a	30.39
T_7. Triazophos 40 EC @ 1.5 ml l^{-1} Hexaconazole 5 SC @ 2.0 ml l^{-1}	2.76a	3.55a	3.16	4.00a	4.12a	4.06	30.04a	29.04a	29.54
T_8. Triazophos 40 EC @ 1.5 ml l^{-1} Tricyclazole 75 WP @ 0.6 g l^{-1}	2.91a	3.58a	3.25	4.67a	4.38a	4.53	28.96b	29.85a	29.41
T_9. Untreated control	7.98b	10.05b	9.02	10.00b	16.52b	13.26	19.60d	19.50b	19.55

CONCLUSION

On the basis of present study, it is concluded that the tank mixing of Flubendiamide+buprofezin 24 SC @ 1.75 g l^{-1} with Hexaconazole 5 SC @ 2.0 ml l^{-1} or Tricyclazole 75 WP @ 0.6 g l^{-1} was most effective in reducing the stem borer and leaf blast infestation and increasing the rice grain yield; and may be recommended for field use.

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