*Available online at* www.ijpab.com

DOI: http://dx.doi.org/10.18782/2320-7051.5173

**ISSN: 2320 – 7051**

*Int. J. Pure App. Biosci.* **5 (6):** 273-277 (2017)

*Research Article*

International Journal of Pure & Applied Bioscience

OPEN ACCESS

# Studies on the Eco-Friendly Insecticidal Management of Major Insect Pests of Cabbage under Agro-Climatic Conditions of Imphal, Manipur

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Received: 10.07.2017 | Revised: 22.08.2017 | Accepted: 27.08.2017

**ABSTRACT**

*Field experiment was conducted for two consecutive years during 2008-09 and 2009-10 at the Agricultural Research Farm, College of Agriculture, CAU, Iroisemba, Imphal. The two years pooled results revealed that, microbial insecticide, spinosad (success 2.5%sc) @500 ml /ha proved to be the most effective against the major insect pests of cabbage i.e., Plutella xylostella (0.82 larvae/5plants) Brevicoryne brassicae (3.60 aphids/5plants), Lipaphis erysimi (1.97aphids/5plants), Pieris rapae (0.19 larvae/5plants), P. brassicae (0.78 larvae/5 plants). spinosad was followed by conventional insecticide with malathion (asamal 50% E.C.) in its efficacy in all the insect pests of cabbage. However all the insecticidal treatments were significantly superior over control?*

***Key words:*** *Cabbage, Major Insect Pests, Eco-Friendly Insecticides, Management*

## INTRODUCTION

Cabbage, *Brassica oleracea* var. *capitata* Linn. a popular and extensively cultivated both in hills and valleys of Manipur and severely attacked by a variety of insect pests throughout its growth period. Of which major insect pests of cabbage like diamond back moth, *Plutella xylostella* Linn. cabbage butterflies, *Pieris rapae* Linn., *P. canidia* Linn. and *P. brassicae* Linn., aphids i.e., *Myzus persicae* (Sulz.), *Lipaphis erysimi* (Kalt.) and *Brevicoryne brassicae* Linn., flea beetle, Phyllotreta cruciferae Goez., etc. act as a limiting factor in the profitable cultivation of this crop. Although several chemical insecticides are recommended for control of these pests[5,7,8,9,14] yet so far work has been done on the management of cabbage pests by using eco-friendly insecticides[2,15]. Hence, the present studies were conducted to eco-friendly insecticidal treatments against major insect pests of cabbage. In order to counteract the problems caused by conventional synthetic insecticides, the bio-rational materials like neem seed extracts and microbial pesticides have been found promising in tackling the pest problem[1,4,11].

**Cite this article:** Yadav, G.P.S., Singh, M.P., Kumar, A. and Vikrant, Studies on the Eco-Friendly Insecticidal Management of Major Insect Pests of Cabbage under Agro-Climatic Conditions of Imphal, Manipur, *Int. J. Pure App. Biosci.* **5(6):** 273-277 (2017). doi: http://dx.doi.org/10.18782/2320-7051.5173

Although from other parts of the country, a number of workers had reported in the management of cabbage pests on these aspects, limited attempt had been made in the North east region.

## MATERIALS AND METHODS

Field trials were conducted in a three replicated randomized block design (RBD) with plot size was 12sq.m (4m×3m) and spacing of 50cm×40 cm. at the Vegetable Research Farm, College of Agriculture, Central Agricultural University, Imphal during Rabi season of 2009 and 2010. The cabbage var. ″Pride of India "cultivated extensively in Manipur, was used in the experiment. There were in all ten treatments including water spray as control (Table 1). All the recommended agronomic practices were followed. Spraying was done during the first week of February, 2009 and 2010. For recording observations, five plants were randomly selected from the net plot of each treatment and pest population was recorded one day before and 3, 7 and 14 days after spraying. Aphid count was taken from three leaves each from upper, middle and lower of the selected plants, while the whole plant was considered for other insects. Finally, percentage reduction in the population of each insect spp. was worked out on the basis of pre -treatment population. The data thus obtained were subjected to the statistical analysis for final interpretation.

## RESULT AND DISCUSSION

**Diamond back moth, *Plutella xylostella* Linn.:**

All the insecticidal application proved to be significantly superior over control in reducing larval population of diamond back moth (Table-1 and 2).In the first year, success was found to be the most effective with 0.00 larvae/5plants which was significantly superior to the rest insecticidal treatments. Conventional insecticide, asamal (12.24/5plants), was found to be the next effective insecticide which showed significantly superior to nuvan, microcel, azacel and *J. gossypifolia*+cow urine (Table-1).Similarly, in the second year also, success remained the most effective treatment with 2.06 larvae/5plants, followed by asamal (5.21larvae/5plants) and both of them were found to be significantly superior to nuvan, confidor, maxima, azacel, and *J. gossypifolia*+cow (Table-2). The better performance of spinosad (success) against DBM was in agreement with the findings of Mallareddy et al.[6], reported high efficacy of spinosad against DBM.

**Cabbage aphid, *Brevicoryne brassicae* Linn. :**

All the insecticidal application proved to be significantly superior over control in reducing aphid population (Table-1 and 2).In the first year, success was most effective with 0.31 aphids /5plants and was closely followed by asamal (0.48aphids/5plants), which were at par to each other (Table-1). Similarly, in the second year also success remained the most effective treatment with 9.42aphids/5plants, followed by asamal (33.02aphids/5plants) (Table-2). The better performance of the synthetic insecticide, malathion (asamal) against *Brevicoryne brassicae* was in agreement with the findings of Gera et al.[3].

**Mustard aphid, *Lipaphis erysimi* Kalt.:**

All the insecticidal application proved to be significantly superior over control in reducing aphid population (Table-1 and 2).In the first year, success was most effective with 2.42 aphids/5plants and was followed by asamal (22.06 aphids/5plants), which were at par to each other and significantly superior to the rest insecticidal treatments except *J.gossypifolia*+cowurine (Table1).Similarly, in the second year also success remained the most effective treatment with 1.57 aphids/5plants, which was found significantly superior to the rest insecticides success was followed by asamal (11.89aphids/5plants)which showed

significantly superior to sevin, azacel and confidor (Table-2). The results obtained in the present investigation on the effectiveness of spinosad (success) against mustard aphid are in agreement with the findings of Mallareddy et al[6].

**Cabbage butterfly, *Pieris rapae* Linn.:** All the insecticidal application proved to be significantly superior over control in reducing larval population of cabbage butterfly (Table-1 and 2).In the first year, success was most effective with 0.23 larvae /5plants and was closely followed by asamal (0.34larvae /5plants), which were at par to each other but significantly superior to microcel, confidor, maxima and *J.gossypifolia*+cowurine (Table1). Similarly, in the second year also success remained the most effective treatment with 0.17 larvae/5plants, which showed significantly superior to the rest insecticidal treatments (Table2). The results of Dichlorvos (nuvan) obtained here are in agreement with the report of Sharma et al.[10] who observed that application of nuvan provided effective control of cabbage butterfly under the Himanchal Pradesh agro-climatic conditions.

**Cabbage butterfly, *Pieris brassicae* Linn. :**

All the insecticidal application proved to be significantly superior over control in reducing larval population of cabbage butterfly (Table-1 and 2).In the first year, success was found to be the most effective with 0.18 larvae /5plants and was closely followed by asamal (0.94 larvae /5plants), which were at par to each other (Table1).Similarly, in the second year also success remained the most effective treatment with 1.57 larvae/5plants, followed by asamal (2.39larvae /5plants) and there was no significant difference between them. (Table2). The moderately effectiveness of *J. gossypifolia* extracts corraborate with the results of Singh and Khuman(1995) who reported that three applications of *J. gossypifolia* and *M. azedarach* each at 1.0 percent concentration effectively controlled the cabbage butterfly.

**Table 1: Relative efficacy of certain eco-friendly insecticides on major insect pests of cabbage (2008-09)**

| Treatments | Dose | Mean percent reduction after spray[1] larval and aphid population per5 plants | | | | |
|---|---|---|---|---|---|---|
| | | ***P. xylostella*** | ***B. brassicae*** | ***L. erysimi*** | ***P. rapae*** | ***P. brassicae*** |
| $T_1$Sevin$_{(Carbaryl50\%WDP)}$ | 750 gm/ha | 16.97(4.18) | 14.32 (3.85) | 54.11 (7.39) | 1.24(1.32) | 3.91(2.10) |
| $T_2$Nuvan(Dichclorvos 76%EC) | 250 ml/ha | 22.25(4.77) | 10.32 (3.29) | 37.32 (6.15) | 0.79(1.14) | 4.60(2.26) |
| **$T_3$Asamal (Malathion50%EC )** | **500 ml/ha** | **12.24(3.57)** | **0.48 (0.99)** | **22.06 (4.75)** | **0.34(0.92)** | **0.94(1.20)** |
| $T_4$ Plant extract(*Jatropha gossypifolia* +Cow urine 75%+25%) | 1250 ml/ha | 20.479(4.59) | 6.05 (2.56) | 35.86 (6.03) | 5.11(2.37) | 7.91(2.90) |
| $T_5$Azacel (Azadirachtin 0.03% ) | 1500 ml/ha | 25.10 (5.06) | 1.32 (1.35) | 57.71 (7.63) | 1.57(1.44) | 3.30(1.95) |
| **$T_6$Success (Spinosad 2.5%SC )** | **500 ml/ha** | **0.00 (0.71)** | **0.31 (0.90)** | **2.42 (1.72)** | **0.23(0.84)** | **0.18(0.83)** |
| $T_7$Microcel(*Beauveria bassiana*) | 500 ml/ha | 22.73 (4.82) | 2.88 (1.84) | 37.94 (6.20) | 2.39(1.70) | 2.25(1.66) |
| $T_8$Confidor(Imidacloprid 17.8%SL) | 250 ml/ha | 16.97 (4.18) | 6.57 (2.66) | 53.22(7.33) | 1.90(1.55) | 8.50(3.00) |
| $T_9$Maxima(Thiomethoxam 25%WG) | 125 gm/ha | 18.07 (4.31) | 4.07 (2.15) | 49.62 (7.08) | 1.87(1.54) | 5.90(2.53) |
| $T_0$ Untreated control | WATER | 53.52 (7.35) | 37.32 (6.15) | 179.33(13.41) | 10.86(3.37) | 28.44(5.38) |
| S.E.d± | - | 0.39 | 0.70 | 0.66 | 0.29 | 0.33 |
| C.D (P=0.05) | - | 0.83 | 1.48 | 1.38 | 0.60 | 0.70 |

Figures in parentheses are √Actual population + 0.5 [1]Composite means of 3 observations recorded at 3, 7 and 14 days after application, [2]Means of 3 replications based on two years' data.

**Table 2: Relative efficacy of certain eco-friendly insecticides on major insect pests of cabbage (2009-10)**

| **Treatments** | **Dose** | **Mean percent reduction after spray[1] larval and aphid population per5 plants** | | | | |
|---|---|---|---|---|---|---|
| | | ***P. xylostella*** | ***B. brassicae*** | ***L. erysimi*** | ***P. rapae*** | ***P. brassicae*** |
| $T_1$Sevin$_{(Carbaryl50\%WDP)}$ | 750 gm/ha | 7.79 (2.88) | 57.56 (7.62) | 26.12(5.16) | 1.66(1.47) | 3.95(2.11) |
| $T_2$Nuvan(Dichclorvos 76%EC) | 250 ml/ha | 13.04(3.68) | 46.42 (6.85) | 21.40(4.68) | 1.87(1.54) | 4.07(2.14) |
| **$T_3$Asamal (Malathion50%EC )** | **500 ml/ha** | **5.21 (2.39)** | 33.02 (5.80) | 11.89 **(3.52)** | 0.89(1.18) | 2.39**(1.70)** |
| $T_4$ Plant extract (*Jatropha gossypifolia* +Cow urine 75%+25%) | 1250 ml/ha | 11.61(3.48) | 40.71 (6.42) | 21.96 (4.74) | 2.09(1.61) | 6.84(2.71) |
| $T_5$Azacel (Azadirachtin 0.03% ) | 1500 ml/ha | 16.31(4.10) | 65.11 (8.10) | 35.74 (6.01) | 3.99(2.12) | 6.79 (2.70) |
| **$T_6$Success (Spinosad 2.5%SC )** | **500 ml/ha** | **2.06 (1.60)** | 9.42 (3.15) | 1.57 **(1.43)** | 0.17(0.82) | 1.57**(1.44)** |
| $T_7$Microcel(*Beauveria bassiana*) | 500 ml/ha | 7.17 (2.77) | 64.30 (8.05) | 22.63 (4.81) | 1.75(1.50) | 2.88(1.84) |
| $T_8$Confidor(Imidacloprid 17.8%SL) | 250 ml/ha | 8.74 (3.04) | 43.72 (6.65) | 28.01(5.34) | 1.34(1.36) | 4.83(2.30) |
| $T_9$Maxima(Thiomethoxam 25%WG) | 125 gm/ha | 8.92 (3.07) | 43.06 (6.60) | 18.77 (4.39) | 2.02(1.59) | 2.42(1.71) |
| $T_0$ Untreated control | WATER | 52.79(7.30) | 167.46 (12.96) | 169.30(13.03) | 17.82(4.28) | 29.20(5.45) |
| S.E.d± | - | 0.24 | 0.90 | 0.60 | 0.16 | 0.22 |
| C.D (P=0.05) | - | 0.51 | 1.90 | 1.27 | 0.34 | 0.45 |

Figures in parentheses are √Actual population + 0.5 [1]Composite means of 3 observations recorded at 3, 7 and 14 days after application, [2]Means of 3 replications based on two years' data.

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