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# Evaluation of selected insecticides on the incidence of gram pod borer [*Helicoverpa armigera* (Hubner)] on chickpea

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**Abstract**
The research work entitled "Evaluation of selected insecticides on the incidence of gram pod borer [*Helicoverpa armigera* (Hubner)] on chickpea" was undertaken at central research field (CRF) SHUATS, Naini, Prayagraj consists of eight treatments *viz*, T1-Neem oil 5%, $T_2$-Nisco sixer plus, $T_3$-Emamectin benzoate 5% WG, $T_4$-Indoxacarb 14.5% SC, $T_5$-Spinosad 45% SC, T6 Flubendiamide 48% SC, $T_7$-Chlorantraniliprole 18.5% SC and $T_0$-untreated control in RBD with three replications targeting to evaluate the efficacy of selected insecticides on the incidence of gram pod borer [*Helicoverpa armigera* (Hubner)] on Chickpea. Data was taken on Chickpea pod borer population. The larval population of chickpea pod borer *Helicoverpa armigera* on third, seventh and fourteen days after spraying revealed that the treatment Chlorantraniliprole (0.567) found superior followed by Flubendiamide (0.811), Indoxacarb (1.011), Spinosad (1.111), Emamectin benzoate (1.222), Nisco sixer plus (1.311) and Neem oil (1.466) as compared to control (3.911). When the cost benefit ratio was worked out, the results were quite interesting. Among the treatments studied, the best and most economical treatment was Chlorantraniliprole (1: 4.09), followed by Flubendiamide (1: 3.91), Indoxacarb (1: 3.68), Spinosad (1: 3.42), Emamectin benzoate (1: 3.34), Nisco sixer plus (1: 3.17) and Neem oil (1: 3.04) as compared to $T_0$ Control (1: 2.26).

**Keywords:** Chickpea, evaluation, *Helicoverpa armigera*, incidence, insecticides

## Introduction
Chickpea (*Cicer arietinum* L.) is one of the most important pulse crops of India. India is the largest producer with 75% of world acreage and production of gram. India produces 5.3 mt of chickpea from 6.67 m ha with an average production of 844 kg ha-1. The survey conducted from time to time by various agencies in different parts of the country revealed that there are many factors which influence the production of chickpea. Among the insect pests particularly pod borer. (Bhushan *et al*., 2011) [1]. chickpea (*Cicer arietinum* L.) is the third most important pulse crop in the world, after dry beans and field peas. (Sarnaik and Chiranjeevi, 2017) [16].
Chickpea (*Cicer arietinum* L.) is grown widely in the world because the seeds are a rich source of protein for the rapidly increasing population. However, the production and productivity of chickpea have been experienced drastically because of biotic and abiotic stresses. It is vulnerable to a broad range of pathogens and the mainly severe pest being gram pod borer, *Helicoverpa armigera* (Hübner). *Helicoverpa armigera* is a cosmopolitan and widely distributed insect pest in the world. It is a serious pest of all legumes. In India, it has been observed to feed on 181 cultivated and uncultivated species belonging to 45 families. (Meena *et al.,* 2018) [13]. India is the largest in terms of area and production of chickpea in the world i.e., approximately 70 per cent of total chickpea production in the world. (Upadhyay *et al*., 2020) [37].
Gram (chick pea) is the crop of tropical, subtropical and temperate region and widely grown in Uttar Pradesh, Madhya Pradesh, Punjab, Rajasthan and Maharashtra which is popularly used as a protein adjunct to starchy diets. Seeds are widely consumed as pulse and in the form of flour which is largely fed to the horse and eaten after roasting. Seeds of chick pea contain 17.1% proteins, 5.3% fats, 16.2% carbohydrates, 3.9% fibres and 2.7% minerals. Moderate to high levels of resistance to cypermethrin and moderate resistance to endosulfan were recorded in field populations of *Helicoverpa armigera*. The growing awareness of the hazards of pesticide use has created a worldwide interest in pest control agents of plant origin that are bioactive and yet ecologically safe.

Hence, the present experiment was conducted to assess the performance of Neem Seed Kernel Extract (NSKE) along with safer new molecule Flubendiamide 39.35 SC as an effective combination of oviposition inhibitor and larvicidal effect for the management of *Helicoverpa armigera* on chickpea. (Gautam *et al*., 2018) [5].

## Materials and Methods

The Studies on the "Evaluation of selected insecticides on the incidence of gram pod borer [*Helicoverpa armigera* (Hubner)] on chickpea (*Cicer arietinum* L.)" was carried out during November 2021 to April 2022 at Central research field (CRF), SHUATS, Naini, Prayagraj, Uttar Pradesh, India. The details of the materials used and the methods adopted for this study are presented in this chapter.

The experiment was conducted during the *rabi* season 2021-2022 at Central research field (CRF), SHUATS, Naini, Prayagraj, Uttar Pradesh, India. The site selected was uniform, cultivable with good drainage system.

Before sowing, the field was thoroughly ploughed and pulverized with tractor drawn cultivator to attain desirable tilt. Harrowing operation was carried out once during land preparation. Stubble and weeds were picked up from the field. The land was leveled with the help of rake and the plots were demarcated according to layout made as per statistical designs. A basal dose of 30 kg N, 60 kg $P_2O_5$ and 30 kg $K_2o$ were applied in furrows before sowing. A seed rate of 80 kg/ha was utilized to raise the crop. Plots of size of 2m×2m was made. Sowing was done with 30 cm × 10 cm spacing.

First irrigation was given immediately after sowing and subsequent irrigations were given as required. The crop was harvested after reaching the dehiscent stage. The observations on the population buildup of chickpea pod borer, *H. armigera* were recorded from 15 days after sowing till harvesting. For recording pest population total number of larvae of the insect were counted on five randomly selected plants from each insecticide free plot and average populations per five plants were worked out.

Cost effectiveness of each treatment was assessed on net returns. Net return of each treatment was worked out by deducting total cost of the treatment from gross returns.

Total cost of production included both cultivation as well as plant protection charges.

Gross return = Marketable yield x Market price

Net return = Gross Return - Total cost

$$\text{B:C ratio} = \frac{\text{Gross returns}}{\text{total cost of Cultivation}}$$

Percentage pod damage was calculated with the following formula suggested by Kumar *et al.* (2013).

$$Percentage\ Pod\ damage = \frac{No.\ of\ affected\ pods}{Total\ no.\ of\ pods} \times 100$$

## Results and Discussion

The data on the overall mean (1st and 2nd Spray) larval population regarding the field efficacy of selected insecticides against gram pod borer revealed that all the treatments were found very effective and significantly superior over untreated control. The minimum larval population was recorded in $T_7$- Chlorantraniliprole (0.567) these findings are in support with Chitralekha *et al*., (2018) [2], Sreekanth *et al*., (2014) [20] & Dadas *et al*., (2019) [3] proved their superiority over other insecticides in reducing larval population of *H. armigera* (0.68), (0.43) & (0.47) followed by $T_6$ Flubendiamide (0.811) which is in line with the findings of Kumar *et al.,* (2018) [11], Sreekanth *et al*., (2014) [20] & Dadas *et al*., (2019) [3] reported similar results with Flubendiamide (1.17 and 0.84), (0.59) & (0.56). $T_4$ Indoxacarb (1.011) was found to be the next best treatment which is in line with the findings of Narayan *et al*., (2015) [14], Sreekanth *et al*., (2014) [20] & Dadas *et al*., (2019) [3] reported similar results with Indoxacarb (2.34), (1.44) & (0.66). $T_5$ Spinosad (1.111) was found to be the next best treatment with the findings of Sreekanth *et al.,* (2014) [20], Dadas *et al*., (2019) [3] & Singh *et al*., (2015) [19] reported similar results with Spinosad (0.85), (0.59) & (4.33) followed by $T_3$ Emamectin benzoate (1.222), with the findings of Upadhyay *et al*., (2020) [23], Dadas *et al*., (2019) [3] reported treatment with Emamectin benzoate with larval population of 1.05 and 0.64, followed by $T_2$ Nisco sixer plus (1.311) with the findings of Gayathri and Kumar (2021) [6], reported percent reduction of larval population with Nisco sixer plus (59.18) and Kumar *et al*., (2019) [10], Gautam *et al*., (2018) [5] supported $T_1$ Neem oil (1.466) of similar findings (2.21), (0.33) was found to be the least effective treatment amongst all but comparatively superior over control.

The highest yield was recorded in $T_7$ Chlorantraniliprole (23.61 q/ha), followed by $T_6$ Flubendiamide (22.75 q/ha), $T_5$ Spinosad (21.66 q/ha), $T_4$ Indoxacarb (19.16 q/ha), $T_3$ Emamectin benzoate (18.33 q/ha), $T_2$ Nisco sixer plus (16.50 q/ha), $T_1$ Neem oil (15.66 q/ha) as compared to control $T_0$ (11.08 q/ha). When cost benefit ratio was worked out, interesting result was achieved. Among the treatments studied, the best and most economical treatment were Chlorantraniliprole, (1: 4.09) Flubendiamide (1: 3.91), Indoxacarb (1: 3.68), Spinosad (1: 3.42), Emamectin benzoate (1: 3.34), Nisco sixer plus (1: 3.17), Neem oil (1: 3.04) as compared to control (1: 2.26).

These present findings are similar with Reddy *et al.,* (2021) [15], Shridhara *et al*., (2019) [18] & Khoshariya *et al*., (2018) [9] reported that the cost benefit ratio obtained in Chlorantraniliprole treated plot was (1:8.5), (1:2.6) & (1:2.78). Shahiduzzaman (2017) [17], Dinesh *et al*., (2017) [4] & Yadav *et al*., (2019) [23] concluded that, in terms of higher cost benefit ratio, Flubendiamide recorded (1:2.65), (1:26) & (1:10.06). Lavanya and Kumar (2022) [12], Sreekanth *et al.*, (2014) [20] & Reddy *et al.,* (2021) [15] observed highest C:B ratio in Indoxacarb with (1:3.07), (1:3.67) & (1:7.8) and in Spinosad with (1:3.01), (1:2.97) & (1:9.6). Sreekanth *et al.*, (2014) [20], Yadav *et al.*, (2019) [23] observed highest cost benefit ratio in Emamectin benzoate with (1:3.13), (1:9.20). Tejeswari and Kumar (2021) [21], Reddy *et al*., (2021) [15] reported C:B ratio of (1:5.9), (1:8.3) in Nisco sixer plus treated plot and (1:5.6) in the plot treated with Neem oil.

**Table 1:** Efficacy of selected insecticides on the incidence of gram pod borer *H. armigera* in chickpea during *rabi* season 2021-2022 (1st spray)

| S. No | Treatment | Average number of Larvae/five plants (1st spray) | | | | |
|---|---|---|---|---|---|---|
| | | 1 DBS | 3 DAS | 7 DAS | 14 DAS | Mean |
| $T_0$ | Control | 2.800 | 3.133 | 3.33 | 3.800 | 3.421 |
| $T_1$ | Neem oil | 3.00 | 2.200 | 1.266 | 1.800 | 1.755 |
| $T_2$ | Nisco sixer plus | 2.933 | 2.00 | 1.067 | 1.467 | 1.511 |
| $T_3$ | Emamectin benzoate | 3.067 | 2.00 | 0.933 | 1.33 | 1.422 |
| $T_4$ | Indoxacarb | 2.400 | 1.600 | 0.667 | 1.133 | 1.133 |
| $T_5$ | Spinosad | 3.00 | 1.933 | 0.867 | 1.200 | 1.333 |
| $T_6$ | Flubendiamide | 2.800 | 1.733 | 0.600 | 0.933 | 1.089 |
| $T_7$ | chlorantraniliprole | 2.667 | 1.533 | 0.400 | 0.667 | 0.867 |
| | **F-Test** | **NS** | **S** | **S** | **S** | **S** |
| | S.Ed (+) | 0.268 | 0.223 | 0.431 | 0.118 | 0.702 |
| | C.D(5%) | ---- | 0.480 | 0.291 | 0.252 | 0.476 |

**Table 2:** Efficacy of selected insecticides on the incidence of gram pod borer *H. armigera* in chickpea during *rabi* season 2021-2022 (2nd spray)

| S. No | Treatments | Average number of Larvae/five plants (2nd spray) | | | |
|---|---|---|---|---|---|
| | | 3 DAS | 7 DAS | 14 DAS | Mean |
| $T_0$ | Control | 4.00 | 4.200 | 5.00 | 4.400 |
| $T_1$ | Neem oil | 1.133 | 0.933 | 1.466 | 1.177 |
| $T_2$ | Nisco sixer plus | 1.133 | 0.933 | 1.267 | 1.111 |
| $T_3$ | Emamectin benzoate | 1.066 | 0.866 | 1.133 | 1.021 |
| $T_4$ | Indoxacarb | 0.933 | 0.733 | 1.00 | 0.889 |
| $T_5$ | Spinosad | 1.00 | 0.733 | 0.933 | 0.889 |
| $T_6$ | Flubendiamide | 0.733 | 0.33 | 0.533 | 0.533 |
| $T_7$ | chlorantraniliprole | 0.333 | 0.133 | 0.33 | 0.266 |
| | F-test | S | S | S | S |
| | S.Ed (+) | 0.089 | 0.100 | 0.089 | 0.151 |
| | C.D. (5%) | 0.197 | 0.211 | 0.197 | 0.329 |

**Table 3:** Efficacy of selected insecticides on the incidence of gram pod borer *H. armigera* in chickpea during *rabi* season 2021-2022 (1st and 2nd Spray overall mean)

| Treatments | 1st Spray | 2nd Spray | Mean |
|---|---|---|---|
| T0 | 3.421 | 4.400 | 3.911 |
| T1 | 1.755 | 1.177 | 1.466 |
| T2 | 1.511 | 1.111 | 1.311 |
| T3 | 1.422 | 1.021 | 1.222 |
| T4 | 1.133 | 0.889 | 1.011 |
| T5 | 1.333 | 0.889 | 1.111 |
| T6 | 1.089 | 0.533 | 0.811 |
| T7 | 0.867 | 0.266 | 0.567 |
| S.Em± | | | 0.300 |
| CD or LSD | | | 0.874 |
| Test of significance (p=0.05) | | | S |

**Table 4:** Yield of different treatments (Kg/ha)

| S. No. | Treatments | Kg/plot | | | | Q/hac | Increase yield over control Q/ha |
|---|---|---|---|---|---|---|---|
| | | R1 | R2 | R3 | Mean | Mean | |
| T0 | Control | 1.6 | 1.3 | 1.1 | 1.33 | 11.08 | 0 |
| T1 | Neem oil | 2.0 | 1.85 | 1.85 | 1.88 | 15.66 | 4.58 |
| T2 | Nisco sixer plus | 1.9 | 2.05 | 2.0 | 1.98 | 16.50 | 5.42 |
| T3 | Emamectin benzoate | 2.1 | 2.3 | 2.2 | 2.2 | 18.33 | 7.25 |
| T4 | Indoxacarb | 2.2 | 2.3 | 2.4 | 2.30 | 19.16 | 8.08 |
| T5 | Spinosad | 2.6 | 2.6 | 2.6 | 2.60 | 21.66 | 10.58 |
| T6 | Flubendiamide | 2.8 | 2.6 | 2.8 | 2.73 | 22.75 | 11.67 |
| T7 | chlorantraniliprole | 2.9 | 2.7 | 2.9 | 2.83 | 23.61 | 12.53 |

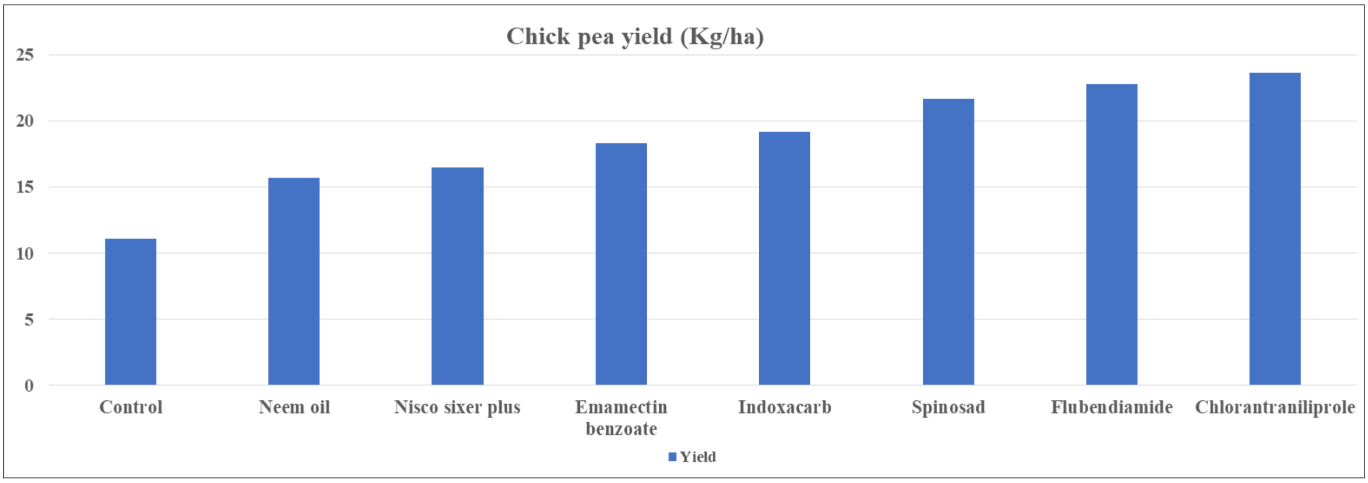


**Fig 1:** Yield of different treatments (kg/ha)

**Table 5:** Cost benefit ratio of the treatments

| Treatment symbols | Treatments | Yield (q/ha) | Cost of yield q/₹ | Total cost of yield in ₹ | Common cost (₹) | Treatment cost (₹) | Total treatment cost (₹) | C:B Ratio |
|---|---|---|---|---|---|---|---|---|
| $T_0$ | Control | 11.08 | 5500 | 60940 | 26900 | ____ | 26900 | 1: 2.26 |
| $T_1$ | Neem oil | 15.66 | 5500 | 86130 | 26900 | 1400 | 28300 | 1: 3.04 |
| $T_2$ | Nisco sixer plus | 16.50 | 5500 | 90750 | 26900 | 1700 | 28600 | 1: 3.17 |
| $T_3$ | Emamectin benzoate | 18.33 | 5500 | 100815 | 26900 | 3200 | 30100 | 1: 3.34 |
| $T_4$ | Indoxacarb | 19.16 | 5500 | 105380 | 26900 | 1700 | 28600 | 1: 3.68 |
| $T_5$ | Spinosad | 21.66 | 5500 | 119130 | 26900 | 7920 | 34820 | 1: 3.42 |
| $T_6$ | Flubendiamide | 22.75 | 5500 | 125125 | 26900 | 5100 | 32000 | 1: 3.91 |
| $T_7$ | chlorantraniliprole | 23.61 | 5500 | 129855 | 26900 | 4802 | 31702 | 1: 4.09 |

## Conclusion
From the present study it can be concluded that the effect of insecticides on chickpea pod borer revealed that the newer insecticides like chlorantraniliprole has shown the maximum effect with the minimum larval population and maximum yield followed by Flubendiamide, Indoxacarb, Spinosad, Emamectin benzoate, Nisco sixer plus and Neem oil which was found to be the least effective treatment. Hence the selected insecticides can be easily incorporated in Integrated Pest Management Programme as an effective tool against gram pod borer as their doses are very low. Where as in terms of cost benefit ratio among the treatments studied, the best and most economical treatment were chlorantraniliprole followed by Flubendiamide, Indoxacarb, spinosad, Emamectin benzoate, Nisco sixer plus, Neem oil as compared to Control.

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## References
1. Bhushan S, Singh RP, Shanker R. Bio-efficacy of neem and Bt against pod borer, *Helicoverpa armigera* in chickpea, Journal of Biopesticides. 2011;4(1):87-89.
2. Chitralekha, Yadav GS, Verma T. Efficacy of insecticides against *Helicoverpa armigera* on chickpea, Journal of Entomology and Zoology Studies. 2018;6(3):1058-1061.
3. Dadas SM, Gosalwad SS, Patil SK. Efficacy of different newer insecticides against pigeon pea pod borers. Journal of Entomology and Zoology Studies. 2019;7(5):784-791.
4. Dinesh K, Singh RB, Kavita K, Choudhary RS. Relative efficacy of newer insecticides and biopesticides against *Helicoverpa armigera* (Hub.) in chickpea. Journal of Entomology and Zoology Studies. 2017;5(3):455-462.
5. Gautam MP, Chandra U, Singh SN, Yadav SK, Giri SK. Studies on Efficacy of Botanicals against *Helicoverpa armigera* (Hubner) On Chickpea (*Cicer arietinum* L.) International Journal of Current Microbiology and Applied Sciences. 2018;(7):612-618.
6. Gayathri L, Kumar A. Field efficacy of certain insecticides against pod borer, *Helicoverpa armigera* (Hubner) on chick pea in Prayagraj. Journal of Entomology and Zoology Studies. 2021;9(3):280-283.
7. Gowda DKS, Patil BV, Yelshetty S. Performance of Different Sprayers against Gram Pod Borer, *Helicoverpa armigera* (Hubner) on Chickpea. Karnataka Journal of Agriculture Sciences. 2007;20(2):261-264.
8. Hossain MS, Islam MS, Salam MA, Hossain MA, Salma MU. Management of chickpea pod borer, *Helicoverpa armigera* (Hubner) using neem seed extract and lambda-cyhalothrin in high Barind tract, Journal of bio-sciences. 2010;1(18):44-48.
9. Khorasiya SG, Raghvani KL, Bharadiya AM, Jethva DM, Bhut JB. Efficacy of bio-pesticides, insecticides alone and their combination against pod damage caused by *Helicoverpa armigera* in chickpea. Journal of Entomology and Zoology Studies. 2018;6(1):928-933.

10. Kumar A, Tripathi MK, Chandra U, Veer R. Efficacy of botanicals and bio-pesticide against *Helicoverpa armigera* in chickpea, Journal of Entomology and Zoology Studies. 2019;7(1):54-57.
11. Kumar L, Bisht RS, Singh H, Kumar A, Pandey N, Kumar M. Bioefficacy and economics of some newer insecticides and bio-pesticides against *Helicoverpa armigera* (Hub.) on chickpea (*Cicer arietinum* L.) crop Journal of Pharmacognosy and Phytochemistry. 2018;SP1:1739-1744.
12. Lavanya V, Kumar A. Efficacy of certain chemicals against gram pod borer [*Helicoverpa armigera* (Hubner)] on chickpea (*Cicer arietinum* L.). The Pharma Innovation Journal. 2022;11(3):1293-1297.
13. Meena RK, Naqvi AR, Meena DS, Shivbhagvan. Evaluation of bio-pesticides and indoxacarb against gram pod borer on chickpea. Journal of Entomology and Zoology Studies. 2018;6(2):2208-2212.
14. Narayan SRP, Singh PS, Singh SK. Evaluation of certain new insecticides against *Helicoverpa armigera* (Hubner) on chickpea (*Cicer arietinum* L.) Journal of Experimental Zoology India. 2015;18(1):227-231.
15. Reddy RD, Kumar A, Sai KP. Efficacy of some insecticides against tomato fruit borer, *Helicoverpa armigera* (Hubner). Journal of Entomology and Zoology Studies. 2021;9(1):1434-1436.
16. Sarnaik SV, Chiranjeevi B. Bioefficacy of newer insecticides against gram pod borer *Helicoverpa armigera* (Hubner) on chickpea. An International quarterly journal of life sciences. 2017;12(1):65-69.
17. Shahiduzzaman MD. Efficacy of insecticides in controlling pod borer (*Helicoverpa armigera* Hubner) infesting chickpea Bangladesh journal Agricultural Research Institute. 2017;42(2):373-378.
18. Shridhara M, Hanchinal SG, Sreenivas AG, Hosamani AC, Nidagundi JM. Evaluation of Newer Insecticides for the Management of Brinjal Shoot and Fruit Borer *Leucinodes orbonalis* (Guenee) (Lepidoptera: Crambidae). International Journal of Current Microbiology and Applied Science. 2019;8(3):2582-2592.
19. Singh P, Singh R, Kumar S, Kumar V, Kumar S. Bio-efficacy of certain new insecticides against larval population of gram pod borer, *Helicoverpa armigera* (Hubner) in chickpea. An international quarterly journal of environmental sciences. 2015;7:315-318.
20. Sreekanth M, Lakshmi MSM, Koteswar DYR. Bio-efficacy and economics of certain new insecticides against gram pod borer, *Helicoverpa armigera* (Hubner.) infesting pigeonpea (*Cajanus cajan* L.). International journal of plant, animal and environmental sciences. 2014;4(1):2231-4490.
21. Tejeswari K, Kumar A. Comparative efficacy of chemicals with biopesticides against tomato fruit borer, *Helicoverpa armigera* (Hubner) on Tomato, *Solanum lycopersicum* (L.) under field conditions. Journal of Entomology and Zoology Studies. 2021;9(5):425-429.
22. Upadhyay RR, Singh PS, Singh SK. Comparative efficacy and economics of certain insecticides against gram pod borer, *Helicoverpa armigera* (Hübner) in chickpea. Indian Journal of Plant Protection. 2020;48(4):403-410.
23. Yadav RK, Chandra U, Veer R, Raj A, Gautam CPN, Kumar S, *et al*. Relative efficacy of newer insecticides against gram pod borer, *Helicoverpa armigera*. Journal of Pharmacognosy and Phytochemistry. 2019;8(4):599-601.