# Effectiveness of Insecticides and Biopesticides against Gundhi Bug on Rice Crop in District Rewa (M. P.), India

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***Abstract-*** An ecofriendly alternative to chemical pesticides is biopesticides, which encompasses a broad array of microbial pesticides, biochemicals derived from micro-organisms and other natural sources, and processes involving the genetic incorporation of DNA into agricultural commodities that confer protection against pest damage.The field studies were carried out for effectiveness of insecticides and biopesticides against gundhi bug on rice in rewa region. Study of insect pest complex was done from 2006-07 to 2007- 08. The observations were made regarding the grain yield monocrotophos was the most efficient insecticide where as among biopescides wanis was the best.

***Index Terms***- Oryza sativa, Biopesticides, Insecticides, Gundhi bug, India

## I. INTRODUCTION

Rice is the most important staple food crop with more than half of the world's population relying on rice as the major daily source of calories and protein [1]. Asia accounts for about 90% of world's rice area and production. Among the rice growing countries, India has largest area under rice in the world (about 44.6 mha) i.e. 28% of the worlds area of production, and ranks second next to China. The share of India to the world's production is near about 22.1 percent. In Madhya Pradesh, the area under rice cultivation is 5144.6 million hectares with production of 5748.3 million tonnes with a productivity of 1-2 t /ha. [2]

Gundhi Bug (*Leptocorisa varicornis)* 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. [3]

Agriculture has had to face the destructive activities of numerous pests like fungi, weeds and insects from time immemorial, leading to radical decrease in yields. With the advent of chemical pesticides, this crisis was resolved to a great extent. But the over dependence on chemical pesticides and eventual uninhibited use of them has necessitated for alternatives mainly for environmental concerns. Degraded soils and groundwater pollution has resulted in nutritionally imbalanced and unproductive lands. Volatile pesticide residues also sometimes raise food safety concerns among domestic consumers and pose trade impediments for export crops. Therefore, an ecofriendly alternative is the need of the hour. Biopesticides or biological pesticides based on pathogenic microorganisms specific to a target pest offer an ecologically sound and effective solution to pest problems. They pose less threat to the environment and to human health. [4]

The present piece of work is attempt to compare the efficacy of chemical and biopesticides against Gundhi bug on rice field in rewa.

## II. MATERIALS AND METHODS

The present study was done in Kuthulia farm of Agriculture College of District Rewa. The study was conducted in the seasons of 2006-07 and 2007-08. During this time period average temperature was 30.4 $^0$C (maximum) and 15.61 $^0$C (minimum). During 2007 the monsoon was received on 16$^{th}$ June whereas in 2008 it was on 12$^{th}$ June. Rainfall was adequate in 2007 (669.5mm) in 41 rainy days but the year 2008 it was comparatively high ranging up to 672.6mm.

**Evaluation of insecticides against insect pests of rice :**

The field experiments were conducted to evaluate the insecticides against insect pests of rice in the years 2007 and 2008.

| **Treatments:** | **dose /g. or ml. of formulation/ha** |
|---|---|
| $T_1$ Chlorpyriphos | 10.0kg |
| $T_2$ Chlorpyriphos | 12.5kg |
| $T_3$ Carbofuran | 33.0kg |
| $T_4$ Deltamethrin | 150.0ml. |
| $T_5$ Monocrotophos | 1390.0 ml. |
| $T_6$ Untreated control | check |
| Design | RBD (Randomized Block Design) |

| | |
|---|---|
| Replication | 3 |
| Plot size | 5x2 |
| Spray | 02 |
| Fertilizer | NPK 60:40:30 Kg /ha |
| Variety | Pusabasmati |

I[st] Spraying of the insecticides was carried out when insect pest incidence was and II[nd] spray observes was done 10days of I[st] Spray.

**Evaluation of biopesticides against insect pests of rice :**

| **Treatment :** | **Dose** |
|---|---|
| $T_1$ Achook | 5 ml. |
| $T_2$ Neem Azal | 3 ml. |
| $T_3$ Neem Gold | 3ml. |
| $T_4$ Spictaf | 4.3ml. |
| $T_5$ Tricure | 5 ml. |
| $T_6$ Wanis` | 5 ml. |
| $T_7$ Biofer | 1.5ml. |
| $T_8$ Biotos | 2.5 ml. |
| $T_9$ Control | Untreated |
| Design | RBD (Randomized Block Design) |
| Replication | 3 |
| Plot size | 5x2 |
| Spray | 02 |
| Fertilizer | NPK 60:40:30 Kg /ha |
| Variety | Pusabasmati |

Analysis of variance (ANOVA) was used to compare the data during experiments.

## III. RESULTS AND DISCUSSION

Gundhi bug (*Leptocorisa oratorius)*, the major insect pest in upland rice environments causes extensive damage every year. Population of insect is governed by a number of abiotic and biotic factors [5]. Varieties favourable for the development of the insect are also one of the factors. [6]

**Evaluation of Insecticides against gundhi bug on Rice:**

For the evaluation of insecticides against the insect pests 4 insecticides were used namely Chlorpyriphos, Carbofuran, Deltamethrinand, Monocrotophos. Four insecticides at different concentrations were evaluated for controlling foliar pests of rice on most susceptible variety Pusabasmati during the year 2007 and 2008 under irrigated ecosystem. It is evident from the data (Table No. 1 ) that Monocrotophos was found significantly superior in controlling the gundhi bug population (% grain damage) over untreated check (47.3) and (39.5) during 2007 and 2008 respectively. Minimum grain damage (11.1%) was recorded in Monocrotophos followed by Corbofuran (11.8%) over untreated check (43.4%). The next effective treatment was Deltamethrin (25.25%) and Chlorpyriphos 1250g. a i/ha (27.6%), which were at par and found to be moderately effective in controlling the gundhi bug population and combating the grain damage.

According to Mishra, 2003 [7] six insecticides viz., fenobucarb 50 EC @ 500ml a.i./ha, imidacloprid 200 SL @ 50ml a.i./ha, malathion 50EC@ 500ml a.i./ha, carbaryl 50 WP @ 1kg a.i./ha, avermectin 1.8 EC @ 18 ml a.i./ha and DDVP 76 EC @ 266ml a.i./ha were field evaluated against mixed population of rice gundhi bug, *Leptocorisa* sp. during *Kharif*, 2002 at Bhubaneswar, Orissa. The results revealed that all the insecticides proved significantly effective in controlling the insect as compared to control.

**Evaluation of biopesticides against rice gundhi bug on rice:**

For the biopesticides against the insect pests 8 biopesticides were used namely Achook, Neem Azal , Neem gold, Spictaf , Tricure , Wanis, Biofer and Biotos. Eight biopesticides were evaluated against rice gundhi bug in two consecutive years 2007 and 2008 in high susceptible variety Pusabasmati. It was observed that gundhi bug incidence was 32.8 % and 34.7% in 2007 and 2008 respectively in untreated check. Among the tested biopesticides Achook was followed by Tricure and Neem gold. They were found to be significantly superior than other products. It is obvious from the data (Table No.2) that minimum gundhi bug population (% incidence) was recorded (8.85) in Achook which was closely followed by Tricure (12.1) and Neem gold (13.1). The effect of biopesticides was seen also in regard of grain yield and Wanis was found most effective showing 30.86% grain yield and lowest yield was recorded by applying Neem azal i.e. 28.51%., Spictaf, Tricure, Biofer, Biotos, Achook and Neem gold were found in between in an ascending order at grain yield i.e. 29.88, 30.04, 30.23, 30.41, 30.59 and 30.73% respectively.

Increase in grain yield was recorded highest by application of Wanis i.e. 18.92%. While it was recorded to be lowest when Neem azal was applied i.e. only 9.86%. Increase in grain yield was recorded to be 15.1% by the application of Spictaf, 15.76% by Tricure, 16.49% by Biofer, 17.18% by Biotos, 17.8% by Achook and 18.48% by Neem gold.

According to Murthy 2007 [8], different scientists on eco-friendly practices demonstrated that for managing pest problems pesticides of plant origin like soybean oil, Oxymetrin and matrine obtained from *Sophoria* sp., plant extract (Biotos) obtained from *Gaultheria* spp., essential oils obtained from *Vitex negundo*, Pyrethrins present in the seed cases of *Chrysanthemum* plant, the extract of perennial shrub *Dodonaea angustifolia*, "Saponin" from *Sapindus trifoliatus*, Pongam seed oil obtained from *Pongamia pinnata* and *P. glabra* are useful.

Rice gundhi bug had significant negative correlations with minimum temperature, evening relative humidity and rainfall; and positive correlations with sunshine hours and maximum temperature.

**Table: 1 - Evaluation of insecticides against gundhi bug Population (2007-2008)**

| Insecticides | | | | | | | | | | | | Gundhi bug |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Common name | Trade name | % a.i. formulation | Rate | | %grain damage | | | Grain Yield q/ha | | | (q/ha)% increase in grain yield |
| | | | g. a.i./ha | g.or ml of Formulation /ha | 2007 | 2008 | Mean | 2007 | 2008 | Mean | |
| Chlorpyriphos (a) | Dursbam 10G | 10% | 1000 | 10.0kg | 37.6 | 35.5 | 36.55 | 11.48 | 13.55 | 12.51 | 22.52 |
| Chlorpyriphos (b) | Dursban 10G | 10% | 1250 | 12.5kg | 28.7 | 26.5 | 27.6 | 13.49 | 15.65 | 14.57 | 42.70 |
| Carbofuran (Check) | Furadan 3G | 3% | 1000 | 33.0kg | 12.7 | 10.39 | 11.8 | 19.05 | 19.20 | 19.12 | 87.26 |
| Deltamethrin | Decis 10%EC | 10% | 15 | 150ml | 28.0 | 22.5 | 25.25 | 12.99 | 13.95 | 13.47 | 31.92 |
| Monocrotophos (Check) | Monocrown 36 WSC | 36% | 500 | 1390ml | 12.0 | 10.2 | 11.1 | 18.92 | 20.93 | 19.92 | 95.10 |
| Untreated Control | - | - | - | - | 47.3 | 39.5 | 43.4 | 8.44 | 11.98 | 10.21 | - |
| Sem ± | - | - | - | - | 0.813 | 0.126 | - | 0.166 | 16.60 | - | - |
| CD (0.05) | - | - | - | - | 2.563 | 0.397 | - | 0.524 | 52.33 | - | - |

**Table: 2 - Evaluation of biopesticides against rice gundhi bug (2007-2008)**

| Neem products/ pesticides | Dose/l of water | Gundhi bug incidence (%) | | | Gain yield (q/ha) | | | Increase in grain yield (%) |
|---|---|---|---|---|---|---|---|---|
| | | 2007 | 2008 | Mean | 2007 | 2008 | Mean | |
| Achook | 5ml | 8.5 | 9.2 | 8.85 | 26.80 | 34.38 | 30.59 | 17.8 |
| Neem Azal | 3ml | 14.1 | 16.1 | 15.1 | 25.90 | 31.13 | 28.51 | 9.86 |
| Neem gold | 3ml | 12.7 | 13.5 | 13.1 | 27.50 | 33.96 | 30.73 | 18.40 |
| Spictaf | 4.5ml | 16.8 | 14.3 | 15.55 | 25.30 | 34.46 | 29.88 | 15.1 |
| Tricure | 5ml | 11.7 | 12.5 | 12.1 | 24.80 | 35.29 | 30.04 | 15.76 |
| Wanis | 5ml | 12.6 | 14.7 | 13.65 | 25.90 | 35.83 | 30.86 | 18.92 |
| Biofer | 1.5ml | 14.2 | 13.6 | 13.9 | 27.1 | 33.37 | 30.23 | 16.49 |
| Biotos | 2.5ml | 14.8 | 15.8 | 15.3 | 27.7 | 33.12 | 30.41 | 17.18 |
| Untreated check | - | 32.8 | 34.7 | 33.75 | 24.3 | 27.6 | 25.95 | - |
| Sem ± | - | 0.942 | 0.767 | - | 1.070 | 0.887 | - | - |
| CD (0.05) | - | 2.824 | 2.302 | - | 3.208 | 2.661 | - | - |

## IV. CONCLUSION

Agriculture being the backbone for Indian economy, accounts for about 30% of GDP and two third of the population is dependent on it. After taking various observations we can be to concluded that regarding the grain yield monocrotophos was the most efficient insecticide where as among biopescides wanis was the best. Biopesticides provide environment friendly alternatives to chemical insecticides but they face a number of constraints in their development, manufacture and utilization.

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