Research Article [Tripathi *et al.*, 5(1): Jan., 2014:3249-3252]
CODEN (USA): IJPLCP ISSN: 0976-7126

INTERNATIONAL JOURNAL OF PHARMACY & LIFE SCIENCES
(Int. J. of Pharm. Life Sci.)

# Effectiveness of Insecticides and Biopesticides against White backed Plant Hopper on Rice Crop in District Rewa (M. P.), India

**Kalpana Tripathi[1]*, Jai Prakash Pandey[3], Arti Saxena[2], Amit Tiwari [1], Dhirendra Pandey[1], Brajesh Pandey[1] and Nisha Shukla[1]**

1, Department of Zoology, Govt. T. R. S. College, Rewa, (MP) - India
2, Department of Zoology, Govt. Science College, Rewa, (MP) - India
3, Department of Biotechnology, Govt. T. R. S. College, Rewa, (MP) - India

## 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 White backed Plant Hopper 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.

Key-Words: *Oryza sativa*, Biopesticides, Insecticides, WBPH, India

## 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]White backed Plant hopper (*Sogatella furcifera)* is a serious pest of rice and sometimes reduce yield by as much as 30%. The adult is brownish black with a yellowish brown body. The adult is 2.6-2.9mm long. Neonate nymph is white to light yellow and 0.8 mm long. It has pink to red eyes. With age, the nymph becomes grayish with white markings on the thorax and abdomen of the creamy body. The mature nymph is 2.1mm long. A distinct white band on its thorax starts to appear. Newly laid eggs are creamy white. They are elongate and much curved. A single egg measures 0.9mm long and 0.2mm wide. With age, the eggs become darker and develop two distinct spots that represent the eyes of the developing hopper. [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 Whitebacked Planthopper on rice field in rewa.

*** Corresponding Author**
E.mail: drkalpanatripathi@gmail.com

## Material 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 16th June whereas in 2008 it was on 12th 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.

## Results and Discussion

Whitebacked Planthopper (*Sogatella furcifera),* 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 WBPH**

Four insecticides at different concentrations were evaluated for controlling the WBPH population during the years 2007 and 2008 under irrigated ecosystem. It is evident from the data (Table No. 1) that Deltamethrin was found significantly superior in controlling the WBPH population (%grain damage) over untreated check (21.2%) and (23.2%) during 2007 and 2008 respectively. Minimum % grain damage (9.0%) was recorded in Deltamethrin followed by Corbofuran (14.4%) over untreated check (22.2%). The next effective treatment was Moncrotophos (16.4%) and Chlorpyriphos 1250g. a i/ha (17.85%), which were at par and found to be moderately effective in controlling the grain damage. White Backed Plant Hopper (WBPH) caused lowest (9.0%) grain damage when treated with Deltamethrin and highest (20.2%) grain damage was found when treated with Chlorpyriphos (1000). Carbofuran, Monocrotophos and Chlorpyriphos (1250) showed an ascending trend in between the two, i.e. 14.4%, 16.4% and 17.85% respectively According to Bhavani and Rao, 2005 imidachloprid @ 25g.a.i/ha was the best insecticide that showed high degree of efficacy against rice plant hoppers followed by acephate @ 600 g.a.i/ha and cartap hydrochloride @ 300 g.a.i/ha) where as triazophos @ 250 ga.i/ha showed least efficacy against planthoppers. The results obtained with acephate 75SP and cartap hydrochloride 50WP are in agreement with the findings of Rao et. al., 2001 reported the high degree of efficacy of these two insecticides against planthoppers.

**Evaluation of biopesticides against rice WBPH 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 WBPH in two consecutive years 2007 and 2008 in high susceptible variety Pusabasmati. The study reveals that WBPH incidence was low in both the years during early crop growth stages which may have not caused heavy economic losses. It is evident from the data (Table No. 2) that minimum WBPH population was

recorded in the treatment of Achook (5.25) followed by Tricure (6.5) whereas, maximum population (9.3) was recorded in Neem Azal treatment, while it was recorded highest under untreated check (16.35). Rests of the biopesticides were found to be at par in controlling the WBPH population during study.The incidence of WBPH was noted to be highest (9.3%) when Neem Azal was applied while it was lowest i.e. 5.25% during the application of Achook. Tricure (6.5%) Spictaf (6.7%), Biofer (6.8%), Neem gold (7.3%), Wanis (7.7%) and Biotos (7.95%) were found in between. 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 18.40% 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. WBPH had positive correlations with minimum temperature and negative with humidity. It was observed that maximum population of WBPH/$m^2$ was recorded at 45 DAS as compared to early and late stages of plant growth stage of the tested varieties Pusabamati.

## 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.

## References

1. Khanjani, M. 2006. Crop pests of Iran. *Buali Sina Uiversity Press*. 717.
2. Anonymous. 2011. Statistics of Agriculture, Volume 1, Agricultural and Horticultural Crops, Crop year 2009-2010, Ministry of Agriculture, Department of Economic Planning, Bureau of Statistics and Information Technology.
3. John, S.1981. Pest management need for integrated approach. *Pesticides*. XV (9): 3-5.
4. Gupta, S. and Dikshit, A. K. 2010. Biopesticides: An ecofriendly approach for pest control. *Journal of Biopesticides*.3(1): 186-188.
5. Emmel, T.C. 1976. *Population Biology*. Harper and Row, New York.
6. Kennedy, J.S. 1965. Mechanism of host plant selection. *Ann. Appl. Biol* . 56: 317-322.
7. Bhavani, B. and Rao, P.R.M. 2005. Bioefficacy of certain insecticides against Rice Planthoppers vis-a-vis natural enemies under irrigated field conditions. *Indian Journal of Plant Protection.* 33 (1): 64-67.
8. Rao, P.R.M., Rajan, C.P.D., Bhavani, B. and Raghava Reddy, P. 2001. Evaluation of certain pesticides against planthoppers and sheath blight incidence in rice Bio-efficacy and compatibility. *Pestotogy* 25:29-31
9. Murthy, K.S.R.K. 2007. Modern trends – Demonstrated Eco-friendly practices/tools for crop protection. *Indian Journal of Plant Protection*. 35(1): 22-24.

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

| Insecticides | | | | | WBPH | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Common name | **Trade name** | **% a.i. F.** | **Rate** | | **%grain damage** | | | **Grain Yield q/ha** | | | (q/ha)% increase in grain yield |
| | | | **g. a.i./ha** | **g. or ml of F /ha** | **2007** | **2008** | **Mean** | **2007** | **2008** | **Mean** | |
| **Chlorpyriphos (a)** | Dursban 10G | 10% | 1000 | 10.0kg | 17.0 | 21.3 | 20.2 | 11.48 | 13.55 | 12.51 | **22.52** |
| **Chlorpyriphos (b)** | Dursban 10G | 10% | 1250 | 12.5kg | 18.7 | 19.1 | 17.85 | 13.49 | 15.65 | 14.57 | **42.70** |
| **Carbofuran (Check)** | Furadan 3G | 3% | 1000 | 33.0kg | 13.7 | 15.1 | 14.4 | 19.05 | 19.20 | 19.12 | **87.26** |
| **Deltamethrin** | Decis 10%EC | 10% | 15 | 150ml | 8.9 | 9.1 | 9.0 | 12.99 | 13.95 | 13.47 | **31.92** |
| **Monocrotophos (Check)** | Monocrown 36 WSC | 36% | 500 | 1390ml | 15.8 | 17.0 | 16.4 | 18.92 | 20.93 | 19.92 | **95.10** |
| **Untreated Control** | - | - | - | - | 21.2 | 23.2 | 22.2 | 8.44 | 11.98 | 10.21 | - |
| **Sem ±** | - | - | - | - | **1.106** | **0.556** | - | **0.166** | **16.60** | - | - |

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

| Neem products/ pesticides | Dose/l of water | WBPH incidence (%) | | | Gain yield (q/ha) | | | Increase in grain yield (%) |
|---|---|---|---|---|---|---|---|---|
| | | **2007** | **2008** | **Mean** | **2007** | **2008** | **Mean** | |
| **Achook** | 5ml | 5.1 | 5.4 | 5.25 | 26.80 | 34.38 | 30.59 | **17.8** |
| **Neem Azal** | 3ml | 8.9 | 9.7 | 9.3 | 25.90 | 31.13 | 28.51 | **9.86** |
| **Neem gold** | 3ml | 7.2 | 7.4 | 7.3 | 27.50 | 33.96 | 30.73 | **18.40** |
| **Spictaf** | 4.5ml | 6.6 | 6.8 | 6.7 | 25.30 | 34.46 | 29.88 | **15.1** |
| **Tricure** | 5ml | 6.4 | 6.6 | 6.5 | 24.80 | 35.29 | 30.04 | **15.76** |
| **Wanis** | 5ml | 7.6 | 7.8 | 7.7 | 25.90 | 35.83 | 30.86 | **18.92** |
| **Biofer** | 1.5ml | 6.7 | 6.9 | 6.8 | 27.1 | 33.37 | 30.23 | **16.49** |
| **Biotos** | 2.5ml | 7.8 | 8.1 | 7.95 | 27.7 | 33.12 | 30.41 | **17.18** |
| **Untreated check** | - | 15.3 | 17.4 | 16.35 | 24.3 | 27.6 | 25.95 | - |
| **Sem ±** | - | 0.746 | 0.699 | - | 1.070 | 0.887 | - | - |
| **CD (0.05)** | - | **2.238** | **2.097** | - | **3.208** | **2.661** | - | - |

**How to cite this article**
Tripathi K. *et al.*, (2014). Effectiveness of insecticides and biopesticides against white backed plant hopper on rice crop in district Rewa (M. P.), India. *Int. J. Pharm. Life Sci.*, 5(1):3249-3252.
Source of Support: Nil; Conflict of Interest: None declared

**Received: 10.12.13; Revised: 17.12.13; Accepted:18.12.13**