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# Field efficacy of seven insecticides against *Chilo partellus* (Swinhoe) on maize (*Zea mays* L.) in Allahabad

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**Abstract**
A field experiment was conducted during *kharif*, 2016 at SHUATS, Allahabad (U.P.) to compare the efficacy of selected insecticides against *Chilo partellus* (Swinhoe) on maize (*Zea mays* L.) in Allahabad. All the seven treatments Carbofuran (7.70%), followed by Cypermethrin (9.86%) and Fipronil (13.38%) are at par with each other, followed by Indoxacarb (14.44%), Cartap recorded (15.37%), Profenophos (17.63%) then the treatment Imidacloprid (19.47%) was least effective reduced the infestation as compared to the untreated control. Result revealed that all the treatments were significantly superior over control among all the treatments Carbofuran recorded highest reduction of *Chilo partellus* (Swinhoe) population *i.e.* (7.70%) which was significantly superior over control followed by followed by Cypermethrin (9.86%) and Fipronil (13.38%) are at par with each other, followed by Indoxacarb (14.44%), Cartap recorded (15.37%), Profenophos (17.63%) then the treatment Imidacloprid (19.47%) was least effective among all the treatments. Among the treatment studied, the best and most economical treatment was $T_3$ Carbofuran (1:1.91), followed by $T_5$ Cypermethrin (1:1.88), $T_2$ Fipronil (1:1.70), $T_1$ Indoxacarb (1:1.59), $T_4$ Cartap (1:1.41), $T_6$ Profenophos (1:1.32), $T_7$ Imidacloprid (1:1.20) as compared to $T_0$ Control (1:1.11).

**Keywords:** *Chilo partellus*, Insecticides, Cypermethrin, efficacy

## Introduction
Maize (*Zea mays* L.) is an annual plant which belongs to family Gramineae. Maize is an important cereal of crop of world which is grown under diverse climatic conditions. Maize occupies a pride place among cereal crops in India and due to its high yield potential called the queen of cereals (Handbook of agriculture, ICAR). In India, maize (*Zea mays* L.) is the third most important cereal crop after rice and wheat. The production of maize is 17.01mt (Annual report, Ministry of Agriculture, Government of India 2015). It provides food, feed, fodder and serves as a sources of basic raw material for the number of industrial products viz. starch, protein, oil, alcoholic beverages, food sweeteners, cosmetics, more recently as bio-fuel etc. (Govt. of india). No other cereal is being used in as many ways as maize. Maize grain has elevated nutritive value as it contains about 72% starch, 10% protein, 4.8% oil, 5.8% fiber and 3% sugar (Rafiq *et.al.*, 2010) [11].
India is the fifth largest producer of maize in the world contributing 3 per cent of the global production. At present, out of the total maize produced, 55% is used for food purpose, about 14% for live stock, 18 % for poultry feed, 12 % for starch and one per cent as seed. (Rathore *et al.*, 2001) [10].

## Materials and method
The trial was conducted in *kharif*, season 2016 the central research field, SHUATS, Allahabad (U.P.). Trial was laid out in a randomized block design consisting of seven different treatments. Each treatment was replicated thrice and maize variety GA-85 was used for study. Application of treatments for the management of the *Chilo partellus* was initiated as soon as 5% ETL of infestation observed in experimental field. Subsequent application was under taken at an interval of 15 days and one applications were made during experimental period. The observation was recorded on weekly intervals throughout the cropping season. To assess the incidence of stem borer at weekly intervals the total number of plants and number of infested plants (number of dead hearts and pin holes present on the leaves) was were counted from each plot. The incidence was determined by correlating with weather parameter. Farid *et al*. (2003). The data were subjected to statistical analysis. The yield per plot was also recorded.

The percentage infestation of the maize stem borer was calculated according to the following equation:

$$\text{Percent infestation} = \frac{\text{Number of infested plants}}{\text{Total number of plants}} \times 100$$

(Syed *et al.* 2015)

**Results and discussion**

Carbofuran (7.70%) was found to be effective against controlling the infestation by stem borer *Chilo partellus* followed by Cypermethrin (9.86%) and Fipronil (13.38%) are at par with each other, followed by Indoxacarb (14.44%), Cartap recorded (15.37%), Profenophos (17.63%) then the treatment Imidacloprid (19.47%) was least effective among all the treatments (Table 1). The statistical analysis of data showed that all the treatments are significantly effective. The treatments all were found to be significant. However, significant reduction in infestation was observed in carbofuran, when compared to all other treatments.

As far as infestation was concerned carbofuran (7.70%) showed the best result in controlling the stem borer infestation and was significant to remaining treatment followed by other treatments. The statistical analysis of data showed that all the treatments are significantly effective.

Carbofuran was more effective in per cent infestation same result of carbofuran also reported by Ahmed *et.al.* (2003) [1] and Pavani *et.al.* (2013) [8]. In the present finding Fipronil reported (13.38%) infestation of this result of Fipronil is supported by Kumar *et.al.* (2015) [4], Sidar *et.al.* (2017) [12] and similarly reading were found by Neupane *et.al.* (2016) [7] and Singh *et.al.* (2014) [13].

Out of seven different chemicals spray highest yield was recorded in $T_3$ Carbofuron (42.72 q/ha) followed by $T_5$ Cypermethrin (40.80 q/ha), $T_2$ Fipronil (37.44 q/ha), $T_1$ Indoxacarb (34.79 q/ha), $T_4$ Cartap (31.68 q/ha), $T_6$ Profenophos (28.54 q/ha), $T_7$ Imidacloprid (25.49 q/ha) as compared to $T_0$ Control (23.57 q/ha) were least effective in recording the marketable yield. The statistical analysis of data showed that all the treatments are significantly recorded highest marketable yield compared to control. However, significant in recording highest marketable yield was observed in Carbofuran ($T_3$), when compared to all other treatments.

The treatments results supported by Kulkarni *et.al.* (2015) [5] also reported that carbofuran 3G applied treatment registered highest grain yield (95.22q/ha). Singh *et.al.* (2014) [13] also found that the maximum C:B ratio was obtained in plot treated with furadan (carbofuran 3G).similarly Radha *et.al.* (2006) [9] also reported that in granular insecticides carbofuran 3G was found to be superior in their efficacy against *C.partellus.*

Bhatt and Baba (2007) [2] reported that the treatments of imidacloprid and cypermethrin 10EC recorded the highest yield of 40.00 and 37.16q/ha.

**Table 1:** To evaluate the seven chemical insecticides in the management of maize stem borer *Chilo partllus* (Swinhoe).

| Sr. No. | Treatments | Per cent infestation | | | | |
|---|---|---|---|---|---|---|
| | | 1 DBS | 3 DAS | 7 DAS | 14 DAS | Mean |
| $T_1$ | Indoxacarb 14.5SC | 22.72 | 17.32 | 14.24 | 11.78 | 14.44 |
| | | (29.76) | (26.15) | (22.91) | (23.20) | (28.15) |
| $T_2$ | Fipronil 0.3G | 22.92 | 15.87 | 13.19 | 11.08 | 13.38 |
| | | (30.02) | (25.07) | (20.74) | (28.65) | (23.01) |
| $T_3$ | Carbofuron 3G | 23.12 | 12.72 | 7.24 | 3.14 | 7.70 |
| | | (30.51) | (20.98) | (13.10) | (9.79) | (15.01) |
| $T_4$ | Cartap 3G | 22.62 | 19.26 | 14.57 | 12.29 | 15.37 |
| | | (30.08) | (29.08) | (23.94) | (21.99) | (27.51) |
| $T_5$ | Cypermethrin 10%EC | 22.69 | 13.84 | 9.30 | 6.44 | 9.86 |
| | | (30.40) | (20.06) | (17.20) | (17.45) | (20.80) |
| $T_6$ | Profenophos 40%EC | 23.88 | 19.94 | 17.55 | 15.41 | 17.63 |
| | | (31.52) | (29.67) | (27.55) | (28.81) | (29.61) |
| $T_7$ | Imidacloprid 0.3G | 22.44 | 20.19 | 19.64 | 18.58 | 19.47 |
| | | (29.62) | (30.10) | (35.15) | (39.20) | (34.85) |
| $T_0$ | Control | 22.87 | 24.57 | 26.49 | 29.65 | 26.90 |
| | | (30.18) | (36.60) | (39.47) | (57.81) | (48.15) |
| Overal Mean | | 22.90 | 17.96 | 15.27 | 13.54 | 15.59 |
| F- test | | NS | S | S | S | S |
| S. Ed. (±) | | 1.49 | 0.27 | 0.33 | 0.23 | 0.11 |
| C. D. (P = 0.05) | | 3.16 | 0.57 | 0.63 | 0.47 | 0.34 |

**Table 2:** Economics of Cultivation:

| Tr. No: | Treatment | Yield q/ha | Cost of yield Rs/q | Total cost of yield in Rs | Common cost in Rs | Treat ment cost in Rs | Total cost in Rs | C:B ratio |
|---|---|---|---|---|---|---|---|---|
| $T_1$ | Indoxacarb 14.5SC | 34.79 | 1500 | 52185 | 31835 | 930 | 32765 | 1:1.59 |
| $T_2$ | Fipronil 0.3%G | 37.44 | 1500 | 56160 | 31835 | 1200 | 33035 | 1:1.70 |
| $T_3$ | Carbofuron 3G | 42.72 | 1500 | 64080 | 31835 | 1700 | 33535 | 1:1.91 |
| $T_4$ | Cartap 3G | 31.68 | 1500 | 47520 | 31835 | 1795 | 33630 | 1:1.41 |
| $T_5$ | Cypermethrin 10%EC | 40.80 | 1500 | 61200 | 31835 | 630 | 32465 | 1:1.88 |
| $T_6$ | Profenofos 40%EC | 28.54 | 1500 | 42810 | 31835 | 575 | 32410 | 1:1.32 |
| $T_7$ | Imidacloprid 0.3G | 26.49 | 1500 | 39735 | 31835 | 1100 | 32935 | 1:1.20 |
| $T_0$ | Untreated/Control | 23.57 | 1500 | 35355 | 31835 | - | 31835 | 1:1.11 |

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