Journal of Entomology and Zoology Studies

Available online at www.entomoljournal.com

Journal of Entomology and Zoology Studies

E-ISSN: 2320-7078
P-ISSN: 2349-6800
JEZS 2017; 5(5): 719-721

Received: 02-07-2017
Accepted: 03-08-2017

Sharanappa
Department of Entomology
Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad,
Uttar Pradesh, India

Ashwani Kumar
Department of Entomology
Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad,
Uttar Pradesh, India

Hadi Husain Khan
Department of Entomology
Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad,
Uttar Pradesh, India

Ramkinkar Sahu
Department of Entomology
Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad,
Uttar Pradesh, India

Correspondence
Sharanappa
Department of Entomology
Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad,
Uttar Pradesh India

Efficacy of certain insecticide against rice stem borer, *Scirpophaga incertulas* (Walker) on rice, *Oryza sativa* L.

Sharanappa, Ashwani Kumar, Hadi Husain Khan and Ramkinkar Sahu

Abstract
The present investigation entitled "Efficacy of certain insecticides against Rice stem borer *Scirpophaga incertulas* (walker)." was conducted during July, 2015 at Agricultural research farm, SHIATS, Allahabad. The occurrence of stem borer commenced from 34th standard week (4th week of August, 2015) with an average infestation per-cent 0.89 on 10 randomly selected hills per plot. The Stem borer infestation increased and gradually reached peak level of 8.92 % infestation at 40th standard week (1st week of October, 2015). Thereafter, declined trend was observed due to fall of maximum and minimum temperatures as optimum weather condition are decreasing. The two sprays were taken for the management of stem borer. Among two sprays, the data on the reduction per-cent of stem borer after two spray revealed that all the chemical treatments were significantly superior over control. Among all the treatments highest reduction per-cent of stem borer was recorded in Monocrotophos (T_1), followed by Chloropyriphos (T_2), Flubendiamid (T_3), Acephate (T_7), Cartap Hydrochloride (T_4), Imidacloprid (T_6), Fipronil (T_5). This was followed by Fipronil (T_5), which was recorded as least effective treatment within the insecticide treatment. The yields among the treatment were significant. The highest yield was recorded in (T_1) Monocrotophos (43.300 q/ha) followed by (T_2) Chloropyriphos (42.800 q/ha), (T_3) Flubendiamide (41.300 q/ha), (T_4) Cartap hydrochloride (42.00 q/ha), (T_5) Fipronil (39.300 q/ha), (T_6) Imidacloprid (41.500 q/ha), (T_7) Acephate (42.100 q/ha) as compared to control T_0 (27.000 q/ha).When cost benefit ratio was worked out, interesting result was achieved. Among the treatment studied, the best and most economical treatment was (T_1) Monocrotophos (1:3.24), followed by (T_2) Chloropyriphos (1:3.18), (T_3) Flubendiamide (1:3.07), (T_4) Cartap hydrochloride (1:2.93), (T_5) Fipronil (1:2.66), (T_6) Imidacloprid (1:2.88), (T_7) Acephate (1:1.25) as compared to control T_0 (1:2.19).

Keywords: Insecticides, rice, *scirpophaga incertulas*, seasonal incidence

Introduction
Rice (*Oryza sativa* L.) is belong to family Poaceae or Gramineae, the rice is life and princess among the cereals, the staple food of 65% of the total population in India. It constitutes about 52% of the total food grain production and 55% of total cereal production. In India, paddy is grown in 44.06 million ha constituting 34.4% of the total cultivable area. About 70% of our farmers are cultivating paddy and the production is about 105.31 million tonnes and productivity being 2178 t/ha. The productivity of rice has increased from 1984 kg per hectare in 2004-05 to 2393 kg per hectare in 2011-12, In Gujarat, it occupies about 2% of area among rice growing states. It is grown on 8.36 lakh ha area, which comprises nearly 90% of *kharif* and 10% of *summer* season rice with a total production of 17.90 lakh tonnes and the productivity of 2141 kg/ha (Anonymous, 2012) [3]. The major pests of rice are brown plant hoppers, white backed plant hoppers, green leaf hoppers, yellow stem borers, pale headed striped borers, pink stem borers, rice leaf folders, rice case worms, Rice Hispa, rice bugs, rice grass hoppers etc. Among them, the rice stem borers and leaf folders cause considerable damage to the rice crop. The loss of yield of rice due to insect pests in india is estimated approximately up to 25 per-cent (31 million tons) of hypothetical production in absence of losses due to insect pests (124 million tons) worth Rs 164300 million (Dhaliwal, *et al.*, 2004) [4]. Reported that due to 1 % dead heart or white ear, or due to both phases stem borer damage would be 2.5, 4.0, and 6.4% yield loss, respectively. In general, yield loss due to insect pests of rice has been estimated at about 25 % (Dhaliwal *et al.*, 2010) [5]. The status of stem borer incidence in 21 states of India reported that the level of pest was "severe" in seven states, "moderate" in six states and "low" in six states.

From a large dataset in India obtained from 28 years of experiments, 1% dead hearts cause 2.5% yield loss, 1% white heads cause 4.0% yield loss, and 1% dead heart and whiteheads cause 6.4% yield loss (Muralidharan and Pasalu, 2006) [8]. Damage cause heavy economic losses to farming community. Incidence of stem borer would give an idea of peak period of their activity which helps in to management strategy. Newer insecticides were taken for studies and evaluate their efficacy.

Materials and Methods

The present investigation was conducted at the Central Research Farm of Sam Higginbottom Institute of Agriculture, Technology and Sciences, Allahabad, Uttar Pradesh during kharif season 2015. To study the seasonal incidence of rice stemborer, four plot were taken randomly at different sites within the field measuring a plot size 5x5mt, without any plant protection measure. To study the efficacy of certain chemical insecticide was laid out in RBD block design with 8 treatments, replicated four times. "The rice variety is IR6444" was used and a healthy crop was raised by following all the recommended agronomic practice. The plot size was 5m x 5m and the spacing between row to row and plant to plant was maintained at 20cm and 10cm, respectively. Stem borer was recorded for the incidence of stem borer up to final harvest of crop, seasonal incidence. For efficacy of insecticidal treatments, the observations were recorded from 10 hills selected randomly per plot. Observation on the efficacy of certain chemical insecticide were recorded before 1st day spraying and 2nd, 7th and 14th day after insecticidal application. Finally yield was recorded for every treatment to calculate cost benefit ratio.

Results and Discussion

a) Seasonal incidence of rice stem borer, *Scirpophaga incertulas*

Studies on the incidence of rice stem borer population with weather parameters. The occurrence of rice stem borer (*Scirpophaga incertulas*) in 2015 *kharif* season was commenced from pests appeared on 34th standard week (4th week of August, 2015) on rice crop with an average infestation per-cent 0.89 on 10 randomly selected hills per plot. Yellow stem borer infestation increased gradually reached peak level of 8.92 rice stem borer per plot on 40th standard week (1st week of October, 2015). At that time, average temperature was 36.11ºC and 27.80 ºC, maximum relative humidity was 89.00 and minimum 50.14, average wind velocity was 1.84km/hour and average sun shine hour was 8.45 hours. Thereafter, declined trend was observed due to fall of maximum and minimum temperatures as optimum weather condition are decreasing. Similar findings have been reported by Kakde and Patel (2014) [7] and also show similar observation by Adiroubane and raja (2005) [1].

b) Efficacy of certain chemical insecticide against rice stem borer, *Scirpophaga incertulas*

It is seen that all the chemical insecticide treatments were significantly reducing the stem borer population. Among the insecticide evaluate, Monocrotophos (T1) recorded highest percentage population reduction over control (70.48%) and proved significantlysuperior to rest of the treatments and however it was at par with followed by Chloropyriphos (T_2) which recorded (66.49%) population reduction over control. Followed by, Flubendiamide (T_3) which recorded (62.50%) population reduction over control and it was also at par with the followed by Acephate (T_7), Cartap hydrochloride (T_4), Imidacloprid (T_6) and Fipronil (T_5) which recorded (62.05%), (61.36%), (59.27%), and (56.31%) per-cent reduction over control respectively and they were at par with each other. This was followed by Fipronil (T_5) which was recorded as least effective treatment within the insecticide treatments with (56.31%) per-cent population reduction over control. Monocrotophos was found to be most effective treatment with the following author's similarly finding have been reported by Amaugo and Emosairue (2003) [2] and also similarly finding another scientist by Shazzadul Islam *et al*. (2013) [6]. The yields among the treatment were significant. The highest yield was recorded in T_1, Monocrotophos (43.300 q/ha) followed by T_2, Chloropyriphos (42.800 q/ha), T_3, Flubendiamide (41.300 q/ha), T_4, Cartap hydrochloride (42.00 q/ha), T_5, Fipronil (39.300 q/ha), T_6, Imidacloprid (41.500 q/ha), T_7, Acephate (42.200 q/ha) as compared to control T_0, (27.000 q/ha). When cost benefit ratio was worked out, interesting result was achieved. Among the treatment studied, the best and most economical treatment was T_1, Monocrotophos (1:3.24), followed by T_2, Chloropyriphos (1:3.18), T_3, Flubendiamide (1:3.07), T_4, Cartap hydrochloride (1:2.93), T_5, Fipronil (1:2.66), T_6, Imidacloprid(1:2.88), T_7, Acephate(1:1.25) as compared to control T_0 (1:2.19). (Rath *et al*., 2015) [9] He reported that Monocrotophos found to be most effective in reducing the population of rice stem borer as well as increasing yield. This result supported by (Suresh *et al*., 2011) and (Rath *et al*., 2015) [9]. The yields among the treatment were significant. The highest yield and benefit cost ratio was recorded in T_1, Monocrotophos (43.300 q/ha and 1:3.24 respectively) supported by Amaugo and Emosairue (2003) [2], They suggested that Monocrotophos is a valuable chemical in the management of *Scirpophaga incertulas.*

Next most effective treatment was T_2, Chloropyriphos (42.800 q/ha and 1:3.18 respectively), this was supported by Amaugo and Emosairue (2003) [2].

Table 1: Seasonal incidence of rice stem borer during *Kharif* season, 2015

		Temperature		Humidity				
Weeks	**Stem borer of rice**	**Max ºC**	**Min ºC**	**Max**	**Min**	**Rain fall**	**Wind Velocity (km/hr)**	**Sun-shine (hr/day)**
31	0.00	35.97	27.74	92.45	53.42	5.00	1.33	5.34
32	0.00	34.22	27.42	92.35	52.36	0.00	1.25	5.12
33	0.00	33.12	27.55	92.45	55.25	0.00	1.24	4.52
34	0.89	33..22	27.00	92.85	58.28	12.48	1.28	4.80
35	2.75	35.45	27.42	90.71	54.85	11.85	2.22	5.74
36	4.52	36.42	27.20	89.71	45.42	0.00	2.55	7.97
37	7.28	37.48	27.37	86.71	47.14	0.00	1.68	8.70
38	8.11	35.65	28.05	86.28	55.71	0.60	2.17	7.11
39	8.62	36.42	27.80	90.71	47.14	0.20	1.71	7.17
40	8.92	36.11	27.80	89.00	50.14	0.00	1.84	8.45
41	5.78	35.77	27.82	90.00	51.57	0.00	1.56	8.68
42	2.25	35.85	23.88	78.28	51.40	0.00	1.35	8.57
43	0.0	36.00	20.57	93.00	50.71	0.00	0.96	8.65
44	0.0	35.25	19.71	91.57	29.71	0.64	0.71	6.65
45	0.0	33.57	20.08	90.71	57.00	0.00	0.51	8.30
46	0.0	32.22	20.18	89.42	52.21	0.18	0.48	8.54
r =		.572	-0.186	-0.355	-0.536	-0.515	-0.391	0.860
t =		2.698	-0.732	-1.471	-2.461	-2.325	-1.643	6.532
		S	NS	NS	S	S	NS	S

Table 2: Pooled mean Infestation per-cent reduction of rice stem borer per hill (1st & 2nd spray)

S. NO	**Treatment**	**Reduction per-cent of rice stem borer per hill**		
		1st spray	**2nd spray**	**Pooled mean**
T_1	Monocrotophos	61.17	79.79	70.48
T_2	Chloropyriphos	55.38	77.60	66.49
T_3	Flubendiamide	53.12	71.89	62.50
T_4	Cartap hydrochloride	50.08	72.65	61.36
T_5	Fipronil	43.59	69.03	56.31
T_6	Imidacloprid	47.02	71.53	59.27
T_7	Acephate	49.33	74.77	62.05
F test		S	S	S
CD (5%)		4.10	1.5	14.04
S.Ed.		1.91	0.74	5.94
CV %		5.20	1.40	10.84

References

1. Adiroubane D, Raja K. Influence of weather parameters on the occurrence of rice yellow stem borer, *Scirpophaga incertulus* (walker). Journal of rice research. 2005; 17(3):44-51.
2. Amaugo GO, Emosairue SO. The efficacy of some indigenous medicinal plant extracts for the control of upland rice stem borers in Nigeria, Tropical and subtropical agro ecosystems. 2003; 23(2):121-127.
3. Anonymous. Progress Report, Entomology and Plant Pathology, All India Co-ordinated Rice Improvement Programme (ICAR), Hyderabad. 2006; 55(2):66-88.
4. Dhaliwal GS, Arora R, Dhawan AK. Indian J Ecol. 2004; 34(1):1-7.
5. Dhaliwal GS, Jindal V, Dhawan AK. Insect pest problems and crop, Losses. Changing trends. Indian J Ecol. 2010; 25(2):1-7.
6. Islam MS, Shimul D. Evaluation of different insecticides and botanical extracts against yellow stem borer *Scirpophaga incertulas* in rice field. International journal of biosciences. 2013; 3(10):117-125.
7. Kakde Am, pate KG. Seasonal incidence of rice yellow stem borer (*Scirpophaga incertulas* wlk.) In relation to conventional and Sri Methods of planting and its correlation with weather parameters. Journal of agriculture and veterinary science. 2014; 7(6):05-10.
8. Muralidharan K, Pasalu IC, IC. Assessments of crop losses in rice ecosystems due to stem borer damage (Lepidoptera: Pyralidae). Crop Prot. 2006; 25(2):409-417.
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):133-234.
10. Suresh D, Kulagod G, Nayak V, Vastrad AS, Hugar PS. Basavanagoud K. Evaluation of insecticides and bio-rationals against yellow stem borer and leaf folder on rice crop. Karnataka j Agric. Sci. 2011; 24(2):244-246.