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Evaluation of efficacy of insecticides and bio pesticide against paddy Earhead bug, *Leptocorisa oratorius* F

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Abstract
An experiment was conducted during 2016-17 at Experimental farm, Bihar Agricultural College, Bihar Agricultural University, Sabour (Bhagalpur) to evaluate the efficacy of different insecticides against rice earhead bug, *Leptocorisa oratorius* F. Data on evaluation of different insecticides against rice earhead bug clearly indicates that all the treatments were significantly superior over untreated control. However, among the different treatments, monocrotophos was found to be most effective (4.50/plant) in reduction of rice gundhi bug population than others. The next best treatment was profenophos (4.75/plant) followed by fenvalerate (5.75/plant) and neem oil (6.25/plant). Regarding yield is concerned, the highest yield was obtained with monocrotophos (17.12 q ha^{-1}) followed by profenophos (14.00 q ha^{-1}), fenvalerate (12.00 q ha^{-1}) and neem oil (11.12 q ha^{-1}).

Keywords: Paddy Earhead, *Leptocorisa oratorius* F

Introduction
Rice is the most important staple food crop with more than half of the world's population relying on it as the major daily source of calories and protein (Khanjani, 2006) [7]. Worldwide this crop is grown over acreage of around 167.25 million hectares (Shahbandeh, 2019) [10] and in terms of dietary intake, rice is considered as the first and main food crop in the world. In rice cultivation, only Asia accounts for about 90% of world's rice in area and production. Among the rice growing countries, India has largest area under rice in the world *i.e.*, 28% of the world's area of production, and ranks second to the China (Tiwari *et al*, 2014) [11]. In India cultivation of rice occupy an area of 433.88 lakh hectare which results in total production of 104.32 lakh tonnes having productivity of 2404 kg ha^{-} (Annual report, 2016-17) [1]. In India cultivation of rice is mainly practiced in Uttar Pradesh, West Bengal, Andhra Pradesh, Chhattisgarh and Bihar. Bihar ranks fifth in the cultivation of rice (3268 th ha) which contributes in the production of 63.77 lakh tonnes (DAC&FW, 2015-16) [3]. The crop is attacked by more than 100 species of insects; 20 of them can cause economic damage. Among them, rice gundhi bug is most destructive insect pest of rice. The pest appears on rice just before flowering stage and continues until panicles ripen. Both nymphs and adults suck juice from grains in milky stage, also from peduncle, leaves and stem causing shrivelled and chaffy grains and the feeding site favour the development of sooty mould which cause considerable loss in the yield which sometimes rich up to 30% (Tiwari *et al.*, 2014) [11]. Heavy infestation can result in 80% (Maharashtra) or total (Malaysia) loss of the crop (Schaefer and Panizzi, 2000) [9].
Many insecticides have been screened against rice earhead bugs and many workers have reported their relative efficacy. But the over dependence on chemical pesticides and eventual uninhibited use of them has necessitated for alternatives mainly for environmental concerns. Therefore, an ecofriendly alternative is the need of the hour. Bio pesticides or biological pesticides based on pathogenic microorganisms specific to a target pest offer an ecologically sound and effective solution to pest problems. They present less danger to the earth and to human wellbeing. The present piece of work is attempt to compare the efficacy of chemical and bio pesticides against gundhi bug on rice field.

Material and Methods
Field trial on efficacy of insecticides was conducted at Experimental Farm, Bihar Agricultural College, Bihar Agricultural University, Sabour (Bhagalpur), Bihar, 25°15'40" North latitude

and 82°2'42" East longitude at an altitude of 46 mt in randomised block design with five treatments including untreated check and four replications. Plot size was kept 20 m^2 with row spacing of 20 cm. The rice variety Rajendra Sweta was sown on 15th June, 2017 and raised as per the recommended package of practices. Spraying was done first prior to milking stage and second at two weeks later with respective insecticide. The details of the insecticides/bio pesticide used in the present investigation are given in the Table 1. Observations were recorded by counting the total number of nymphs and adults of earhead bugs on ten randomly selected hills from each treatment plot of each replication leaving the border rows were counted and averaged into per hills basis at one day before spraying and 5 days after each spray. From these, population of gundhi bug per plant was calculated and data on yield from each plot was also recorded. Data were subjected to ANOVA after transformation as Gomez and Gomez (1984) [5] through SPSS software (version 16.0).

Table 1: Details of the insecticides/bio-pesticide used

Insecticide/ bio-pesticide	Trade name & formulation	Dose (ml or mg/lit)	Manufacturer/Source
Profenophos	Celcron 50% EC	2.0 ml	Excel Crop Care Ltd. Gujarat
Neem oil	Extracted from seed	5.0	Freshly prepared
Monocrotophos	Monocl 36% SL	2.0	Insecticids (India) Ltd.
Fenvalerate	Nagfam Dust 0.4%	200.0	Global Agro Chemicals Gardirampur, Munger (Bihar)
Control	-	-	Water Spray

Table 2: Efficacy of insecticides & bio pesticide against *Leptocorisa oratorius* F

Treatments	1st Count 1DBFS	1st Count 5DAFS	2nd Count 1DBSS	2nd Count 5DASS	Yield q ha^{-1}
Neem Oil	14.50 (3.87)	6.25 (2.59)	5.25 (2.40)	4.75 (2.28)	11.12
Monocrotophos	10.50 (3.31)	4.50 (2.23)	4.00 (2.11)	2.25 (1.65)	17.12
Profenophos	9.50 (3.16)	4.75 (2.28)	3.75 (2.06)	3.00 (1.86)	14.00
Fenvalerate	14.00 (3.80)	5.75 (2.49)	5.00 (2.34)	4.25 (2.18)	12.00
Untreated control	14.00 (3.80)	14.00 (3.80)	13.25 (3.71)	15.00 (3.94)	10.00
SEM (±)	NS	0.07	NS	0.06	0.17
CD (p=0.05)	NS	0.23	NS	0.18	0.54

Figures in the parentheses are angular transformed values; DBFS: Day before first spraying; DAFS: Days after first spray; DBSS: Day before second spray; DASS: Days after second spray.

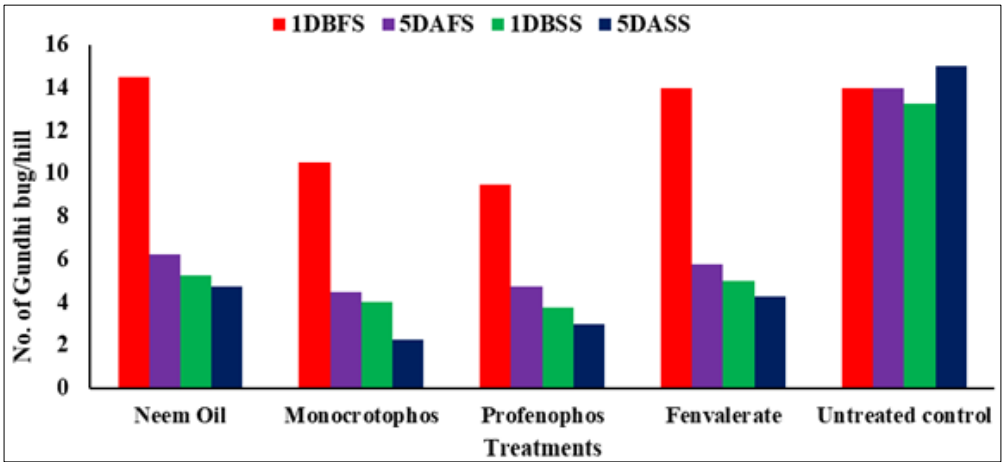

Fig 1: Graphical representation of efficacy of insecticides and bio pesticide against gundhi bug, *Leptocorisa oratorius* F

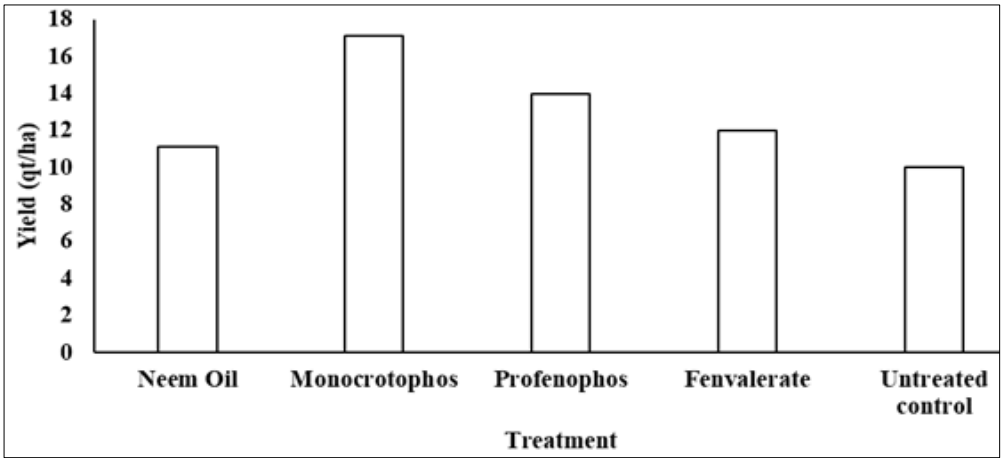

Fig 2: Graphical representation of variations in yield with different treatments

Result and Discussion

Data on evaluation of different insecticides against rice gundhi bug presented in table 2 clearly indicates that all the treatments were significantly superior over untreated control. However, among the different treatments after first spray, monocrotophos was found to be most effective (4.50/plant) in reduction of rice gundhi population than others and is graphically represented in figure 1. The next best treatment was profenophos (4.75/plant) and it was followed by fenvalerate (5.75/plant) and neem oil (6.25/plant). Even after second spray it was observed that least number (2.25/plant) of gundhi bug population was noticed in monocrotophos and it was followed by profenophos (3.00/plant), fenvalerate (4.25/plant) and neem oil (4.75/plant). The present findings clearly indicates that monocrotophos was the best treatment for managing gundhi bug population.

The present finding is in conformity with Tiwari *et al.* (2014) [11] who reported that monocrotophos was found significantly superior in controlling the gundhi bug population (% grain damage) over untreated check (47.3) and (39.5) during 2007 and 2008 respectively. Minimum grain damage (11.1%) was recorded in monocrotophos followed by corbofuran (11.8%) over untreated check (43.4%). Gupta and Kumar (2017) [6] reported that efficacy of monocrotophos (1.77 bug/hill) is superior over acephate (2.06 bug/hill), Carbaryl (2.57 bug/hill), and Malathion (2.84 bug/hill). Dhingra (2014) [4] also reported that the monocrotophos @ 1390 ml/ha proved superior over all tested insecticides with population reduction to the extent of 91.50% followed by triazophos @ 750 ml/ha. The results on profenophos and fenvalerate is scare hence need through study on these chemicals to evaluate the efficacy for the management of paddy earhead bug. The above insecticides showed their effectiveness at 3 and 10 days after treatment.

The marketable yield was significantly high in all the treatments as compared to control, presented in table 3 and is graphically represented in figure 2. Highest yield was obtained with monocrotophos (17.12 q ha^{-1}) and it was followed by profenophos (14.00 q ha^{-1}), fenvalerate (12.00 q ha^{-1}) and neem oil (11.12 q ha^{-1}). The present findings clearly depicted that monocrotophos was recorded maximum yield than other treatments. The present finding is in agreement with the earlier finding of Tiwari *et al.* (2014) [11]. Chakraborty (2011) [2] reported that the yield increase over control and the maximum efficacy was registered when monocrotophos 36 WSC was applied @ 1125ml/ha, followed by commercial formulation of nimbecidine, neem oil, neem seed kernel extract, neem leaf extract, neem root extract, neem bark extract in descending order.

According to Murthy 2007 [8], different scientists on eco-friendly practices demonstrated that for managing pest problems pesticides of plant origin like soybean oil, Oxymetrin and matrine got from *Sophoria sp*., plant separate (Biotos) got from *Gaultheria spp*., fundamental oils acquired from *Vitex negundo*, Pyrethrins present in the seed instances of *Chrysanthemum* plant, the concentrate of enduring bush *Dodonaea angustifolia*, "Saponin" from *Sapindus trifoliatus*, Pongam seed oil got from *Pongamia pinnata* and *P. glabra* are useful.

Conclusion

As per as chemical control is concerned, monocrotophos was found to be the most effective treatment in reduction of rice gundhi population as compared to other treatments. The next best treatment was profenophos and it was followed by fenvalerate and neem oil. Regarding yield, the treatment monocrotophos was recorded significantly higher yield as compared to others. The next best treatment was profenophos, fenvalerate and neem oil.

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References

1. Annual report. Department of Agricultural, Cooperation and Farmers welfare. Ministry of Agriculture and Farmers Welfare, Government of India, 2016-17, 3.
2. Chakraborty K. Extent of suppression of rice earhead bug, *Leptocorisa acuta*. Th Population by different neem formulation in field of paddy cultivar Swarna mashuri (MTU 7029) during kharif season. Journal of agricultural & biological science. 2011; 6(12):37.
3. DAC&FW. State of Indian Agriculture. Ministry of Agriculture and Farmers Wlfare, Directorate of Economics & Statistics, New Delhi, 2015-16, 150.
4. Dhingra MR, Singh SB, Bhagat DV. Field efficacy of some insecticides against *Leptocorisa varicornis* Fabr. (Coreidae: Hemiptera) in rice. Journal of Soils and Crops. 2003; 13(1):29-32.
5. Gomez KA, Gomez AA. Statistical Procedure for Agricultural Research. John Wiley and Sons, New York. 1984; 680.
6. Gupta K, Kumar A. Field Efficacy of Certain Insecticides against Rice Gundhi Bug, *Leptocorisa acuta* (Thonberg) Under Agro-Climatic Condition of Allahabad, India. Int. J Curr. Microbiol. App. Sci. 2017; 6(8):343-345.
7. Khanjani, M. Crop pests of Iran. Buali Sina Uiversity Press, 2006, 717.
8. Murthy, KSRK. Modern trends-Demonstrated Eco-friendly practices/tools for crop protection. Indian Journal of Plant Protection. 2007; 35(1):22-24.
9. Schaefer CW, Panizzi AR. Heteroptera of Economic Importance. CRC Press LLC, N.W. Corporate Blvd., Boca Raton, Florida. 2000; 322-324p.
10. Shahbandeh M. 2019. Statista. (https://www.statista.com/statistics/271969/world-rice-acreage-since-2008/).
11. Tiwari A, Pandey JP, Tripathi K, Pandey D, Pandey B, Nisha S. Effectiveness of Insecticides and Biopesticides against Gundhi Bug on Rice Crop in (M. P.), India. International Journal of Scientific and Research Publications. 2014; 4(1):2050-3153.