ZIBELINE INTERNATIONAL PUBLISHING

ISSN: 2521-5051 (Print)
ISSN: 2521-506X (Online)
CODEN: ASMCCQ

Acta Scientifica Malaysia (ASM)

DOI: http://doi.org/10.26480/asm.02.2020.82.87

CrossMark

RESEARCH ARTICLE

EXTENT OF DAMAGE OF RICE BUG (*Leptocorisa Acuta*) AND ITS CONTROL WITH INSECTICIDES

Ummey Salma Akter[a], Khandakar Shariful Islam[a], Mahbuba Jahan[a], Md. Sohanur Rahman[b*], Fakhar Uddin Talukder[b], Md. Arefin Hasan[c]

[a]*Department of Entomology, Bangladesh Agricultural University, Mymensingh, Bangladesh*
[b]*Pest Management Division, Bangladesh Jute Research Institute, Dhaka, Bangladesh*
[c]*Department of Agricultural Extension, Dhaka, Bangladesh*
[*]*Corresponding Author Email: sohanbau2010@gmail.com*

ARTICLE DETAILS

Article History:

Received 18 August 2020
Accepted 20 September 2020
Available online 30 September 2020

ABSTRACT

The rice bug, *Leptocorisa acuta* is one of the major and destructive pests of rice. The experiments were conducted to study on the extent of damage of rice bug, *Leptocorisa acuta* and to determine the efficacy of five insecticides. The experiments were laid out in a Randomized Complete Block Design (RCBD) with three replications of each treatment. From the study it was found that the infestation rate was in linear progress and the hill infestation was 5.42 to 13.75%, panicle infestation was 27.27 to 54.55%, grain infestation was 4.70 to 7.58% and partial grain infestation was 1.82 to 2.58% respectively. After using different treatments, it was found that the maximum percent of infestation was observed in control and minimum was in Malathion 57 EC treated plot. The maximum no. of grain per panicle was observed in case of Malathion 57 EC (206.4), whereas the minimum was observed in Control (172.6) plot. Malathion and Neem oil showed similar effect when yield was compared while the minimum yield was observed in control treatment. The efficacy of insecticides was ranked as Malathion 57 EC > Azadiractin 2% > Chlorpyrifos 20 EC > Voliam flexi 300 SC > Imidacloprid 17.8 SL. The efficacy of all insecticides on the infestation of rice at different time intervals indicate that all the toxicity of all the products decreases with the progress of time after application. It can be recommended that Malathion 57 EC was most effective chemical in controlling rice bug.

KEYWORDS

rice bug, hill infestation, panicle infestation, grain infestation, neem oil, insecticides, rice.

1. INTRODUCTION

Bangladesh is a predominantly an agricultural country and about 90% of its population live on agriculture. Rice and wheat are the most important cereal crops of Bangladesh. Rice is the staple diet for more than two billion people in Asia and for a few hundreds of millions in Africa and America (IRRI, 1985., Pillaiyar, 1988). Almost 90% of the world's rice is grown and consumed in Asia, where 60% of the earth's people live. It is used as a food for more than two billion people in developing countries of Asia (FAO, 1995; Khush and Brar, 2002). Rice is the staple food of about 135 million people of Bangladesh. About 90% population of Bangladesh depends on rice for their food intake (Anonymous, 1981). It provides about 71% of the total calories and 51% of the protein in a typical diet of Bangladesh (BBS, 1998). Among the leading rice growing countries of the world, Bangladesh ranks fourth in both area and production (Das, 2005). Demand for rice is rapidly increasing with the increase of population and thus rice demand in Bangladesh is the highest among the least developed countries (Virmani et al., 1997). Due to the increasing population growth rate in our country, it is needed to increase yield per acre to fulfill the food requirements. Thus, proper pest control is necessary to obtain a sustainable increase in rice production.

Rice is mainly a crop of warm and humid climate, which is conducive to the survival and rapid proliferation of different kinds of insects. It is an ideal host for over 800 species of insects (Barr and Smith, 1975). More than 100 species of insects are persistent to rice in tropical Asia. Among them, only about 20 species are of major importance and of regular occurrence (Grist and Lever, 1969; Pathak, 1968). Almost all parts of the rice plants are vulnerable to insects feeding from the time of sowing till harvest.

In Bangladesh, rice covers almost 80% of the total cultivable area and 175 species of insect pests of rice have been identified so far (Karim, 1986). Among these pest species, several of them were considered as minor pests which have recently become major pests (Pathak and Pawar, 1982). Major insect pests cause about 13% yield losses to Boro, 24% to Aus and 28% to Aman crops (BRRI, 1985). The estimated annual loss of rice in Bangladesh due to insect pest and diseases amounts to 1.5 to 2.0 million tons (Siddique, 1992). Insecticides used in the paddy fields globally accounting for nearly 15% of the total pesticides used for crop production (Agnihotri, 2000). Among the insect pests of rice, rice bug is considered as the major pest of rice.

Rice bug, *Leptocorisa acuta* is a major pest of rice and found to cause damage in almost all the rice growing seasons (Ahmad, 1965; Akbar, 1958; Israel, 1961; Misra, 1968; Pathak, 1968). It is commonly known as 'gundhi bug' since the adult bugs emit an unpleasant odor when disturbed. Both nymph and adult suck the milk of juice from the developing grain in the

Quick Response Code	Access this article online	
	Website: www.actascientificamalaysia.com	**DOI:** 10.26480/asm.02.2020.82.87

Cite the Article: Ummey Salma Akter, Khandakar Shariful Islam, Mahbuba Jahan, Md. Sohanur Rahman, Fakhar Uddin Talukder, Md. Arefin Hasan (2020). Extent Of Damage Of Rice Bug (*Leptocorisa Acuta*) And Its Control With Insecticides. *Acta Scientifica Malaysia, 4(2): 82-87.*

milky stage of the plant. The attacked grains become shriveled of malformed and remain unfilled and the result is Chita. As a result yields reductions occur severely. The loss of crop yield generally varies from 5 to 30% but may be up to 44% in some susceptible rice varieties (Nair, 1995; Rai et al., 1990). Apart from rice, it is also reported to be feeding on maize, millets, sugarcane and some grasses (Atwal and Dhaliwal, 2002).

Some *Leptocorisa* species are destructive and cause significant damage to rice throughout their range. Their feeding activity can result in partially filled or empty grains. The loss of crop yield generally varies from 5 to 30% but up to 44% damage has been reported in some rice varieties (Nair, 1995; Rai *et al*., 1990). In Sri Lanka, yield loss of rice due to *Leptocorisa* spp. could be as high as 5-60 % (Nugaliyadda and Dissanayake, 2000). In the Philippines, up to 70% of the season's crop could be lost due to *L. acuta* attack. Based on observations of probed spikelets in the field, Rothschild (1970) estimated that a field population of 25 adult's m^{-2} would cause 25% grain yield loss in a traditional rice variety.

Rothschild (1970) reported that weight loss of attacked spikelets was 40-60%. Rice bug is one of the major insect pest of rice in Assam. It has been reported to cause damage to as many as 90 per cent of rice grains and make them remain unfilled in Pupae, New Guinea (Sands, 1977). The bug infestation varies from 10 to 30 per cent grains in panicles in Assam. In non flooded field, the bug becomes most destructive and may cause100 per cent loss to the rice crop in some occasions in Indonesia (Dresner, 1955). Currently, this species occurs throughout the Asia up to New Guinea and northern Australia. Apart from rice, it is also reported to be feeding on maize, millets, sugarcane and some grasses (Atwal and Dhaliwal, 2002). Nymphs and adults feed on developing grains resulting in partially or entirely empty grains and account for a yield reduction ranging from 10% (Pathak, 1968) to total crop failure depending on the degree of infestation. EHB induced loss may range up to 25-35 percent (Banerjee et al., 1982). Verma et al., (1979) from Uttar Pradesh, India have reported that the extent of loss may extend up to 70 percent.

Chemical control will continue to be an important component of an integrated control strategy when judiciously used, especially for crops such as rice and high value crops. Chemical control becomes a necessity if a significant number of nymphs and adults are present in the rice field, with timely insecticide application being targeted at these stages of pest management.

Insecticides available for control of rice bugs are carbaryl (Sevin XLR), methyl para thion, encapsulated methyl parathion (Penncap-M), Lambda-cyhalothrin (Karate Z), zeta-cypermethrin (Mustang Max) and gamma-cyhalothrin (Prolex, Proaxis). Applications should be made in the morning (8 to 11 a.m.) or late evening (7 to 9 p.m.) in 5 to 10 gallons of water to get the best results. When applied parathion will give a high and rapid kill with very little residual activity. Penncap-M (encapsulated methyl parathion) has good initial kill and provides 2 to 3 days of residual activity. Sevin will have some initial kill with 3 to 5 days of residual activity. The synthetic pyrethroid insecticides (Karate Z, Mustang Max, Prolex and Proaxis) have good initial kill and 1 to 2 days of residual activity. When high bug densities are within the field, treatment of field borders using a quick kill insecticide should be considered.

Excessive and indiscriminate use of insecticides not only affects the pest but also becomes a major source of human health hazard, environmental pollution, development of insecticide resistance causing pest resurgence, fish toxicity and deleterious on predators, parasitoids, pathogens and pollinators (Guan-Soon, 1990; Debach and Rosen, 1991 and Phillips et al., 1990). The amount of damage by rice bug in Bangladesh is yet not available as literature. Therefore, this research work is aimed at recording the level of damage and to develop a suitable chemical control measure of rice bug.

2. Objectives

The experiment was conducted with the following objectives-

i. To know the extent of damage of rice bug.
ii. To determine the efficacy of insecticides in controlling rice bug.

3. Materials and Methods

3.1 Description of the Field Experiment

The experiments were carried out in Boro rice in the Entomology Field Laboratory, Bangladesh Agricultural University.The period of the study was from January to June 2014. The soil of the experimental area was under Brahmaputra alluvial tract with sandy loam texture having good irrigation and drainage facilities. The experimental area was under the subtropical climate which is characterized by high temperature, high humidity and heavy precipition with occasional gusty winds in kharif season. The experiment was conducted with the rice variety of BINA dhan5. The experiments were laid out in a Randomized Complete Block Design (RCBD) with three replications of each treatment. Each replication represented a block. Each block was divided into 6 unit plots. The total number of treatments was 6. The total number of the unit plots was 18. The unit plot size was 2m × 2.5m ($5m^2$), where plot-plot distances was 0.5m, and block-block distance was 1m. Plots were allocated randomly and they were separated in such a way so that impact of treatments can be quantified. Treatments were as T_1= Malathion 57 EC, T_2= Chlorpyrifos 20 EC, T_3= Imidacloprid 17.8 SL, T_4= Volume flexi 300 SC, T_5= Azadiractin (Neem oil 2%) and T_6= Control.

Seeds of the tested variety were collected from the Agronomy Seed Store and those were dipped in bucket for 24 hours. The seeds were then taken out of water and kept thickly in gunny bags. After 72 hours the seeds were sown. Seedling nursery was prepared puddling the soil. Sprouted seeds were sown in the wet nursery bed. Irrigation and other facilities were given in the seed bed as and when necessary. The land was ploughed with a power tiller and leveled with the ladder. The field layout was done according to the design immediately after land preparation. The phosphate, potassium and gypsum fertilizers were applied in the experimental plots at the rate of 100, 70 and 30 kg/ha, respectively in the form of the Triple super phosphate, Muriate of potash and Sulphate respectively. Urea, as a source of nitrogen was applied as per experimental specification. The entire amount of TSP, MP and Gypsum were broadcast and incorporated into the soil at final land preparation. Urea at the rate of 135 kg/ha were applied as experimental specification as top dressing in three installments at 15, 30 and 50 days after transplanting (DAT). Seedlings were transplanted in the experimental plots at the rate of 3-4 seedlings per hill. The plant spacing was followed viz. 25 cm x 15 cm. Except for insecticidal application, all the other agronomic practices were common to the six treatments and followed as per recommended package of practices. Intercultural operations were maintained properly. No chemical pesticides were used allowing the pest to multiply and cause damage in pesticide free rice field.

For the present study, five insecticides namely Malathion 57 EC, Voliam flexi 300 SC, Imidachloropid 17.8 SL, Chloropyriphos 20 EC, Azadiractin 2% were bought from locally available pesticide dealer. The treatments comprised of synthetic insecticides were tested at the doses of Malathion 57 EC-450 ml/acre, Chlorpyrifos 20 EC-400 ml/acre, Imidacloprid 17.8 SL-14g/acre, Voliam flexi 300 SC-100ml/acre, Azadiractin-2ml/L respectively and untreated control. Insecticide treatments were started on March 08, 2014 (spray 1) when both nymph and adult suck the milk of juice from the developing grain in the milky stage of the plant. Insecticides were applied with a knapsack hand pressurized sprayer. Spraying was done at 4.30 p.m. to avoid bright sun and drift caused by strong wind.

3.2 Procedure of data collection

3.2.1 Panicle infestation

Number of infested panicle per hill was recorded. Then the number total panicle (infested and uninfested) was recorded. There were average 22 panicles per hill. Percentage infested panicle was counted from following formula:

$$\% \text{ of infested panicle} = \frac{\text{total no. of infested panicle}}{\text{total no. of panicle (infested+uninfested)}} \times 100$$

3.2.2 Hill infestation

Number of infested hill per plot was recorded. Then the number of total hill (infested and uninfested) was recorded. There were 80 hills per plot. Percentage infested hill was counted from following formula:

$$\% \text{ of infested hill} = \frac{\text{total no. of infested hill}}{\text{total no. of hill (infested+uninfested)}} \times 100$$

3.2.3 Grain infestation

Number of infested grain per plot was recorded. Then the number of total grain (infested and uninfested) was recorded. There were 220 grains per panicle. Percentage infested grain was counted from following formula:

$$\% \text{ of infested grain} = \frac{\text{total no. of infested grain}}{\text{total no. of grain (infested+uninfested)}} \times 100$$

3.2.4 Partial grain infestation

Number of partial infested grain per plot was recorded. Then the number of total grain (infested and uninfested) was recorded. There were 220 grains per panicle. Percentage of partial infested grain was counted from following formula:

$$\text{\% of partial infested grain} = \frac{\text{total no. of partial infested grain}}{\text{total no. of grain (infested+uninfested)}} \times 100$$

3.3 Measurement of efficacy of five insecticides

The efficacy of five insecticides viz. Malathion 57 EC, Voliam flexi 300 SC, Imidachloropid 17.8 SL, Chloropyriphos 20 EC, Azadiractin 2%, each having single dose along with control was tested against rice bug, *Leptocorisa acuta* on standing rice plant at the place of Bangladesh Agricultural University Campus, Mymensingh. The trial was conducted in a Randomized Complete Block Design and was replicated 3 times. Each insecticide was tested at the doses of Malathion 57 EC-450 ml/acre, Chlorpyrifos 20 EC-400 ml/acre, Imidacloprid 17.8 SL-14g/acre, Voliam flexi 300 SC-100ml/acre and Azadiractin-2ml/L respectively and efficacy doses on rice bug was compared. Pretreatment data were recorded one day before application of insecticides. For recording the data 10 hills and 25 panicles were randomly selected from the plot for respective insecticides treatment and 10 hills and 25 panicles were observed from each plot. Data of damage symptoms like hill infestation, panicle infestation, grain infestation etc. were recorded after 7, 14, 21 days after spraying of insecticides. Yield of treated plots were recorded and compared for their difference.

The recorded data were compiled and tabulated for statistical analysis. Analysis of variance was done with the help of computer package MSTAT. The mean differences among the treatments were analyzed as per test with Duncan's Multiple Range Test (DMRT) and Least Significance Difference (LSD) when necessary (Gomez and Gomez, 1984).

3. Results and Discussion

3.1 Extent of Damage

3.1.1 Extent of damage of hill infestation at different time intervals

The total numbers of healthy and infested hill were recorded randomly at different day's interval after first incidence. Collected data were converted into percent hill infestation per plot. Percent of hill damaged by *Leptocorisa acuta* in rice plants showed linear progress with increasing time interval (Fig. 1). The hill damage increased gradually and the percent of hill damaged range from 5.42 to 13.75%. The lowest percent of hill damage was (5.42%) at 7 days after first incidence and highest percent of hill damage was (13.75%) at 21 days after first infestation which was 2.54 times more than that of 7 days after first incidence. Rothschild (1970) reported that weight loss of attacked spikelets was 40-60%.

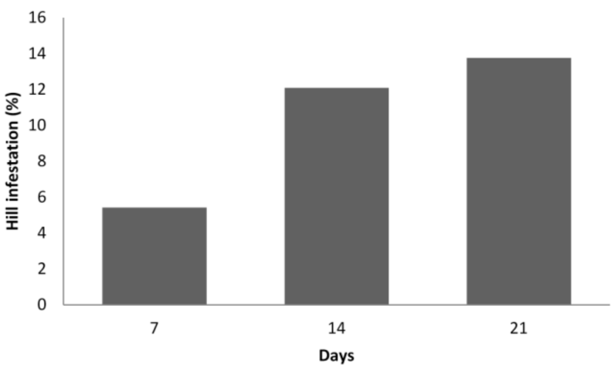

Figure 1: Percentage of hill infestation at different time intervals after initial infestation

3.1.2 Extent of damage of panicle infestation at different time intervals

The total numbers of healthy and infested panicles were recorded randomly at different day's interval after first incidence. Collected data were converted into percent panicle infestation per plot. Percent of panicle damaged by *Leptocorisa acuta* in rice plants showed linear progress with increasing time interval (Fig. 2). The panicle damage increased gradually and the percent of panicle damaged range from 27.27 to 54.55%.

The lowest percent of panicle damage was (27.27%) at 7 days after first incidence and highest percent of panicle damage was (54.55%) at 21 days after first infestation which was 2.00 times more than that of 7 days after first incidence. The bug infestation varies from 10 to 30 per cent grains in panicles in Assam. In non flooded field, the bug becomes most destructive and may cause100 per cent loss to the rice crop in some occasions in Indonesia (Dresner, 1955). Verma *et al.*, (1979) from Uttar Pradesh, India have reported that the extent of loss may extend up to 70 percent.

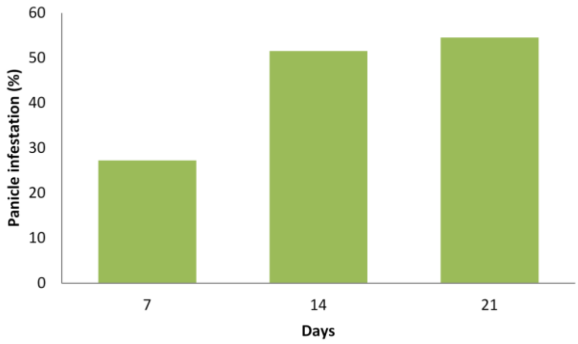

Figure 2: Percentage of panicle infestation at different time intervals after initial infestation

3.1.3 Extent of damage of grain infestation at different time intervals

The total numbers of healthy and damaged grains were recorded randomly at different day's interval after first incidence. Collected data were converted into percent damage grain per plot. Percent of damaged grain by *Leptocorisa acuta* in rice plants showed linear progress with increasing time interval (Fig. 3). The grain damage increased gradually and the percent of grain damaged range from 4.70 to 7.58%.

The lowest percent of grain damage was (4.70%) at 7 days after first incidence and highest percent of grain damage was (7.58%) at 21 days after first infestation which was 1.61 times more than that of 7 days after first incidence. It has been reported to cause damage to as many as 90 per cent of rice grains and make them remain unfilled in Pupae, New Guinea (Sands, 1977). Pathak, (1968) reported that 10% yield reduction occurs depending on the degree of infestation. The loss of crop yield generally varies from 5 to 30% but up to 44% damage has been reported in some rice varieties (Nair, 1995; Rai *et al.*, 1990).

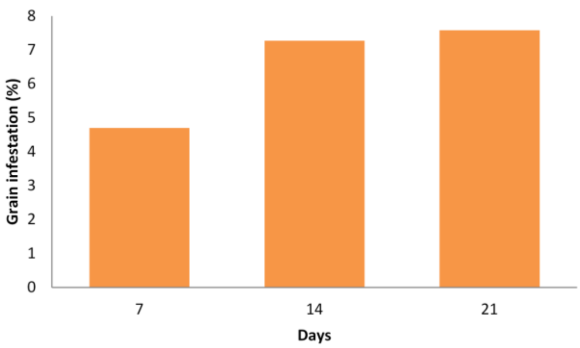

Figure 3: Percentage of grain infestation at different time intervals after initial infestation

3.1.4 Extent of damage of grain (partial damage) infestation at different time intervals

The total numbers of healthy and partial damaged grains were recorded randomly at different day's interval after first incidence. Collected data were converted into percent partial damage grain per plot. Percent of partial damaged grain by *Leptocorisa acuta* in rice plants showed linear progress with increasing time interval (Fig. 4). The partial damage grain increased gradually and the percent of partial damaged grain range from 1.82 to 2.58%.

The lowest percent of partial damage grain was (1.82%) at 7 days after first incidence and highest percent of partial damage grain was (2.58%) at 21 days after first infestation which was 1.42 times more than that of 7 days after first incidence. Yield loss of rice due to *Leptocorisa* spp. could be as high as 5-60 % (Nugaliyadda and Dissanayake, 2000).

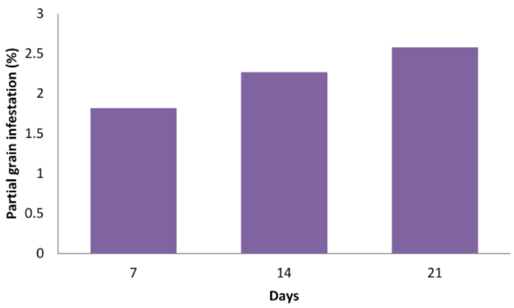

Figure 4: Percentage of grain infestation (partial) at different time intervals after initial infestation

3.2 Effects of Five Insecticides on Rice Bug, Leptocorisa acuta

3.2.1 Efficacy of different insecticides on the hill infestation at different time intervals

The number of total and infested hills per plot was counted at 7, 14 and 21 days after spraying. The percent of hill infestation was significantly influenced by the application of insecticides after 7, 14 and 21 days after spraying (Fig. 5). At 7 DAS, the maximum percent of hill infestation was observed in control (5.42%) and minimum percent of hill was observed in Malathion 57 EC (2.50%). At 14 DAS, the maximum percent of hill infestation was observed in control (12.08%) and minimum percent of hill was observed in Malathion 57 EC (2.50%). At 21 DAS, the maximum percent of hill infestation was observed in control (13.75%) and minimum percent of hill was observed in Malathion 57 EC (2.50%). This result is supported by Pio & Tuan, (2014) who reported that Malathion 57 EC is most suitable to control rice bug.

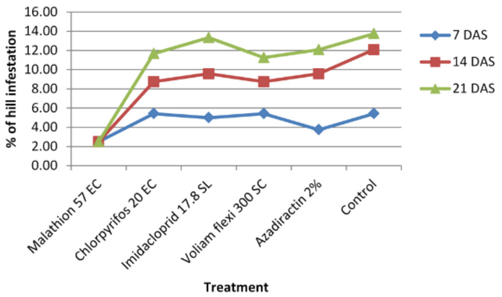

Figure 5: Effect of insecticides on % of hill infestation of rice bug at different days after spraying

3.2.2 Efficacy of different insecticides on the panicle infestation at different time intervals

The number of total and infested panicles per plot was counted at 7, 14 and 21 days after spraying. The percent of panicle infestation was significantly influenced by the application of insecticides after 7, 14 and 21 days after spraying (Fig. 6). At 7 DAS, the maximum percent of panicle infestation was observed in control (27.27%) and minimum percent of panicle was observed in Malathion 57 EC (15.15%). At 14 DAS, the maximum percent of panicle infestation was observed in control (51.52%) and minimum percent of panicle was observed in Malathion 57 EC (15.15%). At 21 DAS, the maximum percent of panicle infestation was observed in control (54.55%) and minimum percent of panicle was observed in Malathion 57 EC (15.15%).

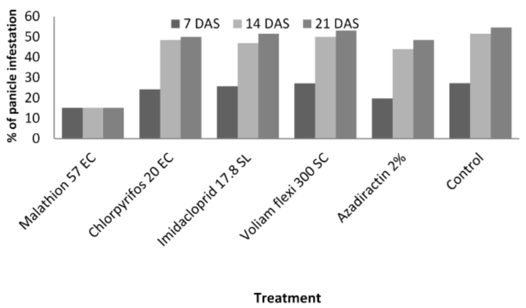

Figure 6: Effect of insecticides on % of panicle infestation of rice bug at different days after spraying

3.2.3 Efficacy of different insecticides on the grain infestation at different time intervals

The number of total and infested grains per plot was counted at 7, 14 and 21 days after spraying. The percent of grain infestation was significantly influenced by the application of insecticides after 7, 14 and 21 days after spraying (Table 1). At 7 DAS, the maximum percent of grain infestation was observed in control (4.70%) and minimum percent of grain was observed in Malathion 57 EC (2.88%). At 14 DAS, the maximum percent of grain infestation was observed in control (7.27%) and minimum percent of grain was observed in Malathion 57 EC (2.88%). At 21 DAS, the maximum percent of grain infestation was observed in control (7.58%) and minimum percent of grain was observed in Malathion 57 EC (2.88%). This result is supported by Pio & Tuan, (2014) who reported that Malathion 57 EC is most suitable to control rice bug.

Table 1: Effect of insecticides on % of grain infestation of rice bug at different days after spraying

Treatments	Percent of grain infestation at different time intervals		
	7 DAS	14 DAS	21 DAS
Malathion 57 EC	2.88 c	2.88 d	2.88 d
Chlorpyrifos 20 EC,	4.24 ab	6.51 ab	7.27 a
Imidacloprid 17.8 SL	4.09 b	6.66 ab	7.12 ab
Voliam flexi 300 SC	4.09 b	5.61bc	6.36bc
Azadiractin 2%	4.55 ab	5.15 c	5.76 c
Control	4.70 a	7.27 a	7.58a
LSD	**	**	**

Means in a column followed by same letter(s) are not significantly different.

** indicates significance at 1% level; DAS = Days after Spraying.

3.2.4 Efficacy of different insecticides on the damaged grain (partial damage) a different time intervals

The number of total and partial damaged grains per plot was counted at 7, 14 and 21 days after spraying. The percent of partial grain infestation was significantly influenced by the application of insecticides after 7, 14 and 21 days after spraying (Table 2). At 7 DAS, the maximum percent of partial grain infestation was observed in control (1.82%) and minimum percent of grain was observed in Malathion 57 EC (0.61%). At 14 DAS, the maximum percent partial of grain infestation was observed in control (2.27%) and minimum percent of grain was observed in Malathion 57 EC (0.61%). At 21 DAS, the maximum percent of partial grain infestation was observed in control (2.58%) and minimum percent of grain was observed in Malathion 57 EC (0.61%).

Pio & Tuan, (2014) showed that Malathion 57 EC is most effective to control rice bug.

Table 2: Effect of insecticides on % of partial grain infestation of rice bug at different days after spraying

Treatments	Percent of partial grain infestation at different time intervals		
	7 DAS	14 DAS	21 DAS
Malathion 57 EC	0.61 e	0.61 d	0.61 c
Chlorpyrifos 20 EC,	1.52bc	1.97abc	2.12 b
Imidacloprid 17.8 SL	1.67 ab	2.12 ab	2.58 a
Voliam flexi 300 SC	1.36 c	1.82bc	2.27 ab
Azadiractin 2%	1.06 d	1.67 c	2.12 b
Control	1.82 a	2.27 a	2.58 a
LSD	**	**	**

Means in a column followed by same letter(s) are not significantly different.

** indicates significance at 1% level; DAS = Days After Spraying.

3.2.5 Effect of insecticides on number of grain per panicle

The number of grain per panicle was significantly influenced by the application of insecticides (Table 3) when the average grain per panicle of an uninfested panicle was 220. The maximum no. of grain per panicle was observed in case of Malathion 57 EC (206.4), whereas the minimum was observed in case of Control (172.6).

Cite the Article: Ummey Salma Akter, Khandakar Shariful Islam, Mahbuba Jahan, Md. Sohanur Rahman, Fakhar Uddin Talukder, Md. Arefin Hasan (2020). Extent Of Damage Of Rice Bug (*Leptocorisa Acuta*) And Its Control With Insecticides. *Acta Scientifica Malaysia, 4(2): 82-87.*

Table 3: Effect of insecticides on number of grain per panicle	
Treatments	No. of grain per panicle
Malathion 57 EC	206.4 a
Voliam flexi 300 SC	189.7 bc
Imidacloprid 17.8 SL	184.0 cd
Chlorpyriphos 20 EC	191.3 bc
Azadiractin 2%	196.7 ab
Control	172.6 d
LSD	**

Means in column followed by same letter(s) are not significantly different.

** indicates significance at 1% level.

3.2.6 Effect of insecticides on yields by reducing the pest population

Effect on yields also observed at the end of the experiment, by reducing test insect as rice bug, *L. acuta* of rice by the application of insecticides. The analysis showed significant variation among the yield due to various treatments. Among the treatments Malathion 57 EC showed the best result (2.67 kg) which was statistically similar with Neem oil (2.40 kg) (Table 4). The minimum yield was observed at control (1.67 kg). The maximum Chita dhan was observed at control (59.33 g) and the minimum Chita dhan was observed at Malathion 57 EC (46.67 g) (Table 4).

Table 4: Effects on yield of different treatments by reducing the rice bug population		
Treatments	Yield (kg)	Chita dhan (g)
Malathion 57 EC	2.67 a	46.67 c
Voliam flexi 300 SC	1.90 c	55.00 b
Imidacloprid 17.8 SL	1.77 c	53.33 b
Chlorpyriphos 20 EC	2.00bc	49.00 c
Azadiractin 2%	2.40 ab	48.33 c
Control	1.67 c	59.33 a
Level of significance	**	**

Means in column followed by same letter(s) are not significantly different.
** indicates significance at 1% level.

3.3 Relationship between yield and extent of damage of rice bug

Correlation and Regression analysis was worked to know the relationship among the yield and extent of damage of rice bug.

3.3.1 Relationship between yield and infested hill at different Days after Transplanting in Boro season

The relationship between yield and infested hill was analyzed. The result showed strongly correlated (Fig. 7) between the yield and infested hill (r= 0.918**, y= -0.3485x+3.5193) but they are negatively correlated i.e. increase of one unit of infested hill decrease the yield by one unit.

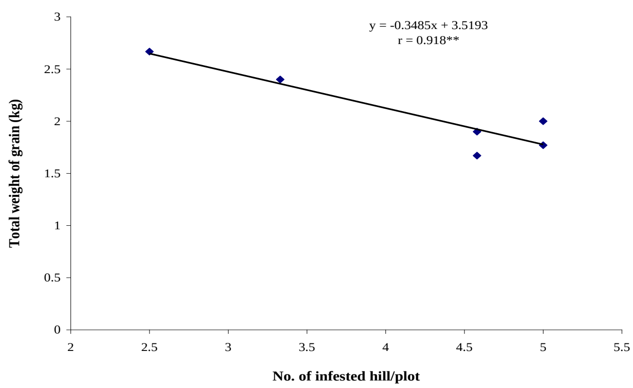

Figure 7: Relationship between yield and infested hill by rice bug

3.3.2 Relationship between yield and infested panicle at different Days After Transplanting in Boro season

The relationship between yield and infested panicle was analyzed. The result showed strongly correlated (Fig. 8) between the yield and infested panicle (r= 0.784, y= -0.0626 x+3.4265) but they are negatively correlated i.e. increase of one unit of infested panicle decrease the yield by one unit.

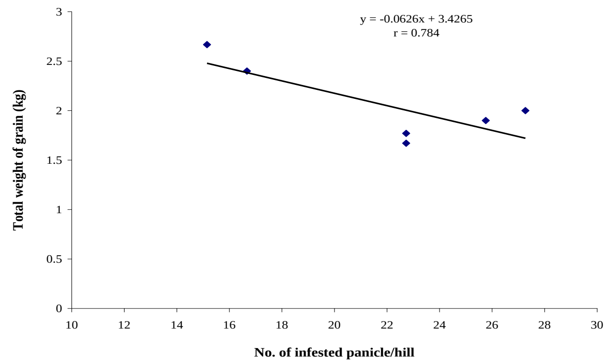

Figure 8: Relationship between yield and infested panicle by rice bug

3.3.3 Relationship between yield and damaged grain at different Days After Transplanting in Boro season

The relationship between yield and damaged grain was analyzed. The result showed strongly correlated (Fig. 9) between the yield and damaged grain (r= 0.908*, y= -0.5062 x+3.8967) but they are negatively correlated i.e. increase of one unit of damaged grain decrease the yield by one unit.

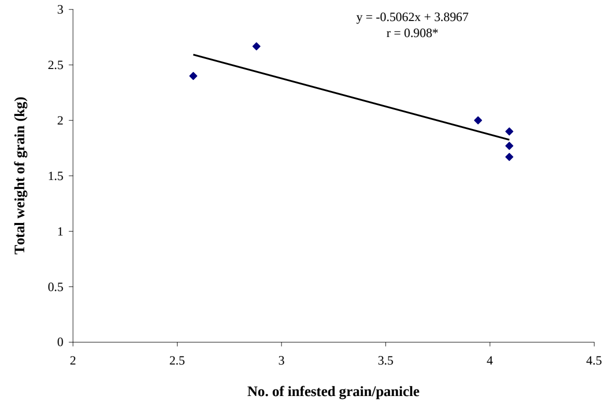

Figure 9: Relationship between yield and damaged grain by rice bug

4. Summary and Conclusion

The rice bug, *Leptocorisa acuta* is one of the major and destructive pests of rice. It was found that the hill infestation, panicle infestation, grain infestation and partial grain infestation were 5.42 to 13.75%, 27.27 to 54.55%, 4.70 to 7.58% and 1.82 to 2.58% respectively. This infestation showed linear progress with increasing time interval.

In order to control this pest and to determine the efficacy of insecticides, it was found that the maximum percent of infestation was observed in control and minimum percent of infestation was observed in Malathion 57 EC. It was evident that the percent reduction of *L. acuta* infestation differed significantly with the application of insecticides. The maximum no. of grain per panicle was observed in case of Malathion 57 EC (206.4), whereas the minimum was observed in case of Control (172.6). Efficacy of the insecticides was high after first application but it reduced gradually in course of time.

Effect on yields also observed at the end of the experiment, reducing the test insect rice bug by the application of insecticides. The analysis showed significant level of variation in yield. Among the treatments Malathion 57 EC showed the best result (2.67 kg) which was statistically similar with Neem oil (2.40 kg). The minimum yield was observed at control (1.67 kg).

From the present research findings it can be concluded that the maximum infestation was occurred in untreated plot and the minimum in Malathion treated plot. Among the different treatments Malathion, Azadiractin and Chlorpyrifos were found to be most effective for controlling *L. acuta.* Imidacloprid and Voliam flexi showed least efficacy than Malathion, Azadiractin and Chlorpyrifos. As rice bug is a pest of rice crop mainly in the reproductive stage of the plant, its infestation could lead to considerably higher amount of grain damage in just one week of panicle emergence. Therefore, the use of proper insecticide with less residual toxicity is of great importance. The experimental findings indicate that Malathion and Azadiractin are the promising of most effective insecticide against the pest rice bug.

ACKNOWLEDGEMENT

Authors are grateful to the Ministry of science and technology, Bangladesh for providing financial support to conduct the research work.

CONFLICT OF INTEREST

The authors have no conflict of interest to report.

REFERENCES

Agnihotri, N.P. 2000. Pesticide consumption in Agriculture in India update. Pestic. Res. J.12(1): 150-155.

Ahmad, I. 1965. The Leptocorisinae (Heteroptera, Alydidae) of the world. Bull. Br. Mus. Nat. Hist.Ent. Suppl. 5, 156.

Akbar, S.S. 1958. The morphology and life history of Leptocorisa varicornis Fabr. A pest of paddy crop in India. Publ. Aligarh Univ. (Zool. Ser.) Ind. Ins.Typ. 5, 1-50.

Anonymous, 1981. Principles and practices of rice production. John Wiley and Sons, Inc. New York. 49.

Atwal, A.S. and Dhaliwal, G.S. 2002. Agricultural pests of south Asia and their management. Kalyani Publishers, New Delhi.

Banerjee, P.K. and Chatterjee, P.B. 1982. Pests of hill rice in West Bangal, India. International Rice Research Newsletter. 7(4), 12-14.

Barr, B.A.C.S. and Smith, R.F. 1975. Crop loss to insects, diseases and other pests. USAID pest management and related environmental protection project. University of California, Berkley. 64.

BBS, 1998. Statistical Year Book of Bangladesh, Bangladesh Bureau of Statistics (BBS). Statistics Division, Ministry of Planning, Government of the People's Republic of Bangladesh. 270. https://doi.org/10.5176/2251-3426_thor17.30

Das, D.T. 2005. Rice in Bangladesh. BRRI, Gazipur, Dhaka. 5.

Debach, P. and Rosen, S. 1991. Biological control of natural enemies. Cambridge University Press. 13.

Dresner, E. 1955. Present Status of economic entomology in Indonesia. Food and Agricultural Organization. Plant Protection Bulletin. 4, 49-55.

FAO, Food and Agriculture Organization of the United Nations. 1995. FAO Quarterly Bulletin of Statistics. 8, 1-2.

Gomez, K.A. and Gomez, A.A. 1984. Statistical Procedures for Agricultural Research. Second edition. A Wiley Interscience Publications John Wiley and Sons, New York, Chichester, Torento, Singapore. 680.

Grist, D.H. and Lever, R.J.A.W. 1969. Pests of rice. Longmans Green and Company Ltd., London, Xit. 520.

Guan-Soon, L. 1990. Overview of vegetables IPM in Asia. 38(2), 73-78.

International Rice Research Institute (IRRI), (985. International Rice Research, 25 years partnerships. Loss Banos, Philippines. 5-10.

Israel, 1961. Incidence of rice Gandhi bug and steps for its control. Proc. Rice Res. Workers' Conference, Cuttack, India. 297-299.

Karim, A.N.M.R. 1986. Modern rice cultivation workshop. BRRI, Joydebpur. 125-160 pp.

Khush, G.S. and Brar, D.S. 2002. Biotechnology for breeding: Progress and potential impact. In Proceeding of the 20th Session of the International Rice Commission (23th-26th July, Bangkok, Thailand). Available from internet. http:/wwwfao.org/docrep/006/Y47E/y4751e04.

Misra, A.S. 1968. Bionomics of the rice Gandhi bug, Leptocorisa varicornis Fabr. (Hemiptera, Heteroptera: Coreidae). Allahabad Farming. 42 (2), 75-77.

Nair, M.R.G.K. 1995. Insects and mites of crops in India. I.C.A.R., New Delhi.

Nugaliyadda, L. and Dissanayake, N. 2000. Advance in pest and disease management of rice in Sri Lanka: a review. Annual Symposium of Department of Agriculture.

Pathak, M.D. 1968. Ecology of common insect pest of rice. Annual Review of Entomology. 13, 257-294. https://doi.org/10.1146/annurev.en.13.010168.001353

Pathak, M.D. and Pawar, A.D. 1982. Insect pests of rice. In Srivastava et al. (eds.). Agricultural Entomology. All India Scientific Writers Soc. New Delhi, India. 2, 438.

Phillips, J.R. Graues, J.P and Luttecl, R.G. 1990. Insecticides resistance management. Pak. J. Agri. Sci. 38, 3-4.

Pio P. Tuan, PhD. 2014. Management of Rice Bug, Leptocorisa oratorius (F.) (Hemiptera: Alydidae) Using White Muscardine Fungus Beauveria bassiana (Bals.) Vuill. In Upland Rice + Legume Cropping Systems. International Journal of Innovative Science, Engineering & Technology, 1(10).

Rai, A.B. Singh, J. and Rai, L. 1990. Evaluation of Gandhi bug, Leptocorisa varicornis (F.) damage in rice. International Symposium on Rice Research. Hyderabad, India.

Rothschild, G.H.L. 1970. Observations on the ecology of the rice –ear bug Leptocorisa oratorius (F.). (Hemiptera: alydidae) in Sarawak (Malaysian Borneo). Journal of Applied Ecology. 7, 147-167. https://doi.org/10.2307/2401616

Sands DPA. 1977. The biology and ecology of Leptocorisa (Hemiptera) in pupae New Guinea, Research Bulletin. 19, 104.

Siddique, A.K.M.T. 1992. An overview of the ETL of rice pest and IPM scope in the content of M.V. rice production. In Proc. of the workshop on experiences with modern rice cultivation in Bangladesh. BRRI, Gazipur. 33-45.

Verma, S.K. Pathak, P.K. Singh, B.N. and Lal, M.N. 1979. Leaf folder and rice Gandhi bug break in tarai and hill region of Uttar Pradesh, India. International Rice Research Notes. 4, 20.

Virmani, S.S. Viraktamath, B.C. Casal, C.L. Toledo, R.S. Lopez, M.T. and Manalo, J.O. 1997. Hybrid Rice Breeding Manual, IRRI, Philippines. 7-8.