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Assessment of the efficacy of certain chemical insecticides against rice gundhi bug, *Leptocorisa acuta* (Thun.) in Naini, Allahabad region

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Abstract

The occurrence of gundhi bug commenced from 37th standard week (September 2nd week) with an average 0.57 gundhi bug per hill. The gundhi bug infestation increased and gradually reached peak level of 3.025 gundhi bug per hill at 41st standard week (October 2nd week). Thereafter, declined trend was observed due to fall of maximum and minimum temperatures as optimum weather condition are decreasing. Therefore Percent infestation was positively correlated with the maximum temperature. Hence decline of temperature lead to the decline of the gundhi bug infestation.

The spray was taken for the management of gundhi bug. The different insecticides were evaluated by given foliar spray rice crop in field condition; the data on the gundhi bug per hill of after spray revealed that all the chemical treatments were significantly superior over control. Among all the treatments lowest gundhi bug population per hill was recorded in Imidacloprid (0.700) followed by Thiamethoxam (0.844), Monocrotophos (0.881), Triazophos (0.906), Acephate (1.031), Carbaryl (1.088) and Malathion (1.156) as compared to Control.

The yields among the treatment were significant. The highest yield was recorded in Imidacloprid (44.200 q/ha) followed by Triazophos (43.500 q/ha), Thiamethoxam (43.200 q/ha), Monocrotophos (43.000 q/ha), Acephate (41.600 q/ha), Carbaryl (39.500 q/ha), Malathion (38.400 q/ha) as compared to control (28.000 q/ha).

When cost benefit ratio was worked out, interesting result was achieved. Among the treatment studied, the best and most economical treatment was Imidacloprid (1:3.390), followed by Triazophos (1:3.340), Monocrotophos (1:3.246), Acephate (1:3.192), Thiamethoxam (1:3.115), Carbaryl (1:3.067), Malathion (1:2.833) as compared to control (1:2.234).

Keywords: Gundhi bug, Insecticides, *Leptocorisa acuta*, *Oriza sativa*, rice, seasonal incidence

Introduction

Rice, *Oryza sativa* is a cereal crop, belongs to the family Gramineae. It has one of the largest germplasm collections in the world. Human selection and adaptation to diverse environments have created a large number of cultivars and it is estimated that about 1, 20,000 varieties of rice exist in the world. (Khush, 1997).

In modern agriculture, high yielding rice varieties are extensively grown with the use of fertilizers and manures. Such cultivation pattern of rice accidentally or inadvertently offers infestation of a large number of insect pests, which results in to severe loss in crop yields. (Neeta *et al.*, 2013)^[6].

Today, the majority of all rice produced comes from China, India, Indonesia, Bangladesh, Vietnam, Thailand, Myanmar, Pakistan, Philippines, Korea and Japan. Asian farmers still account for 87% of the world's total rice production.

Gundhi bug, *Leptocorisa varicornis* (Thunberg) is a serious pest of rice and sometimes reduce yield by as much as 30%. The adults are slender and brown-green. They measure 19-16 mm long. The younger instars are pale in color. The nymphs have long antennae. The older instars measure 1.8 - 6.2 mm long. They are yellowish green. The eggs are oval, shiny, and reddish brown. They are laid in batches of 10-20 in one to three rows along the midrib on the upper surface of the leaf. (John 1981)^[3].

The adult insect is long and slender. Newly hatch nymphs are tiny and green, but become brownish as they grow. Both nymphs and adults of gundhi bug are difficult to recognize in the rice fields because they camouflage easily on plants due to their green or brownish colour

resembles that of rice plants. Infested fields can be detected, from a distance, because they emit a typical rice bug odour produced by scent glands on the abdomen of the insect. Adults are active in early morning and evening time. The bugs are most abundant at 27-28 °C and 80-82% RH. (Gangwar, 2015)^[2].

Materials and Methods

A field trial was conducted during *kharif* season of 2016 with IR-6444 variety in research field of Department of Entomology, Sam Higginbottom University of Agriculture, Technology & Sciences, Allahabad. The experiment was laid out in randomized block design, with four replications and eight treatments including untreated check with a plot size of 5m x 5m each. Twenty one days old seedlings were planted with a spacing of 20cm x 10cm. The treatments comprised of foliar sprays of chemical insecticides, viz Imidacloprid 17.8% @ 300g/ha, Thiamethoxam 25% @ 625g/ha, Acephate 75 SP @ 1000 g/ha, Triazophos 25% @ 625g/ha with Monocrotophos 36% @ 1390 ml/ha, Malathion 50EC @ 500 ml/ha, Carbaryl 50 WP @ 1Kg/ha control were tested to compare the efficacy against *Leptocorisca acuta* (Thun.)

Results and Discussion

The pooled data presented in Table1 and Table2 indicates that all insecticides were significantly superior over control in reducing the population of gundhi bug recorded at 1st, 5th, 10th and 15th days after insecticidal applications. Imidacloprid was found significantly superior (1.325, 0.750, 0.375, 0.350) followed by Monocrotophos (1.475, 0.975, 0.550, 0.525), Thiamethoxam (1.425, 0.925, 0.450, 0.575), Triazophos (1.575, 0.850, 0.625, 0.575), Acephate (1.625, 0.875, 0.750, 0.875), Carbaryl (1.425, 0.950, 0.850, 1.125) and NSKE

(1.725, 0.825, 0.825, 1.250) as compared to Control (2.375, 2.625, 3.025, 3.325) on 1st, 5th, 10th and 15th days respectively. The data for the efficacy of different treatments were evaluated on the basis of per cent population reduction. All the treatments were significant. Per cent population reduction of gundhi bug recorded on 1st, 5th, 10th and 15th days after insecticidal applications. Imidacloprid was found significantly superior (44.84%, 71.75%, 87.74%, 89.59%) followed by Triazophos (43.34%, 72.33%, 82.35%, 85.23%) as compared to other treatments i.e. Thiamethoxam (46.66%, 68.68%, 86.78%, 84.63%), Monocrotophos (37.18%, 62.43%, 81.61%, 84.03%), Acephate (28.216%, 34.743%, 61.653%, 64.566%), Carbaryl (37.88%, 62.53%, 70.91%, 64.97%) and Malathion (21.09%, 65.86%, 70.37%, 59.16%) respectively. Similar finding have been reported by Yaduman *et al.* (2015) Tiwari *et al.* (2014) Rath *et al.* (2015) and Dey *et al.* (2013).

The yields among the treatment were significant. The highest yield was recorded in Imidacloprid (44.200 q/ha) followed by Thiazophos (43.500 q/ha), Thiazophos (43.200 q/ha), Monocrotophos (43.000 q/ha), Trizophos (41.600 q/ha), Carbaryl (39.500 q/ha), Malathion (38.400 q/ha) as compared to control (28.000 q/ha).

The probable reason for such findings may be that the insecticides after penetrating inside the body of insect may have reached the synoptic sites and may have mimicked the acetyl choline and reacted with enzyme acetyl choline esterase and inhibited it by blocking its active sites which are responsible for hydrolysis of natural substrate acetyl choline. This enzyme inhibition may have led to the accumulation of acetyl choline at the nerve endings which may have ultimately resulted in restlessness, tremors, paralysis and death of the target insect.

Table 1: Efficacy of certain chemical insecticides against gundhi bug *Leptocorisca acuta* during *kharif* season 2015 in Naini Allahabad region (Population/hill)

Tr. No.	Treatments	Population of gundhi bug/hill					
		Before spray	1 st Day	5 th Day	10 th Day	15 th Day	Mean
T ₀	Control	2.200	2.375	2.625	3.025	3.325	2.837
T ₁	Imidacloprid	2.225	1.325	0.750	0.375	0.350	0.700
T ₂	Triazophos	2.575	1.575	0.850	0.625	0.575	0.906
T ₃	Monocrotophos	2.175	1.475	0.975	0.550	0.525	0.881
T ₄	Thiamethoxam	2.475	1.425	0.975	0.450	0.575	0.844
T ₅	Acephate	2.100	1.625	0.875	0.750	0.875	1.031
T ₆	Carbaryl	2.125	1.425	0.950	0.850	1.125	1.088
T ₇	Malathion	2.025	1.725	0.825	0.825	1.250	1.156
	F test	NS	S	S	S	S	S
	CD (5%)	0.23	0.25	0.22	0.28	0.34	0.46
	S.Ed.	0.11	0.12	0.10	0.14	0.16	0.22
	CV %		10.47	13.33	20.74	21.67	26.27

Table 2: Efficacy of certain chemical insecticides against gundhi bug *Leptocorisca acuta* during *kharif* 2015 in Naini Allahabad region (percent population reduction)

Tr. No.	Treatments	Per cent population reduction of gundhi bug per hill					
		1 DBS	1 st Day	5 th Day	10 th Day	15 th Day	Mean
T ₀	Control	2.200	-----	-----	-----	-----	-----
T ₁	Imidacloprid	2.225	44.84	71.75	87.74	89.59	73.48
T ₂	Triazophos	2.575	43.34	72.33	82.35	85.23	70.81
T ₃	Monocrotophos	2.175	37.18	62.43	81.61	84.03	66.31
T ₄	Thiamethoxam	2.475	46.66	68.68	86.78	84.63	71.69
T ₅	Acephate	2.100	28.32	65.08	74.03	72.43	59.96
T ₆	Carbaryl	2.125	37.88	62.53	70.91	64.97	59.07
T ₇	Malathion	2.025	21.06	65.86	70.37	59.16	54.11

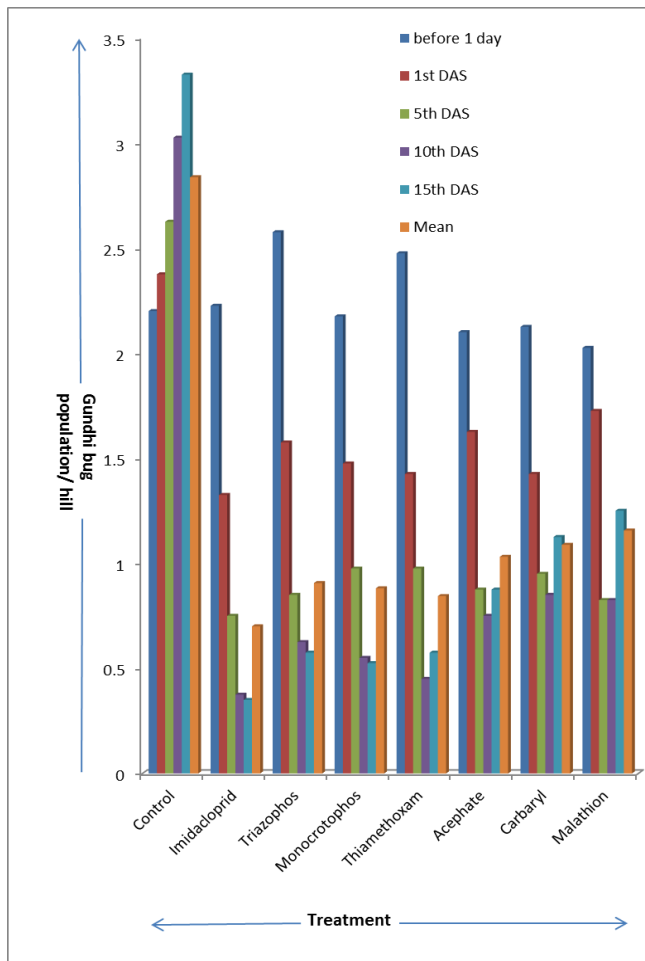


Fig 1: Graphical representation of efficacy of certain chemical insecticides against gundhi bug per hill during *kharif* season 2015 in Naini Allahabad region

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