Evaluation of Insecticide-Botanicals against Stem Borer *Scirpophagaincertulas*(Walker) Green Leafhopper and Leaf Folder (*Cnaphalocrosismedinalis*) in Rice

Abstract

A field experiment was conducted during the kharif season of 2020-21 and 2021-22 at Crop Research station, Masodha, Ayodhya to evaluate the efficacy of insecticide-botanicals against rice stem borer, green leafhopper and leaf folder. The experiment was comprising Four combination modules/treatments consisting of three insecticidesChlorantraniliprole 20% SC, Cartap hydrochloride 50% SC and Triflumezopyrim 10% SC, one commercial neem formulation - Neemazal and two plant oils - Neem and Eucalyptus oil procured from local market, Hyderabad (Telangana) were compared along with untreated control (only water spray). The lowest incidence of rice stem borer dead heart all insecticides treatment module recorded mean damage of 1.0% when compared to 14.8% in untreated control. Among modules, all insecticides module was found to be the best with 1.0% mean white ear damage followed by neemazal, eucalyptus oil and cartap hydrochloride module with 5.3% WE.Green leafhopperinfestation was all insecticides combination was the most effective treatment showing mean population of 110.7/10 hills followed by all botanical combination (120.7) and were superior to control (158.7/10 hills).Leaf Folderdamage was recorded from all insecticides module was the most effective treatment showing mean leaf damage of 1.8% followed by treatment with neemazl, Eucalyptus oil and Triflumezopyrim 10% SC (3.9% DL) when compared to untreated control (14.5% DL).Grain Yieldall insecticides treatment - Chlorantraniliprole, Cartap hydrochloride, Triflumezopyrim recorded the highest grain yield of 5212.0 kg/ha with 95.79% increase over control (IOC) followed by neemazal, neem oil and cartap hydrochloride with 4500 kg/ha (69.04% IOC). All the treatments were significantly superior to control plot which showed a yield of 2662 kg/ha.

(Keywords: Stem borers, incidence, Green leaf hopper, Leaf folder,Grain yield,**)**

Introduction

Rice is a major staple food crop of the state, it is necessary to increase the productivity of rice to meet the food requirement of the population. Not only the productivity has to be increased but it should be sustainable also over the years. There are over 70 pests infesting rice in India and

20 are of regular occurrence (Pathak, 1975).The pest causes 25-30% damage to rice crop (Lal, 1996).Among the major pest attacking rice crop the stem borer, Scirpophagaincertulas (Walker) is the number one pest, which attack the crop both at vegetative and reproductive stages (Pasalu et.al., 2002).Rice stem borer (*Scirpophagaincertulas*.), Leaf folder (*Cnaphalocrosismedinalis*) have been reported from all major rice growing areas and causes severe damage to the rice crop. The young larvae of stem borer primarily enter to the leaf sheath and feed on the green tissue for 2-3 days after which the larvae enter to the basal parts usually 5-10cm above water level and at heading stage boring usually occurs at the peduncle node and the white ear headformed. The leaf folder larvae cause injury to rice leaves by scrapping folding and webbing them up to 60%(Prakash and Rao, 1999). In the field against rice stem borer the insect pest caused 25 to 30 percent yield loss in rice (Agarwala 1995, Sen 1956 and Shukla et. Al, 1986).The larval stage of stem borers mostly remain concealed inside the stem and it is difficult to control (Abro et al., 2013). Rice leaf folder, *Cnaphalocrocismedinalis* (Pyraulidae; Lepidoptera) has attained the status of a major pest in rice growing areas of Eastern Uttar Pradesh.

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Hence keeping the above facts in mind the present study was undertaken to identified the most suitable insecticide against rice stem borer (*Scirpophagaincertulas*) (Walker) and leaf folder (*Cnaphalocrosismedinalis*) in kharif season of rice crop.

Material and Methods

Experiment were conducted during WS 2020-21 and 2021-22 at Crop Research Station, Masodha, which is situated at 26.47^{0}N (latitude), 82.12 ^{0}E (longitude) and at 113 m (altitude). The soil is sandy loam low in organic carbon. It is rich in potassium, medium in phosphorus and possesses good water holding capacity.To evaluate the different insecticide to rice stem borer, green leafhopper and leaf folder. The susceptible rice variety Pusa Basmati-1 was used as test variety. The nursery of Pusa Basmati 1 was sown in raised beds and 23 days old seedling were transplanted keeping 2-3 seedling/hill in the 1st week of July in the be both years of study. Transplanted of randomized block design with fourreplication in 20m^{2} plot size, spacing 20x15 cm. Variety specific agronomic practices were adapted to raise the crop.

Treatments: Four combination modules/treatments consisting of threeinsecticidesChlorantraniliprole 20% SC, Cartap hydrochloride 50% SC and Triflumezopyrim 10% SC, one commercial neem formulation - Neemazal and two plant oils - Neem and Eucalyptus oil procured from local market, Hyderabad (Telangana) were compared

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along with untreated control (only water spray). There were five treatments replicated four times and laid out in Randomized Complete Block Design (RCBD). Spray applications of the treatments were done based on pest incidence exceeding the economic threshold level guidelines at 10-15 days interval. All the treatments were applied as high-volume sprays @ 500 litres of spray fluid/ha. Standard observation procedures were followed to record insect pest incidence in data sheets at regular intervals throughout the crop growth period. To assess stem borer damage, observations were recorded on total tillers (TT), dead hearts (DH) at 30 and 50 DAT, while stem borer damage at heading stage was expressed as percent white ears based on counts of panicle bearing tillers (PBT) and white ear heads (WE). The damage due to foliage feeders such as leaf folder was assessed based on counts of damaged leaves/10 hills. At the time of harvest, the grain yield from net plot leaving 2 border rows on all sides was collected and expressed as kg/ha. The data so obtain were subjected to statistical analysis after necessary transformation for final statistical analysis (Gomez and Gomez, 1983).

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Results and Discussion

Use of plant extracts or botanicals is one of the earliest and traditional practice adapted in control of insect pests of crops. Botanicals can play a key role in sustainable management of pests as they are environment-friendly, safe to nontarget organisms, renewable and cost effective. Integration of botanicals in rice IPM will reduce pesticide load in environment, prevent insecticide resistance and help in conserving natural enemy populations. Increasing emphasis on natural and organic farming in the recent past makes use of botanicals all the more relevant in pest control. Earlier efforts under AICRIP were mainly focussed on evaluation of efficacy of various commercial botanical formulations and insecticides against insect pests. Hence, it was felt necessary to test combination of insecticide and botanicals as modules against major pests of rice in order to identify the effective combination and strategically integrate use of botanicals for ideal rice IPM. So, a trial consisting of various treatments having combinations of effective and commercially available essential oils, neem formulations with recommended insecticides was evaluated during kharif 2021 to evaluate their performance against major insect pests.

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Pest Infestation:

Stem Borer DH: infestation was recorded in damage during vegetative stage ranged from 1.0 to 26.8% dead hearts (DH) in all insecticide treatments and 1.0 to 17.9% in other combination treatments compared to 26.8% in untreated control, during 30 to 50 DAT. There were significant differences in dead heart damage among the treatments. All insecticides treatment module recorded the lowest mean damage of 1.0% when compared to 26.8% in untreated control. Among other treatments, neemazal, neem oil and Triflumezopyrim combination showed mean infestation of 9.5% DH. These results are in accordance presented in table 1

Stem Borer WE: Damage at heading stage in all insecticide treatment ranged from 1.0 to 10.0% compared to 28.6% in control. Among modules, all insecticides module was found to be the best with 1.0% mean white ear damage followed by neemazal, neem oil and Triflumezopyrimmodule with3.9% WE.

Overall, all insecticides module was found to be superior in reducing stem borer damage compared to other insecticide-botanical modules and was the most effective treatment at both vegetative and reproductive phases.

Green leafhopper: infestation was high (110.7-158.7 hoppers/10 hills). All insecticides combination was the most effective treatment showing mean population of 110.7/10 hills followed by neeamazal, neem oil and Triflumezopyrim combination (120.7) and were superior to control (158.7 hoppers/10 hills).There were significant differences in hopper populations among the treatments as well as in populations.

Leaf Folder: Damage was recorded from highest leaf damage was recorded in (1.8 to 14.5%) during 30 and 50 DAT. All insecticides module was the most effective treatment showing mean leaf damage of 1.8% followed by treatment with neemazl,neem oil and Triflumezopyrim (3.9% DL) when compared to untreated control (14. 7% DL).

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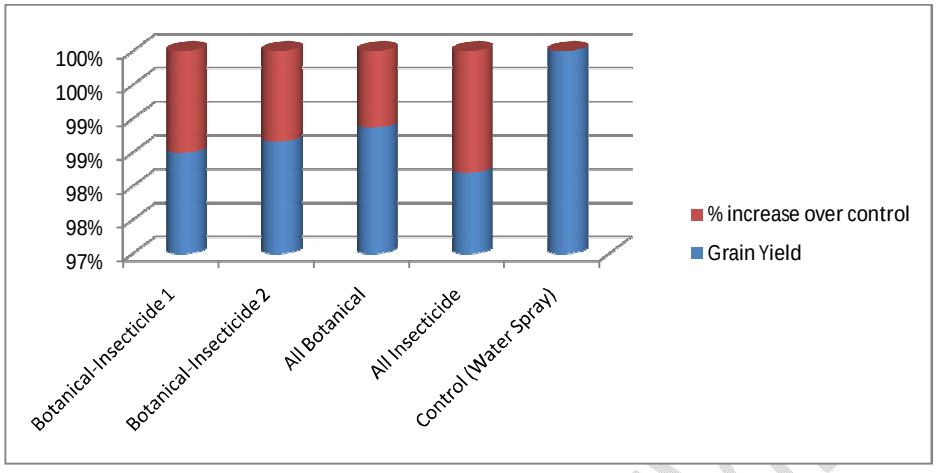
Grain Yield: All insecticides treatment - Chlorantraniliprole, Cartap hydrochloride, Triflumezopyrim recorded the highest grain yield of 5212 kg/ha with 95.79% increase over control (IOC) followed by Botanical-Insecticide-1with 4500 kg/ha (69.4% IOC). All the treatments were significantly superior to control plot which showed a yield of 2662 kg/ha.

All insecticides module was found to be superior in reducing stem borer damage at both vegetative and reproductive phases compared to other insecticide-botanical modules.

Table:1. Insect pest's incidence and Yield in different treatments, insecticide-botanicals

Sl No	Common Name	Stem Borer DH		Mean	WE	LF		Mean	GLH	GY	% increase over control
		30 DAT	50 DAT			30 DAT	50 DAT				
1	Botanical-Insecticide 1	10.8	9.8	10.3	5.3	5	5.5	5.3	126.2	4500	69.04
2	Botanical-Insecticide 2	13.8	5.1	9.5	4.3	3.9	3.9	3.9	128.5	4175	56.83
3	All Botanical	20.9	14.8	17.9	10	6.6	6.8	6.7	120.7	3837	44.13
4	All Insecticide	1.3	0.7	1.0	1	1.7	1.9	1.8	110.7	5212	95.79
5	Control (Water Spray)	26.5	27.0	26.8	28.6	14.1	14.9	14.5	158.7	2662	-

Figure 1: Yield and increase % over control in different treatments, insecticide-botanicals



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