Journal of Entomology and Zoology Studies

Available online at www.entomoljournal.com

E-ISSN: 2320-7078
P-ISSN: 2349-6800
www.entomoljournal.com
JEZS 2020; 8(4): 90-94

Received: 04-06-2020
Accepted: 08-07-2020

Sweety Kumari
Ph. D Research Scholar, Patna University Patna, Bihar, India

Munna Yadav
Senior Research Fellow, ICAR-Indian Institute of Natural Resins and Gums, Ranchi, Jharkhand, India

Rabindra Prasad
Associate Professor cum Senior Scientist, Department of Agricultural Entomology, Birsa Agricultural University, Kanke, Ranchi, Jharkhand, India

Rajendra Prasad
Subject Matter Specialist (Agronomy), Krishi Vigyan Kendra, Sheohar, (DRPCAU, Pusa, Samastipur), Rani Pokhar, Sheohar, Bihar, India

Uday Kumar
Department of Plant Pathology, Bihar Agricultural University, Sabour, Bhagalpur, Bihar, India

Corresponding Author:
Munna Yadav
Senior Research Fellow, ICAR-Indian Institute of Natural Resins and Gums, Ranchi Jharkhand, India

Effect of different chemical insecticides on the incidence of gundhi bug (*Leptocorisa oratorius* and *L. acuta*) infesting rice

Sweety Kumari, Munna Yadav, Rabindra Prasad, Rajendra Prasad and Uday Kumar

Abstract
Leptocorisa acuta Thunberg (Hemiptera: Alydidae) is an important and common pest of rice which is also called "head bug "or" ear bug". The present experiment was carried out to determine the relative efficacy of some newer insecticides against gundhi bug. The experiment was carried out at Rice Research Farm, RAC, B.A.U, Kanke, Ranchi, Jharkhand during *kharif*, 2016 and 2017. In this experiment nine different chemical insecticides were used to know which insecticide is most effective in reducing the population of gundhi bug. The minimum pest population (0.85GB/10 hills) was recorded in the treatment comprising of the new combination product of Spinetoram 6SC+ Methoxyfenozide 30 SC @400ml/ha. But it was at par with spinetoram 6 SC + methoxyfenozide 30 SC @ 375 ml/ha, flubendiamide 48 SC @ 50 ml/ha and carbofuran 3 G @ 30 kg/ha followed by need based foliar spray with triazophos 40 EC @ 1500 ml/ha. Peak duration of occurrence of gundhi bug was observed almost from 95 DAT and onward period during the experiment.

Keywords: Gundhi bug, *Leptocorisa acuta*, efficacy, newer insecticides

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. 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 is a dipterous insect pest of rice. It is generally distributed throughout India but is more prevalent in U.P, Bihar and southern states. 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. Rice gundhi bug, *Leptocorisa acuta* (Thunb) is an important pest of rice [1]. They damage rice crops in large number when it comes to flower. The rice bug both nymphs and adults cause damage by feeding on the sap of milky grain and turn them chaffy. Rice gundhi bug is one of the serious pests of rice in India and sometimes reduce yield by as much as 30% [2, 3 & 4]. Prakash *et al.*, (1995) [5] reported that grain viability is also reduced by infestation of gundhi bug. The rice plant is subjected to attack by more than 100 species of insects and 20 of them can cause economic damage (Pathak and Khan, 1994) [6]. When the infestation crosses a threshold value then application of insecticides is the only way to prevent the damage as soon as possible. The same type of insecticides cannot kill all type of pest. Due to the excessive use of harmful insecticides the environment of our world is getting worse day by day and many diseases are spreading. Therefore in today's time we need an insecticide which is able to reduce the population of every kind of pest while minimizing the environmental damage. There have been many experiments in this direction before and my step is also in this direction. Hence, efforts were made to assess the relative field efficacy of newer molecules insecticides against gundhi bug pest of rice. To reduce the incidence of gundhi bug we have to use different strategies according to the environment. Efficacy of all the nine test chemical insecticides appeared to be almost at par in terms of reduction in the incidence of gundhi bug.

Methods and Materials

The experiment was carried out to study the efficacy of nine different formulation insecticides for the control of rice gall midge. In order to evaluate field bio-efficacy of newer molecules of different insecticides against gundhi bug of rice, a field trial was conducted at Rice research farm, RAC, B.A.U, Kanke, Ranchi, Jharkhand during *kharif*, 2016 and 2017.

Treatment application: Periodical and need based application of the respective test insecticidal treatments were applied based on the ETL of the pest species at the different stages of the crop. Observations on pest incidence were be recorded at 4th, 7th, & 10th days after insecticidal application (DAA)

Table 1: Detail of the field experiment, conducted during *kharif*, 2016 and 2017

Design Insecticidal treatments	:	RBD (Randomized block design) 10
Replications	:	3
Spacing (plant to plant)	:	15 cm
Spacing (row to row)	:	20 cm
Plot size	:	5 x 4 m
N:P:K	:	80:40:20 ka/ha (As per local recommendation)
Date of sowing	:	3rd July
Date of transplanting	:	22th July
Date of insecticide application	:	95 DAT
Date of harvesting	:	7th November
Crop variety	:	Naveen

Table 2: Treatment details of field bio-efficacy of some selected commercial formulations of newer molecules of chemical insecticide against gundhi bug of rice:

Treatments	Trade name	Common Name	% a.i. in formulations	Dose of the formulated product (ml or g /ha)	Dose ml or g/l of water
T 1	Spinetoram 6 SC + methoxyfenozide 30 SC	spinetoram 6 SC + methoxyfenozide 30 SC	36 SC	375 ml	0.75 ml
T 2	Spinetoram 6 SC + methoxyfenozide 30 SC	spinetoram 6 SC + methoxyfenozide 30 SC	36 SC	400 ml	0.80ml
T 3	DPX-RAB55	Triflumezopyrim	106 SC	238 ml	0.475 ml
T 4	Fame	Flubendiamide 480 SC	48 SC	50 ml	0.10 ml
T 5	Coragen	Rynaxypyr	20 SC	150 ml	0.30 ml
T 6	Hunk	Acephate	95 SG	526 g	1.053
T 7	Osheen	Dinotefuran	20 SG	200 g	0.40 g
T 8	Hostathion	Triazophos	36 SL	1500 ml	3 ml
T 9	Furadan +Hostathion (in form of alternate use)	Carbofuran + triazophos (in form of alternate use)	3 G+40 EC	30 kg+1500 ml	30 kg+ 3 ml
T 10	Untreated control	-	--	-	-

Result and Discussion

The observations pertaining to gundhi bug/Ear bug (*Leptocorisa oratorius* and *L. acuta*) were recorded at milking stage of the crop to determine the bioefficacy of certain test insecticides against the pest during both years of experimentations, 2016 and 2017. The results are presented in Table-3. Peak duration of occurrence of Gandhi bug was observed almost from 95 DAT and onward period during both of years of the experimentations.

1. Incidence of Gandhi bug recorded at 4 days after application (4 DAA)

i. Incidence of GB recorded at 4 DAA, during 2016

The effect of different insecticides against ear bug was found significant results. The minimum pest population (0.85 GB/10 hills) was recorded in the treatment comprising of the new combination product of spinetoram 6 SC + methoxyfenozide 30 SC @ 400 ml/ha, which was apparently superior among all the test insecticides, but it was at par with spinetoram 6 SC + methoxyfenozide 30 SC @ 375 ml/ha (0.98 GB/10 hills), flubendiamide 48 SC @ 50 ml/ha (1.13 GB/10 hills), carbofuran 3G @ 30 kg/ha followed by need based foliar spray with triazophos 40 EC @ 1500 ml/ha (1.23 GB/10 hills), acephate 95 SG @ 526 g/ha (1.33 GB/10 hills), triazophos 40 EC @ 1500 ml/ha (1.54 GB/10 hills) and triflumezopyrim 106 SC @ 237.5 ml/ha (1.75 GB/10 hills). The highest population of the pest (9.28 GB/10 hills) was harbored by the rice plants which were left unprotected.

ii. Incidence of GB recorded at 4 DAA, during 2017

The effect of different insecticides against ear bug was found significant. The minimum pest population of the pest (1.18 GB/10 hills) was found in the treatment comprising of the new combination product of spinetoram 6 SC + methoxyfenozide 30 SC @ 400 ml/ha, which was apparently superior among all the test insecticides, but it was at par with spinetoram 6 SC + methoxyfenozide 30 SC @ 375 ml/ha (1.31 GB/10 hills), flubendiamide 48 SC @ 50 ml/ha (1.47 GB/10 hills), carbofuran 3 G @ 30 kg/ha followed by need based foliar spray with triazophos 40 EC @ 1500 ml/ha (1.57 GB/10 hills), acephate 95 SG @ 526 g/ha (1.66 GB/10 hills), triazophos 40 EC @ 1500 ml/ha (1.87 GB/10 hills) and triflumezopyrim 106 SC @ 237.5 ml/ha (2.08 GB/10 hills). The highest population of the pest (9.61 GB/10 hills) was observed in the untreated crop of rice.

iii) Pooled mean incidence of GB recorded at 4DAA, during 2016 and 2017

The effect of insecticides against ear bug based on the mean pest population of 2016 and 2017 at 4DAA found significant results. The minimum pest population (1.02GB/10 hills) was found in the treatment comprising of the new combination product of spinetoram 6 SC + methoxyfenozide 30 SC @ 400 ml/ha, which was apparently superior among all the test insecticides, but it was at par with spinetoram 6 SC + methoxyfenozide 30 SC @ 375 ml/ha (1.14 GB/10 hills), flubendiamide 48 SC @ 50 ml/ha (1.30 GB/10 hills), carbofuran 3 G @ 30 kg/ha followed by need based foliar spray with triazophos 40 EC @ 1500 ml/ha (1.40 GB/10 hills) and acephate 95 SG @ 526g/ha (1.50 GB/10 hills). The highest population of the pest (9.45 GB/10 hills) was observed in case of the unprotected plants of rice.

2. Incidence of GB recorded at 7 days after application (7 DAA)

i. Incidence of GB recorded at 7 DAA, during 2016

The effect of insecticides on the incidence of gundhi bug recorded was found significant. The minimum pest population (1.22 GB/10 hills) was found in the treatment comprising of the new combination product of spinetoram 6 SC + methoxyfenozide 30 SC @ 400 ml/ha, which was apparently superior among all the test insecticides, but it was at par with spinetoram 6 SC + methoxyfenozide 30 SC @ 375 ml/ha (1.46 GB/10 hills), flubendiamide 48 SC @ 50 ml/ha (1.64 GB/10 hills), carbofuran 3 G @ 30 kg/ha followed by need based foliar spray with triazophos 40 EC @ 1500 ml/ha (1.79 GB/10 hills), acephate 95 SG @ 526g/ha (1.99 GB/10 hills) and triazophos 40 EC @ 1500 ml/ha (2.16 GB/10 hills). The highest population of the pest (11.53 GB/10 hills) was observed in case of unprotected crop of rice.

ii. Incidence of GB recorded at 7 DAA, during 2017

The effect of different insecticides gundhi bug remained significant. The minimum pest population (1.60 GB/10 hills) was found in the treatment comprising of the new combination product of spinetoram 6 SC + methoxyfenozide 30 SC @ 400 ml/ha, which was apparently superior among all the test insecticides, but it was at par with spinetoram 6 SC + methoxyfenozide 30 SC @ 375 ml/ha (1.84 GB/10 hills), flubendiamide 48 SC @ 50 ml/ha (2.02 GB/10 hills), carbofuran 3 G @ 30 kg/ha followed by need based foliar spray with triazophos 40 EC @ 1500 ml/ha (2.17 GB/10 hills), acephate 95 SG @ 526 g/ha (2.37 GB/10 hills), triazophos 40 EC @ 1500 ml/ha (2.54 GB/10 hills) and triflumezopyrim 106 SC @ 237.5 ml/ha (2.70 GB/10 hills). The highest population of the pest (11.91 GB/10 hills) was observed in case of untreated plants of rice.

iii. Pooled mean incidence of GB recorded at 7DAA, during 2016 and 2017

The results in this regard remained significant. The minimum pest population (1.41GB/10 hills) was found in the treatment comprising of the new combination product of spinetoram 6 SC + methoxyfenozide 30 SC @ 400 ml/ha, which was apparently superior among all the test insecticides, but it was at par with spinetoram 6 SC + methoxyfenozide 30 SC @ 375 ml/ha (1.65 GB/10 hills), flubendiamide 48 SC @ 50 ml/ha (1.83 GB/10 hills) and carbofuran 3 G @ 30 kg/ha followed by need based foliar spray with triazophos 40 EC @ 1500 ml/ha (1.98 GB/10 hills). The highest population of the pest (11.72 GB/10 hills) was observed in case of the unprotected plants of rice.

3. Incidence of GB recorded at 10 days after application (10 DAA)

i. Incidence of GB recorded at 10 DAA, during 2016

The effect of insecticides on the incidence of an ear bug recorded significant. The minimum population gundhi bug (1.38 GB/10 hills) was found in the treatment comprising of the new combination product of spinetoram 6 SC + methoxyfenozide 30 SC @ 400 ml/ha, which was apparently superior among all the test insecticides, but it was at par with spinetoram 6 SC + methoxyfenozide 30 SC @ 375 ml/ha (1.61 GB/10 hills), flubendiamide 48 SC @ 50 ml/ha (1.81GB/10 hills), carbofuran 3 G @ 30 kg/ha followed by need based foliar spray with triazophos 40 EC @ 1500 ml/ha (1.99 GB/10 hills), acephate 95 SG @ 526 g/ha (2.23 GB/10 hills), triazophos 40 EC @ 1500 ml/ha (2.41 GB/10 hills) and triflumezopyrim 106 SC @ 237.5 ml/ha (2.66 GB/10 hills). The highest population of the pest (12.97 GB/10 hills) was observed in case of the untreated plants of rice.

ii. Incidence of GB recorded at 10 DAA, during 2017

The effect of insecticides against incidence of ear bug recorded remained significant. The minimum pest population gundhi bug (1.95 GB/10 hills) was found in the treatment comprising of the new combination product of spinetoram 6 SC + methoxyfenozide 30 SC @ 400 ml/ha, which was apparently superior among all the test insecticides, but it was at par with spinetoram 6 SC + methoxyfenozide 30 SC @ 375 ml/ha (2.14 GB/10 hills), flubendiamide 48 SC @ 50 ml/ha (2.34 GB/10 hills), carbofuran 3G @ 30 kg/ha followed by need based foliar spray with triazophos 40 EC @ 1500 ml/ha (2.52 GB/10 hills), acephate 95 SG @ 526 g/ha (2.76 GB/10 hills), triazophos 40 EC @ 1500 ml/ha (2.94 GB/10 hills) and triflumezopyrim 106 SC @ 237.5 ml/ha (3.19 GB/10 hills). The highest population of the pest (13.50 GB/10 hills) was observed in the untreated control plot.

iii. Pooled mean incidence of GB recorded at 10 DAA, during 2016 and 2017

The insecticidal treatments differed significantly. The minimum pest population (1.69GB/10 hills) was found in the treatment comprising of the new combination product of spinetoram 6 SC + methoxyfenozide 30 SC @ 400 ml/ha, which was apparently superior among all the test insecticides, but it was at par with spinetoram 6 SC + methoxyfenozide 30 SC @ 375 ml/ha (1.88 GB/10 hills), flubendiamide 48 SC @ 50 ml/ha (2.08 GB/10 hills) and carbofuran 3 G @ 30 kg/ha followed by need based foliar spray with triazophos 40 EC @ 1500 ml/ha (2.25 GB/10 hills). The highest population of the pest (13.24 GB/10 hills) was observed in case of the unprotected plants of rice.

4. Overall mean of GB recorded at 4, 7 and 10 days after application (DAA)

i. Mean of GB recorded at 4, 7 and 10 DAA, during 2016

Overall mean of GB of three dates of observations (4, 7 & 10 DAA), in respect of the effect of insecticides against ear bug was found to be significant. The minimum population of gundhi bug (1.16 GB/10 hills) was found in the treatment comprising of the new combination product of spinetoram 6 SC + methoxyfenozide 30 SC @ 400 ml/ha, which was apparently superior among all the test insecticides, but it was at par with spinetoram 6 SC + methoxyfenozide 30 SC @ 375 ml/ha (1.35 GB/10 hills), flubendiamide 48 SC @ 50 ml/ha (1.53 GB/10 hills), carbofuran 3 G @ 30 kg/ha followed by need based foliar spray with triazophos 40 EC @ 1500 ml/ha (1.67 GB/10 hills) and acephate 95 SG @ 526g/ha (1.85 GB/10 hills). The highest population of the pest (11.26 GB/10 hills) was observed in the untreated crop of rice.

ii. Mean of GB recorded at 4, 7 and 10 DAA, during 2017

Overall mean of GB three dates of observations (4, 7 & 10 DAA), in respect of the effect of insecticides against the pest was also found significant. The minimum population of gundhi bug (1.58GB/10 hills) was found in the treatment comprising of the new combination product of spinetoram 6 SC + methoxyfenozide 30 SC @ 400 ml/ha, which was apparently superior among all the test insecticides, but it was at par with spinetoram 6 SC + methoxyfenozide 30 SC @ 375 ml/ha (1.77 GB/10 hills), flubendiamide 48 SC @ 50 ml/ha (1.94 GB/10 hills), carbofuran 3 G @ 30 kg/ha followed by need based foliar spray with triazophos 40 EC @ 1500 ml/ha (2.08 GB/10 hills), acephate 95 SG @ 526 g/ha (2.27 GB/10 hills) and triazophos 40 EC @ 1500 ml/ha (2.45 GB/10 hills). The highest population of the pest (11.67 GB/10 hills) was observed in case of the unprotected plants of rice.

iii. Pooled mean of GB recorded at 4, 7 and 10 DAA, during 2016 and 2017

There was a significant effect of the insecticidal treatments in this regard. The minimum population of gundhi bug (1.37GB/10 hills) was found in the treatment comprising of the new combination product of spinetoram 6 SC + methoxyfenozide 30 SC @ 400 ml/ha, which was apparently superior among all the test insecticides, but it was at par with spinetoram 6 SC + methoxyfenozide 30 SC @ 375 ml/ha (1.56 GB/10 hills), flubendiamide 48 SC @ 50 ml/ha (1.74 GB/10 hills) and carbofuran 3 G @ 30 kg/ha followed by need based foliar spray with triazophos 40 EC @ 1500 ml/ha (1.88 GB/10 hills). The highest population of the pest (11.47 GB/10 hills) was observed in case of the unprotected plants of rice.

Earlier, some research workers reported the bioefficacy of different chemical insecticides against gundhi bug in rice at different locations of the country. Nigam *et al.* (1989) [7] found that carbofuran 3G @ 30 kg/ha, cartap hydrochloride 4G @ 25kg/ha and phosalone 35 EC @ 0.05 kg ai/ha proved more efficacious than other insecticidal treatments including the untreated control against major insect pests of rice. Their findings are in consonance with that of the present results. The most effective treatment was imidacloprid, Thaimethoxam, Traizophos and Monocrotophos [8, 9, 10 & 11].

Table 3: Effect of chemical insecticides on the incidence of gundhi bug /ear bug infesting rice

S.N	Treatment	Formulations (a.i.)	Dose (ml or g /ha)	Number of ear bug per 10 hills, recorded after spray at											
				4 DAA			7 DAA			10 DAA			Overall Mean		
				2016	2017	Pooled Mean	2016	2017	Pooled Mean	2016	2017	Pooled Mean	2016	2017	Pooled Mean
T1	Spinetoram 6 SC + methoxyfenozide 30 SC	36 SC	375 ml	0.98 (1.20)	1.31 (1.33)	1.14 (1.26)	1.46 (1.34)	1.84 (1.48)	1.65 (1.41)	1.61 (1.43)	2.14 (1.60)	1.88 (1.51)	1.35 (1.33)	1.77 (1.47)	1.56 (1.40)
T2	Spinetoram 6 SC + methoxyfenozide 30 SC	36 SC	400 ml	0.85 (1.15)	1.18 (1.29)	1.02 (1.22)	1.22 (1.29)	1.60 (1.43)	1.41 (1.36)	1.42 (1.38)	1.95 (1.55)	1.69 (1.46)	1.16 (1.28)	1.58 (1.43)	1.37 (1.35)
T3	Triflumezopyrim	106 SC	238 ml	1.75 (1.47)	2.08 (1.58)	1.92 (1.52)	2.32 (1.66)	2.70 (1.77)	2.51 (1.71)	2.66 (1.74)	3.19 (1.89)	2.93 (1.81)	2.24 (1.63)	2.66 (1.75)	2.45 (1.69)
T4	Flubendiamide	48SC	50 ml	1.13 (1.26)	1.47 (1.38)	1.30 (1.32)	1.64 (1.44)	2.02 (1.56)	1.83 (1.50)	1.81 (1.49)	2.34 (1.65)	2.08 (1.57)	1.53 (1.40)	1.94 (1.54)	1.74 (1.47)
T5	Rynaxypyr	20SC	150 ml	1.96 (1.53)	2.30 (1.64)	2.13 (1.59)	2.68 (1.76)	3.06 (1.86)	2.87 (1.81)	2.92 (1.80)	3.45 (1.94)	3.19 (1.87)	2.52 (1.71)	2.94 (1.83)	2.73 (1.77)
T6	Acephate	95SG	526 g	1.33 (1.33)	1.66 (1.45)	1.50 (1.39)	1.99 (1.55)	2.37 (1.67)	2.18 (1.61)	2.23 (1.62)	2.76 (1.78)	2.50 (1.70)	1.85 (1.51)	2.27 (1.64)	2.06 (1.57)
T7	Dinotefuran	20 SG	200 g	2.22 (1.62)	2.55 (1.72)	2.38 (1.67)	3.00 (1.85)	3.38 (1.95)	3.19 (1.90)	3.45 (1.94)	3.98 (2.07)	3.72 (2.00)	2.89 (1.81)	3.30 (1.92)	3.10 (1.87)
T8	Triazophos	40 EC	1500 ml	1.54 (1.41)	1.87 (1.52)	1.71 (1.47)	2.16 (1.60)	2.54 (1.72)	2.35 (1.66)	2.41 (1.68)	2.94 (1.82)	2.68 (1.75)	2.04 (1.58)	2.45 (1.70)	2.24 (1.64)
T9	Carbofuran followed by triazophos	3G & 40 EC	30 kg & 1500 ml	1.23 (1.30)	1.57 (1.42)	1.40 (1.36)	1.79 (1.49)	2.17 (1.61)	1.98 (1.55)	1.99 (1.55)	2.52 (1.71)	2.25 (1.63)	1.67 (1.45)	2.08 (1.59)	1.88 (1.52)
T10	Untreated control	Water spray	500 lit.	9.28 (3.07)	9.61 (3.12)	9.45 (3.09)	11.53 (3.43)	11.91 (3.49)	11.72 (3.46)	12.97 (3.65)	13.50 (3.72)	13.24 (3.68)	11.26 (3.39)	11.67 (3.45)	11.47 (3.42)
	SEm±			(0.12)	(0.12)	(0.07)	(0.12)	(0.11)	(0.07)	(0.12)	(0.12)	(0.08)	(0.10)	(0.10)	(0.06)
	CD 5%			(0.35)	(0.34)	(0.21)	(0.35)	(0.34)	(0.21)	(0.36)	(0.34)	(0.21)	(0.29)	(0.28)	(0.18)
	CV %			(13.30)	(12.13)	(12.70)	(11.87)	(10.58)	(11.20)	(11.48)	(10.15)	(10.79)	(9.95)	(9.01)	(9.47)

Figures under the parentheses are square root transformed values. GB-Gundhi bug

DAT-Days after transplanting; DAA-Days after application of insecticidal treatment, foliar spray of the insecticidal treatments was applied at 95 DAT

Conclusion

It may be concluded that the minimum infestation of Gundhi bug / Ear bug insect in case of application of spinetoram 6 % SC + methoxyfenozide 30 % SC @ 400 ml/ha which was found to be most superior in terms of reduced the population and infestation with lowest pest incidence as compare to other treatments (insecticides) showed the highest minimize the population of gundhi bug/ear bug. But it was at par with spinetoram 6 SC + methoxyfenozide 30 SC @ 375 ml/ha, flubendiamide 48 SC @ 50 ml/ha and carbofuran 3 G @ 30 kg/ha followed by need based foliar spray with triazophos 40 EC @ 1500 ml/ha. So, that is a newer molecules of insecticide that can be used for the ecologically management of gall midge in a changes agro climatic condition. Newer molecules help in the terms of minimizing the environmental pollution and global warming because of inter specific relation between them.

Reference

1. Rao J, Prakash A. Biodegradation of paddy seed quality due to insects and mites and its control using botanicals. Final report ICAR/CRRI Ad-hoc Scheme 1995;87;1992-95.
2. Tiwari A, Pandey JP, Tripathi K, Pandey D, Pandey B, Shukla N. Effectiveness of Insecticides and Biopesticides against Gundhi Bug on Rice Crop in District Rewa (M. P.), India. International Journal of Scientific and Research Publications 2014;4(1):1-4.
3. Gupta SP, Prakash A, Rao J, Gupta A. Qualitative losses of paddy grain due to bugs in farmer's field of coastal Orissa. Indian Journal of Entomology 1993;55:229-236.
4. Israel P, Rao YS. Incidences of gundhi bug and steps for control. Protocol Rice Research Works Management. CRRI, Cuttack 1961,297-299.
5. Prakash A, Rao J, Ghos SK, Gupta SP. Deterioration of grain quality due to bug in eastern India In:IRRI-1995 on fragile lives in fragile ecosystem,13-18Feb.1995 at IRRI, Manila, Philippines 1995,22.
6. Pathak S, Khan J. Evaluation of significant relationship between the degree of infestation and yield attributes. Indian Journal of Entomology 1994;44(3):452-457.
7. Nigam PM, Sen R. Efficacy of neem oil against *Nephotettix virescence* an *Mythimna separate* (Lepidoptera: Noctuidae) as pests of rice. Neem Newsletter 1989;6:23.
8. Girish VP, Balikai RA. Efficacy of Botanicals, Biopesticides and Insecticide Molecules against Ear Head Bug, *Leptocorisa acuta* (TH.) in Paddy and their effect on Yield. Journal of Experimental Zoology India 2015;18(2):943-946.
9. Rath PC, Chakraborty K, Nandi P, Moitra MN. Field efficacy of some new insecticides against rice stem borer and Gundhi bug in irrigated rice ecology. International Journal of Plant, Animal and Environmental Sciences 2015;5(2):94-97.
10. Ashokappa *et al.*, Management of Rice Earhead Bug, *Leptocorisa oratorius Fabricius* (Hemiptera; Alydidae). J Exp. Zool. India 2015;18(1):177-179.
11. Rath PC, Lenka S, Mohapatra SD, Jena M. Field evaluation of selected insecticides against insect pests of wet season transplanted rice. Indian Journal of Plant Protection 2014;51(4):324-326.