Int.J.Curr.Microbiol.App.Sci (2017) *6*(9): 1697-1701

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Volume 6 Number 9 (2017) pp. 1697-1701**
Journal homepage: http://www.ijcmas.com

Original Research Article https://doi.org/10.20546/ijcmas.2017.609.209

Efficacy of Certain Chemical Insecticides against Rice Gundhi Bug (*Leptocorisa acuta* Thunberg) Under Field Condition

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Keywords

Efficacy, Gundhi bug, Insecticides, *Leptocorisa acuta*, Rice, Seasonal incidence.

Article Info

Accepted:
21 July 2017
Available Online:
10 September 2017

A B S T R A C T

The pests appeared on 37th standard week (September 2nd week) on rice crop with an infestation of average 0.47 gundhi bug per hill. The gundhi bug population increased and gradually reached peak level of 3.035 gundhi bug per hill on 41st standard week (October 2nd week). At that time, average max temperature was 35.77 °C and minimum temperature was 28.82 °C, maximum relative humidity was 90 % and minimum 51.57 %, average wind velocity was 1.56 km/hr and average sunshine hour was 8.68 hours. One application of seven chemical insecticide viz., Imidacloprid 17.8 SL @ 100 ml/ha, Thiamethoxam 25 % WP @ 100g/ha, Chloropyrifos 50 % EC @ 2.5 lit/ha, Carbaryl 50 % WP 625 g/ha, Triazophos 40 % EC @ 875 ml/ha, Cartap hydroclorid 20 % SP @ 500 g/ha and Cypermethrin 25 % EC @ 250 ml/ha were evaluated against rice gundhi bug *Leptocorisa acuta* Thunberg. Maximum Per cent population reduction of gundhi bug per hills and B: C ratio were observed in Imidacloprid with (71.80 % and 1:3.36) respectively. Which are followed by Carbaryl (70.26 % and 1:3.22)> Thiamethoxam(67.63 and 1:3.27) >Chloropyrifos (66.71 and 1:3.35)> Triazophos (58.17and 1:3.00) >Cypermethrin (54.55 and 1:2.98) Cartap hydroclorid (52.21and 1:2.83) and > Untreated Control (1:2.29) respectively.

Introduction

Rice (*Oryza sativa* L.) is the world's most important food and a primary food source for more than a third of the world's population. India produces 99.15 million tons of rice. Rice, the staple food of more than half of human population is grown in 153.9 million hectares in the world with a production of 618 million tones and a productivity of 4.02 tones/ha. China ranks first in rice production in the world. In India, the area under rice cultivation is 41.90 million hectares with production of 132.02 million tons.

Gundhi Bug (*Leptocorisa varicornis* Fabricious) 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.

There are mainly two species, *viz.*, *Leptocorisa acuta* Thunberg and *L. oratorius* Fabricious. Rice gundhi bug causes an average loss of 10-30% yield because of its infestation during milky stage which leads to partial filling of grains/chaffy grains.

The nymphs as well as adults emit a characteristic offensive odour in infested fields, which can be very easily recognized as a signal of presence of gundhi bug in rice fields (Prasad and Prasad, 2006). IPM is an eco-friendly approach for managing pest problems utilizing all possible available methods and techniques of pest control such as cultural, mechanical, biological and chemical methods in a compatible and scientific manner to suppress the pest population below economic injury level.

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 Institute 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 20 x 10cm. The treatments comprised of foliar sprays of chemical insecticides, *viz.*, Cypermethrin 25 % EC @ 250 ml /ha, Cartap 20 % SP @ 500 g/ha, Chloropyrifos 50 % EC @ 2.5 ml/ha, Carbaryl 50 % WP @ 625 g/ha with Triazophos 40 % EC @ 500 g/ha, Thiamethoxan 25 % WP @ 100 g/ha and Imidacloprid 17.8 SL @ 100 ml /ha (Yaduman *et al.*, (2015) Tiwari *et al.*, (2014) Rath *et al.*, (2015) Dey *et al.*, (2013).

Results and Discussion

The pooled data presented in Table 1and Table 2 indicates that all insecticides were significantly superior over control in reducing the population of gundhi bug recorded at 1^{st}, $5t^{h}$, 10^{th} and 15^{th} days after insecticidal applications.

Imidacloprid was found significantly superior (1.32, 0.67,.35,.30) followed by Chloropyrifos (1.42,.90,.50,.47), Carbaryl (1.35,.87,.42,.57), Thiamethoxam (1.55, .80, .55, .52), Triazophos (1.62, .82, .62, .82) Cartap (1.65,.75,.72, 1.27) and Cypermethrin (1.40, 0.97, 0.77, 1.20) as compared to control (2.32, 2.60, 2.95,3.32) at 1^{st}, $5t^{h}$, 10^{th} and 15^{th} 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 at 1^{st}, $5t^{h}$, 10^{th} and 15^{th} days after insecticidal applications of Imidacloprid was found significantly superior (37.27, 72.07, 87.69, 90.10) followed by Carbaryl (44.89, 66.97, 85.94, 83.24) as compared to other treatments, Thiamethoxam (37.27, 71.05, 82.45, 79.76), Chloropyrifos (35.79, 63.60, 82.17, 85.28), Triazophos (20.52, 64.02, 76.01, 72.15), Cypermethrin (31.32, 57.44, 70.21, 59.24) and Cartap (16.29,65.97, 71.20, 55.39) respectively. Siminar findings have been reported by Yaduman *et al.*, (2015) Choudhary *et al.*, (2014)

Treatments were found significant among each other in yield comparison. Maximum yield (q/ha) was recorded in Imidacloprid (45.500) followed by Carbaryl (44.000), Thiamethoxam (43.700), Chloropyrifos (42.000), Triazophas (40.600), Cypermethrin (38.200), and Cartap (37.000) as compared to control (27.500).

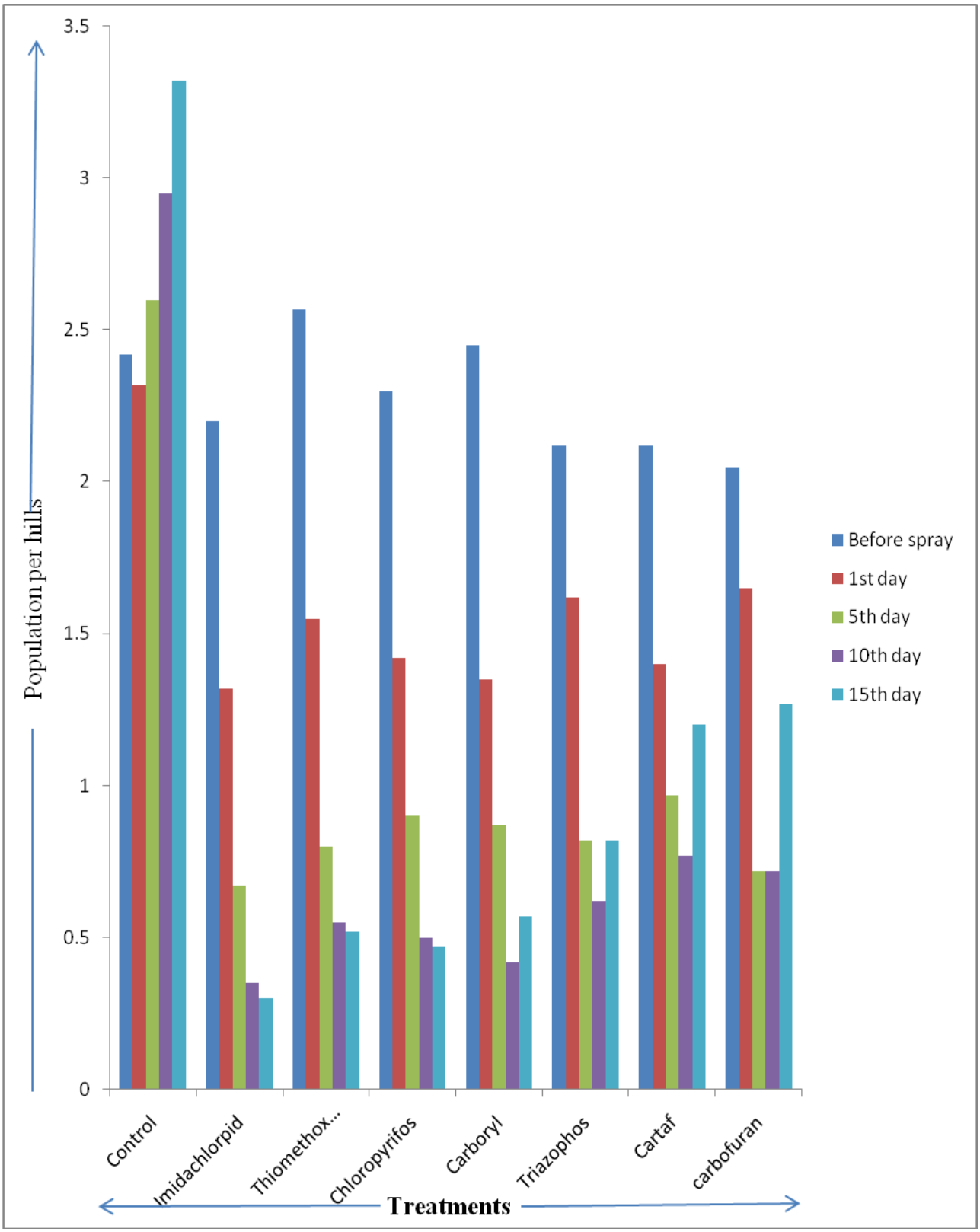
Table.1 Efficacy of certain chemical insecticides against Gundhi bug, *Leptocorisa acuta* Thunberg during *kharif* season of 2015: (Population / hills)

		Gundhi bug population / hills					
Tr. No	**Treatment**	**Before spray**	**1st DAS**	**5th DAS**	**10th DAS**	**15th DAS**	Mean
T0	Control	2.42	2.32	2.60	2.95	**3.32**	2.72
T1	Imidacloprid	2.20	1.32	0.67	0.35	0.30	0.96
T2	Thiamethoxam	2.57	1.55	0.80	0.55	0.52	1.19
T3	Chloropyrifos	2.30	1.42	0.90	0.50	0.47	1.11
T4	Carbaryl	2.45	1.35	0.87	0.42	0.57	1.13
T5	Triazophos	2.12	1.62	0.82	0.62	0.82	1.20
T6	Cartap	2.12	1.40	0.97	0.77	1.20	1.29
T7	Cypermethrin	2.05	1.65	0.72	0.72	1.27	1.28
F.test		**NS**	**S**	**S**	**S**	**S**	**s**
C D (5%)=		0.28	0.26	0.27	0.31	0.36	0.47
S,ED(+_)		0.13	0.12	0.13	0.15	0.18	0.22
C V%		8.33	11.12	17.77	24.17	23.30	27.96

Table.2 Efficacy of certain chemical insecticides against gundhi bug *Leptocorisa acuta* Thunberg during *kharif* seasion of 2015 : (Per cent population reduction)

		Per cent population reduction of rice gundhi bug /hills					
Tr. No	**Treatment**	**Before Spray**	**1st DAS**	**5th DAS**	**10th DAS**	**15th DAS**	**Mean**
T0	Control	2.42	_	_	_	_	_
T1	Imidacloprid	2.20	37.27	72.07	87.69	90.18	71.80
T2	Thiamethoxam	2.57	37.27	71.05	82.45	79.76	67.63
T3	Chloropyrifos	2.30	35.79	63.60	82.17	85.28	66.71
T4	Carbaryl	2.45	44.89	66.97	85.94	83.24	70.26
T5	Triazophos	2.12	20.52	64.02	76.01	72.15	58.17
T6	Cartap	2.12	31.32	57.44	70.21	59.24	54.55
T7	Cypermethrin	2.05	16.29	65.97	71.20	55.39	52.21

Fig.1 Graphical representation of efficacy of certain chemical insecticides against gundhi bug, *Leptocorisa acuta Thunberg* on rice



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 lead 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**.**

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How to cite this article:

Brajesh Bais, Ashwani Kumar, Hadi Husain Khan, Ramkinkar Sahu and Pramod Kumar Kaiwart. 2017. Efficacy of Certain Chemical Insecticides against Rice Gundhi Bug (*Leptocorisa acuta* Thunberg) Under Field Condition. *Int.J.Curr.Microbiol.App.Sci.* 6(9): 1697-1701. doi: https://doi.org/10.20546/ijcmas.2017.609.209