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# EVALUATION OF NEW INSECTICIDES AGAINST CHICKPEA POD BORER *HELICOVERPA ARMIGERA* (HUBNER)

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## ABSTRACT

Evaluation of newer insecticides against chick pea pod borer, *H. armigera* was carried out during 2011-12. The crop was sprayed two times at 14 days interval with six insecticides. The treatment of Emamectin Benzoate 5 SG @ 0.0015 was the most promising treatment to reduce the larval population of *H. armigera*. The reduction recorded was 92.45 and 93.46 per cent larval population over control after 7 and 14 days after first spray application; while 99.41 and 99.41 per cent after 7 and 14 days after second spray application, respectively. The per cent pod damage was observed in the range of 3.93 to 21.81 per cent. The lowest pod damage was recorded in the treatment of Emamectin Benzoate 5 SG @ 0.0015. The highest yield was recorded from Emamectin Benzoate 5 SG @ 0.0015 treated plots; whereas, the lowest from the untreated control plot. Higher net return per hectare was realized due to application of Emamectin Benzoate 5 SG @ 0.0015, Ethion 50 EC @0.1 % (2 ml/lit) and λ-cyhalothrin 5 EC @ 0.00625 %. In terms of higher ICBR application of λ-cyhalothrin 5 EC @ 0.00625 %, Ethion 50 EC @0.1 % and Emamectin benzoate 5 SG @ 0.0015 % with 1: 11.3, 1: 9.5 and 1: 7.0, respectively.

**Key words:** *Helicoverpa armigera,* Newer insecticids

## INTRODUCTION

Chickpea (*Cicer arietinum* L.) remarkably predominates among other pulse crops in terms of both area and production. The year 2009-10 marked significant increase in area under chickpea (8.56 million ha) which is highest in last 10 years. Similarly, the chickpea production (7.35 million tonnes) also surpassed last 50 years record with highest productivity (858 kg/ha) ever recorded in India. The area under chickpea has increased from 6.45 million ha in 1992-93 to 8.56 million ha in 2009-10 (Anon., 2010). Among the biotic factors, gram pod borer, *Helicoverpa armigera* (Hubner) (Lepidoptera: Noctuidae) is the most important pest on chickpea. It attacks tender foliage, flowers and pods of chickpea. Chemical control is still an important and most effective tool of pest management. The indiscriminate use of insecticides results in increased resistance to insecticides against insects with the passage of time and creates the problem of environmental pollution. Sole dependence on conventional insecticides did not result in effective management of pest. Thus, scientific and judicious use of new molecules is the best method of pest management from the yield and economic point of view; therefore, the present experiment was planned to study the effect of newer molecules against *H. armigera* in chickpea.

## MATERIALS AND METHODS

The experiment was conducted at the research farm, Krishi Vigyan Kendra, Sindewahi (Maharashtra) in the year 2011-12 in a Randomized Block Design (R.B.D.) with seven treatments, each consisting of three replicates. The chickpea seeds of variety 'Jaki 9218' were sown in plots of size 5.2m x 2.4m with row spacing of 30 cm and plant to plant distance of 10 cm. All the insecticides under study were applied as foliar spray using knapsack sprayer. To determine the efficacy of chemicals, two sprays were conducted on chickpea; the first spray was done at pod initiation stage and second spray after 15 days of first spray. The details of treatments with respective dose and method of application has been given in Table 1.

The population of *H. armigera* larvae was recorded per meter row length from 3 randomly selected spots from each plot after 7 and 14 days after first and second sprays. 14 day count was considered pre-treatment count for the second spray.

The infested pods were counted from randomly selected five plants from five inner rows in each plot one day before spraying and 3, 5 and 7 days after first and second spray, with ninth day count becoming pretreatment count for the second spray. The formula used to calculate the percent infestation of pods was

**Table 1. Treatment Details**

| | Treatment | Concentration | Dose / liter of water |
|---|---|---|---|
| $T_1$ | λ-cyhalothrin 5 EC - | 0.00625 % | 1.25 ml |
| $T_2$ | Ethion 50 EC | 0.1 % | 2 ml |
| $T_3$ | Novaluron 10 EC | 0.015 % | 1.5 ml |
| $T_4$ | Emamectin benzoate 5 SG | 0.0015 % | 0.44 g |
| $T_5$ | Azadirachtin | 300 ppm | 5 ml |
| $T_6$ | Quinolphos 25 EC | 0.05 % | 2 ml |
| $T_7$ | Untreated control | - | - |

$$\text{Pod Infestation (\%)} = \frac{\text{No. of infested pods}}{\text{Total no. of pods}} \times 100$$

The mean original data of percentage pod damage was calculated as percentage reduction over control with the following formula (*Abbott's* 1925)

$$\text{Percent Reduction} = \frac{C - T}{C} \times 100$$

Where,

C: larval population on control

T: larval population on treatments

## RESULTS AND DISCUSSION

All the treatments had significant effect in minimizing per cent larval population reduction over control from 75 to 92.45 after seven days of first spraying (Table: 2). Among these, emamectin benzoate 5 SG (0.0015 %) was most effective and gave maximum reduction in larval population (92.45%) over control, followed by ethion 50 EC (0.1 %). At fourteen days after first spray, reduction of *H. armigera larvae* ranged from 93.46 to 72.38 per cent over control. Emamectin benzoate 5 SG (0.0015 %) was highly effective among all the treatments with of 93.46 per cent reduction over control. The next treatment in order was ethion 50 EC (0.1 %). Three days after the second spray, emamectin benzoate 5 SG(0.0015 %) was the best among all the treatments, though was statistically at par with ethion 50 EC (0.1 %) recording 99.41 and 97.78 per cent larval reduction respectively over control. The next effective treatments were novaluron 10 EC @ 0.015 % and λ-cyhalothrin 5 EC @ 0.00625 % (96.73 and 93.96% larval reductions over control, respectively). Fourteen days after second spray, reduction in the population of *H. armigera* ranged from 91.83 to 99.41per cent over control. The highest, 99.41 per cent larval reduction over control was observed in emamectin benzoate 5 SG (0.0015 %), followed by ethion 50 EC (0.1 %), novaluron 10 EC (0.015 %) and λ-cyhalothrin 5 EC (0.00625 %). Kumar *et al* (2011) observed that emamectin benzoate 5 SG @ 11 g a.i./ ha recorded the lowest larval population of *H. armigera* in two years on chick pea.

The per cent pod damage was observed in the range of 3.93 to 21.81 per cent. The lowest per cent pod damage was also recorded from the treatment of emamectin benzoate 5 SG @ 0.0015 due to highest larval population reduction. It was followed by treatment of ethion 50 EC (0.1 %) which recorded 5.01 per cent

**Table 2. Evaluation of newer insecticides against chick pea pod borer, *H. armigera***

| Sr.No. | Treatment Details | Per cent larval reduction over control | | | | Per cent Pod Damage |
|---|---|---|---|---|---|---|
| | | 7 DAFA | 14 DAFA | 7 DASA | 14 DASA | |
| $T_1$ | λ-cyhalothrin 5 EC @ 0.00625 % | 84.52 | 83.21 | 93.96 | 93.00 | 5.84 |
| $T_2$ | Ethion 50 EC @0.1 % | 86.83 | 86.30 | 97.78 | 97.59 | 5.01 |
| $T_3$ | Novaluron 10 EC @ 0.015 % | 85.60 | 84.49 | 96.73 | 96.51 | 5.45 |
| $T_4$ | Emamectin benzoate 5 SG @ 0.0015 % | 92.45 | 93.46 | 99.41 | 99.41 | 3.93 |
| $T_5$ | Azadirachtin 300 ppm @ 5 ml/litre water | 75.00 | 72.38 | 90.33 | 88.18 | 8.42 |
| $T_6$ | Quinolphos 25 EC –@ 0.05 % | 75.39 | 72.95 | 93.55 | 91.83 | 6.31 |
| $T_7$ | Untreated control | 0.00 | 0.00 | 0.00 | 0.00 | 21.81 |
| | F test | Sig. | Sig. | Sig. | Sig. | Sig. |
| | SEm | 1.91 | 2.47 | 1.75 | 2.27 | 0.66 |
| | CD | 6.02 | 7.79 | 5.51 | 7.14 | 2.09 |

**Table 3. Economics of newer insecticides against chick pea pod borer, *H. armigera***

| Sr.No. | Treatment details | Increase in yield over control | Cost of increased yield @ Rs. 2300/qt | Per hector cost of insecticides (Rs.) | Application cost of Module (Rs.) | Net profit (Rs./Ha.) | ICBR |
|---|---|---|---|---|---|---|---|
| $T_1$ | λ-cyhalothrin 5 EC @ 0.00625 % | 4.32 | 9936 | 281 | 811 | 9125 | 1:11.3 |
| $T_2$ | Ethion 50 EC @0.1 % | 4.93 | 11338 | 550 | 1080 | 10258 | 1:9.5 |
| $T_3$ | Novaluron 10 EC @ 0.015 % | 4.55 | 10465 | 2625 | 3155 | 7310 | 1:2.3 |
| $T_4$ | Emamectin benzoate 5 SG @ 0.0015 % | 6.81 | 15671 | 1440 | 1970 | 13701 | 1:7.0 |
| $T_5$ | Azadirachtin 300 ppm @ 5 ml/litre water | 1.87 | 4301 | 875 | 1405 | 2896 | 1:2.1 |
| $T_6$ | Quinolphos 25 EC –@ 0.05 % | 3.35 | | | | | |
| | 7705 | 320 | 850 | 6855 | 1:8.1 | | |
| $T_7$ | Untreated control | 0.0 | 0 | 0 | 0 | 0 | - |

pod damage. Similar results on emamectin benzoate 5 SG @ 11 gma.i./ha were obtained by Kambrekar *et al* (2012) and Deshmukh *et al* (2010).

The higher net return per hectare was realized due to application of emamectin Benzoate 5 SG @ 0.0015, ethion 50 EC @0.1 % (2 ml/lit) and λ-cyhalothrin 5 EC @ 0.00625 % with Rs. 13,701/-, Rs.10,258/- and Rs. 9,125/- per hectare, respectively. In terms of higher ICBR the decreasing order of efficacy was λ-cyhalothrin 5 EC @ 0.00625 %, ethion 50 EC @0.1 % and emamectin benzoate 5 SG @ 0.0015 % with 1: 11.3, 1: 9.5 and 1: 7.0 ratios, respectively.

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