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BIO-EFFICACY OF NEWER INSECTICIDES AGAINST GRAM POD BORER (*HELICOVERPA ARMIGERA* HUBNER) ON CHICKPEA

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Abstract:
The investigation sought to examine the Bio efficacy of several insecticides on the larval population of the gram pod borer (*Helicoverpa armigera*) in chickpea plants, as well as the corresponding cost-benefit ratio. The present study was carried out at KVK Operational area Village Nahnegaon Solapur during *Rabi* (2024-25) in a Randomized Block Design (RBD) with seven treatments replicated three times. The outcomes revealed that the application of Cyclaniliprole 100 DC @ 40 g.a.i/ha and Chlorantraniliprole 18.5% SC @ 25g a.i./ha were established to be most effective treatments and application of Chlorantraniliprole 9.30 % + Lambda-cyhalothrin 04.60 % ZC @ 30 g.a.i./ha was least effective in respect of larval population/mrl of *H.armigera*. Novaluron 5.25 % + Indoxacarb 4.50 % SC @ 43.31 + 37.13 g.a.i./ha recorded highest percent pod damage and Cyclaniliprole 100 DC @ 40 g.a.i/ha and Chlorantraniliprole 18.5% SC @ 25g a.i./ha recorded least percent pod damage. The maximum yield was recorded in Cyclaniliprole 100 DC @ 40 g.a.i/ha (22.56 q/ha) followed by Chlorantraniliprole 18.5% SC @ 25g a.i./ha (21.13 q/ha) and lowest yield was recorded from Chlorantraniliprole 9.30 % + Lambda-cyhalothrin 04.60 % ZC (15.60 q/ha) treated plot. The economics of different new molecule insecticides indicated that higher benefit cost ratio (BCR) was observed from Chlorantraniliprole 18.5% SC @ 25g a.i./ha (8.14:1) followed by Cyclaniliprole 100 DC @ 40 g.a.i/ha (7.14:1) and the lower BCR was recorded from Novaluron 5.25 % + Indoxacarb 4.50 % SC @ 43.31 + 37.13 g.a.i./ha (2.86:1). Cyclaniliprole 100 DC @ 40 g.a.i/ha, Chlorantraniliprole 18.5% SC @ 25g a.i./ha, Flubendiamide 8.33 % + Deltamethrin 5.56 % SC @ 22.50 + 15 g.a.i./ha (250 ml/ha) and Novaluron 5.25 % + Indoxacarb 4.50 % SC @ 43.31 + 37.13 g.a.i./ha are newer group of insecticides, which are relatively safer and more effective against gram pod borer as comparison to conventional insecticides and can be used in successful management of this key pest of chickpea.

Keywords: Bio efficacy, *Helicoverpa armigera*, Chickpea, newer insecticides etc.

Introduction:
Chickpea (*Cicer arietinium* L.) is an important pulse crop of India (Dixit et al*.,* 2017; Anon., 2018). *Cicer arietinum L*., belongs to the "Fabaceae" (or Leguminosae) family of legumes, peas, or pulses. Chickpeas, sometimes called Chana, Bengal gramme, or Gramme are an important pulse crop that is farmed in many different nations worldwide. (Singh F, Diwakar B, 1995). Due to its low cost of production, wide range of adaptability, capacity to fix atmospheric nitrogen, and flexibility to fit in different crop rotations, it is one of the most significant food legume plants in sustainable agricultural systems (Singh, 1997).
India ranks first in the production and consumption of chickpea (*Cicer arietinum L.*) in the world. Globally it was grown in 149.66 lakh ha area, with a total production of 15.97 million metric tons and an average productivity of 1252 kg/ha (DES 2023, MOAF and W, GoI). Chickpea production in India was 13.75 million tons from acreage of 10.91 million ha. With a productivity of 12.6 q./ha (DES 2023, MOAF and W, GoI. Chickpea solely contributes nearly 50% of the Indian pulse production. States like Maharashtra (25.97%

contribution to national production), Madhya Pradesh (18.59%), Rajasthan (20.65%), Gujarat (10.10%) and Uttar Pradesh (5.64%) are major chickpea-producing states of India.

It is a rich source of nutritional values in the diet of Indian people, Per 100 grammes, chickpeas contain the following nutrients: 27.42 grams of carbohydrates, 8.86 grammes of protein, 2.59 grammes of total fat, 7.6 grams of dietary fibre, 172 µg of folates, 0.526 mg of niacin, 0.245 mg of pantothenic acid, 0.216 mg of pyridoxine, 0.063 mg of riboflavin, 0.200 mg of thiamine, 1.3 mg of vitamin C, 27 IU of vitamin A, 0.35 mg of vitamin E, 4.0 milligrams of potassium, 291 mg of sodium, 49 milligrams of calcium, 2.89 mg of iron, 48 milligrams of magnesium, 168 milligrams of phosphorous, and 1.53 milligrams of zinc.

It is infested by half a dozen insect pests, of which the pod borer, *Helicoverpa armigera* (Hubner) is the most important, and it is a multivoltine, highly mobile and fecundative insect (Khan et al., 2013). *H. armigera* is a notorious, multigenerational and widely distributed pest and is reported to habituate 181 species of host plants belonging to 47 families in India. Among the insect-pests, pod borer is the most severe yield reducer throughout India (Kailas and Choudhary 2021). Gram Pod borer, *Helicoverpa armigera* (Hubner) is a pest with notable economic consequence, and it is the main constraint on the growth of chickpeas. In extreme situations, it reduces seed production by roughly 75% to 90% (Sarwar et al., 2013). Several new chemistry insecticides are being applied by chickpea growers against *Helicoverpa armigera*. Due to indiscriminate use of chemicals and an eventual increase in insecticides resistance among insect, it is imperative to test the efficacy of new chemistry insecticides. Therefore, the current study was designed to evaluate the efficacy of few new chemistry insecticides for the effective management of chickpea pod borer.

Materials and Methods

The present investigation entitled "Bio efficacy of new insecticides against pod borer *Helicoverpa armigera* (Hub.) in chickpea (Lepidoptera: Noctuidae)" was carried at, Krishi Vigyan Kendra Solapur, Operational area Village Nahnegaon Tal Akkalkot, District Solapur Maharashtra during *Rabi* 2024-25. The research trail was laid out in Randomized block design (RBD) with seven different treatments replicated thrice. The plot had a dimension of 3 × 3 m. The chickpea seeds of variety 'Phule Vishwaraj' were sown in plots keeping row to row and plant to plant distance of 30 × 10 cm. All of the insecticides used in the study were sprayed as foliar application. The six different treatments were used with dosage consisting of T_1 Flubendamide 20WDG @ 50 g.*a.i*/ha (250gm/ha), T_2 Cyclaniliprole 100 DC @ 40 g.*a.i*/ha (400ml/ha), T_3 Chlorantriniliprole 18.5 SC @ 25 g.a.i/ha (150ml/ha), T_4 Flubendiamide 8.33 % + Deltamethrin 5.56 % SC @ 22.50 + 15 g.*a.i.*/ha (250 ml/ha), T_5 Novaluron 5.25 % + Indoxacarb 4.50 % SC @ 43.31 + 37.13 g.*a.i.*/ha (825ml/ha), T_6 Chlorantraniliprole 9.30 % + Lambda-cyhalothrin 04.60 % ZC @ 30 g.*a.i.*/ha (200ml/ha),T7 Water Spray. Two sprays were carried out at intervals of 15 days during the experiment to assess the effectiveness of insecticides when the *Helicoverpa armigera* larval population reached the ETL threshold. Spraying will be initiated when average larval count was ≥1 mrl. Observations were recorded before spraying and 1, 3, 7 and 10 days after spraying. Grain yield of each plot will be also recorded. The populations of gram pod borer were recorded on 5 randomly selected plants from each plot for investigate larval population and cost-benefit ratio by following the formula.

The spray solution of desired concentration should be prepared by adopting the following formula:

$$V = \frac{(C \times A)}{\% \text{ a.i.}}$$

$$\text{C: B Ratio} = \frac{\text{Gross returns}}{\text{Total cost incurred}}$$

RESULTS AND DISCUSSION

First Spray:

Six insecticides Flubendamide 20WDG, Cyclaniliprole 100 DC, Chlorantraniliprole 18.5 SC, Flubendiamide 8.33 % + Deltamethrin 5.56 % SC, Novaluron 5.25 % + Indoxacarb 4.50 % SC, Chlorantraniliprole 9.30 % + Lambda-cyhalothrin 04.60 % ZC were tested against gram pod borer *Helicoverpa armigera* in chickpea during Rabi-2024-25. Pre-treatment observation was recorded a day before the application of insecticides, which revealed the uniform distribution of pod borer in the field. The data pertaining efficacy of the first and second spray was obtained and presented in Table 1 and Figure 1 indicates that the population a day before was ranged from 1.40 to 2.3 larvae/mrl. The data obtained from 1 DAS (Days after spray) revealed that reduction in larval population was recorded in all treated plots in comparison to the untreated plot. However, among all the treatments the minimum larval population after first spray was found in treatment T_2-Cyclaniliprole 100 DC

@ 40 g.a.i/ha (0.33 larvae/mrl) followed by the treatment T_3- Chlorantraniliprole 18.5 SC @ 25 g.a.i/ha and T_5- Novaluron 5.25 % + Indoxacarb 4.50 % SC @ 43.31 + 37.13 g.a.i./ha (0.53 larvae/mrl),T4- Flubendiamide 8.33 % + Deltamethrin 5.56 % SC @ 22.50 + 15 g.a.i./ha (250 ml/ha) at par with T_5 (0.60 larvae/mrl) and highest in treatment T_6- Chlorantraniliprole 9.30 % +Lambda-cyhalothrin 04.60 % ZC @ 30 g.a.i./ha (1.07 larvae/mrl), T_1- Flubendamide 20WDG @ 50 g.a.i/ha (0.93larvae/mrl).The observation recorded at 3 DAS revealed that the minimum population was found in T_2-Cyclaniliprole 100 DC @ 40 g.a.i/ha (0.20 larvae/mrl) followed by the treatment T_3- Chlorantraniliprole 18.5 SC @ 25 g.a.i/ha(0.27 larvae/mrl), T_4- Flubendiamide 8.33 % + Deltamethrin 5.56 % SC @ 22.50 + 15 g.a.i./ha (0.40 larvae/mrl) and T_6- Chlorantraniliprole 9.30 % +Lambda-cyhalothrin 04.60 % ZC @ 30 g.a.i./ha (0.60 larvae/mrl) which was at par with T1- Flubendamide 20WDG @ 50 g.a.i/ha (0.73larvae/mrl) and highest in treatment T_5- Novaluron 5.25 % + Indoxacarb 4.50 % SC @ 43.31 + 37.13 g.a.i./ha (0.80 larvae/mrl). The data recorded at 7 DAS that all the treatments were significantly superior to over control and treatments T_2-Cyclaniliprole 100 DC @ 40 g.a.i/ha (0.27 larvae/mrl) followed by the treatment T_3- Chlorantraniliprole 18.5 SC @ 25 g.a.i/ha(0.53 larvae/mrl), T_5- Novaluron 5.25 % + Indoxacarb 4.50 % SC @ 43.31 + 37.13 g.a.i./ha (0.60 larvae/mrl) and T_4- Flubendiamide 8.33 % + Deltamethrin 5.56 % SC @ 22.50 + 15 g.a.i./ha (0.67 larvae/mrl) at par with T_5, the maximum population was observed in T_1- Flubendamide 20WDG @ 50 g.a.i/ha and T_6- Chlorantraniliprole 9.30 % +Lambda-cyhalothrin 4.60 % ZC @ 30 g.a.i./ha (0.80 larvae/mrl). The data noted at 10 DAS depicted that all the treatments were significantly superior to over control and treatment T_2-Cyclaniliprole 100 DC @ 40 g.a.i/ha (0.27 larvae/mrl) (0.40 larvae/mrl) was the most effective treatment recorded the lowest population over control followed by T_3- Chlorantraniliprole 18.5 SC @ 25 g.a.i/ha(0.27 larvae/mrl) (0.47 larvae/mrl) and treatment T_4- Flubendiamide 8.33 % + Deltamethrin 5.56 % SC @ 22.50 + 15 g.a.i./ha (0.67 larvae/mrl (0.93 larvae/mrl) and T_6- Chlorantraniliprole 9.30 % + Lambda-cyhalothrin 4.60 % ZC @ 30 g.a.i./ha (0.93 larvae/mrl) were least effective treatment recorded the highest population over control.

Second Spray:

The data recorded at 1 DAS revealed that minimum larval population was recorded in T2-Cyclaniliprole 100 DC @ 40 g.a.i/ha (0.13 larvae/mrl) followed by Chlorantraniliprole 18.5 SC @ 25 g.a.i/ha (0.33 larvae/mrl) and maximum population was found in T_6- Chlorantraniliprole 9.30 % + Lambda-cyhalothrin 4.60 % ZC @ 30 g.a.i./ha (0.73 larvae/mrl). The data noted at 3 DAS depicted that the lowest population was found in T_2-Cyclaniliprole 100 DC @ 40 g.a.i/ha (0.40 larvae/mrl) followed by Chlorantraniliprole 18.5 SC @ 25 g.a. i/ha (0.67 larvae/mrl) and highest population was found in T_4- Flubendiamide 8.33 % + Deltamethrin 5.56 % SC @ 22.50 + 15 g.a.i./ha (1.13 larvae/mrl) and T_6- Chlorantraniliprole 9.30 % +Lambda-cyhalothrin 4.60 % ZC @ 30 g.a.i./ha (0.93 larvae/mrl). At 7 DAS that the minimum population was recorded in T_2-Cyclaniliprole 100 DC @ 40 g.a.i/ha (0.53 larvae/mrl) followed by Chlorantraniliprole 18.5 SC @ 25 g.a.i/ha (0.60 larvae/mrl) and maximum population was found in T_4- Flubendiamide 8.33 % + Deltamethrin 5.56 % SC @ 22.50 + 15 g.a.i./ha (1.0 larvae/mrl). At 10 DAS that the lowest population was recorded in Chlorantraniliprole 18.5 SC @ 25 g.a.i/ha (0.40 larvae/mrl) followed by T_2-Cyclaniliprole 100 DC @ 40 g.a. i/ha (0.60 larvae/mrl) and maximum population was found in T_6- Chlorantraniliprole 9.30 % +Lambda-cyhalothrin 4.60 % ZC @ 30 g.a.i./ha (1.07 larvae/mrl). The records on overall insecticidal efficacy revealed that the treatments were statistically superior to control.

The overall mean population of 1, 3, 7 and 10 DAS indicate that all treated plots were significantly outperformed over control. However, among the all-treatments minimum larval population was found in T_2-Cyclaniliprole 100 DC @ 40 g.a.i/ha (0.36 larvae/mrl) and T_3- Chlorantraniliprole 18.5 SC @ 25 g.a.i/ha (0.48larvae/mrl which were most effective treatments in reducing the larval populations, T_4- Flubendiamide 8.33 % + Deltamethrin 5.56 % SC @ 22.50 + 15 g.a.i./ha (0.78 larvae/mrl) and T_1- Flubendamide 20WDG @ 50 g.a.i/ha (0.79 larvae/mrl) were at par with each other and equally effective against *Helicoverpa armigera* and T_6- Chlorantraniliprole 9.30 % + Lambda-cyhalothrin 4.60 % ZC @ 30 g.a.i./ha (0.87 larvae/mrl) had maximum population. The results are in conformity with the Prasanna PM *et al.* (2020) who tested the, Cyclaniliprole 100DC at different doses and Chlorantraniliprole 18.5 SC @ 25 g.a.i/ha against gram pod borer in chickpea. Since, the Cyclaniliprole 100DC is new molecule, the efficacy of this insecticide was reported by Bala (2020) and Thomas *et al.* (2015). The efficacy of Chlorantraniliprole 18.5 SC @ 25 g a.i. /ha was found highly conformity with findings of Bala (2020), Bala and Sarkar (2017), Barber *et al.* (2012), Chankapue *et al.,* 2014, Chitralekha *et al.* (2018), Patel *et al.* (2016), Patil *et al*. (2018), Sapkal *et al.* (2018).

Effect of certain new molecule of insecticides on pod damage

The efficacy of insecticides was tested in terms of pod damage in the field trial for the Rabi 2024-25 (Table 1). The respective results show that each of the individual treatments was significantly efficient than the control. The best result in terms of minimum pod damage was shown by treatment T_2- Cyclaniliprole 100 DC @ 40 g.a. i/ha (4.50) followed by T_3- Chlorantraniliprole 18.5 SC @ 25 g.a.i/ha (6.54%) whereas maximum pod damage was recorded from T_5- Novaluron 5.25 % + Indoxacarb 4.50 % SC @ 43.31 + 37.13 g.a.i./ha (15.63%) and Chlorantraniliprole 9.30 % + Lambda-cyhalothrin 04.60 % ZC @ 30 g.a.i./ha (12.41%) Rani *et al*. (2018) reported that application of Chlorantraniliprole in red gram had lowest pod damage caused by gram pod borer. All the treatments had resulted significantly better than water spray (Control). The present findings are having close conformity with results Prasanna PM *et al.* (2020) with reduction of larval population of *Helicoverpa armigera*. The highest percent pod damage was recorded in Novaluron 5.25 % + Indoxacarb 4.50 % SC @ 43.31 + 37.13 g.a.i./ha (15.63%). The efficacy of the insecticide Cyclaniliprole 100DC on *Helicoverpa armigera* was long lasting it can be used as next best alternate insecticide against chickpea pod borer, *Helicoverpa armigera*, in order to avoid resistance development.

Table No. 1: Efficacy of different new Insecticides against gram pod borer, *Helicoverpa armigera* infesting chickpea

Treatments	**Pre-treatments**	***Helicoverpa armigera* Larval population /mrl**								**Overall mean of 2 sprayings**	**Pod damage * (%)**
		1st Spraying				**2nd Spraying**					
		Day after Spraying				**Day after Spraying**					
		1	**3**	**7**	**10**	**1**	**3**	**7**	**10**		
Flubendamide 20WDG @ 50 g.a.i/ha (250gm/ha)	1.73	0.93 (1.20)	0.73 (1.10)	0.80 (1.14)	0.80 (1.14)	0.60 (1.05)	0.93 (1.18)	0.87 (1.16)	0.67 (1.11)	0.79 (1.14)	8.22 (16.67)
Cyclaniliprole 100 DC @ 40 g.a.i/ha (400ml/ha)	2.33	0.33 (0.91)	0.20 (0.83)	0.27 (0.87)	0.40 (0.94)	0.13 (0.79)	0.40 (0.94)	0.53 (1.00)	0.60 (0.84)	0.36 (0.93)	4.50 (12.25)
Chlorantraniliprole 18.5 SC @ 25 g.a.i/ha (150ml/ha)	1.47	0.53 (1.01)	0.27 (0.87)	0.53 (1.02)	0.47 (0.98)	0.33 (0.91)	0.67 (1.07)	0.60 (1.05)	0.40 (0.95)	0.48 (0.99)	6.54 (14.82)
Flubendiamide 8.33 % + Deltamethrin 5.56 % SC @ 22.50 + 15 g.a.i./ha (250 ml/ha)	1.33	0.60 (1.02)	0.40 (0.94)	0.67 (1.08)	0.93 (1.20)	0.80 (1.14)	1.13 (1.28)	1.00 (1.22)	0.73 (1.08)	0.78 (1.13)	7.89 (16.33)
Novaluron 5.25 % + Indoxacarb 4.50 % SC @ 43.31 + 37.13 g.a.i./ha (825ml/ha)	1.40	0.53 (1.01)	0.80 (1.14)	0.60 (1.05)	0.73 (1.11)	0.60 (1.05)	1.00 (1.22)	0.87 (1.17)	0.40 (1.14)	0.69 (1.09)	15.63 (23.31)
Chlorantraniliprole 9.30 % + Lambda-cyhalothrin 04.60 % ZC @ 30 g.a.i./ha (200ml/ha)	2.07	1.07 (1.25)	0.60 1.05)	0.80 (1.12)	0.93 (1.20)	0.73 (1.10)	0.93 (1.20)	0.80 (1.14)	1.07 (1.16)	0.87 (1.17)	12.41 (20.64)
Water spray @ 500 lit/ha	1.53	1.40 (1.38)	1.40 (137)	1.73 (1.49)	1.67 (1.47)	1.93 (1.56)	1.60 (1.45)	1.73 (1.49)	1.57 (1.47)	1.63 (1.46)	39.88 (39.08)
Mean	1.70	0.77 (1.11)	0.63 (1.04)	0.77 (1.11)	0.89 (1.15)	0.73 (0.86)	0.95 (1.19)	0.91 (1.18)	0.78 (1.11)	0.80 (1.14)	13.98 (21.70)
SEm ±	0.27	0.11	0.11	0.10	0.08	0.12	0.16	0.10	0.09	0.11	1.07
CD at 5%	NS	0.35	0.35	0.33	0.24	0.36	0.48	0.32	0.29	0.34	3.28

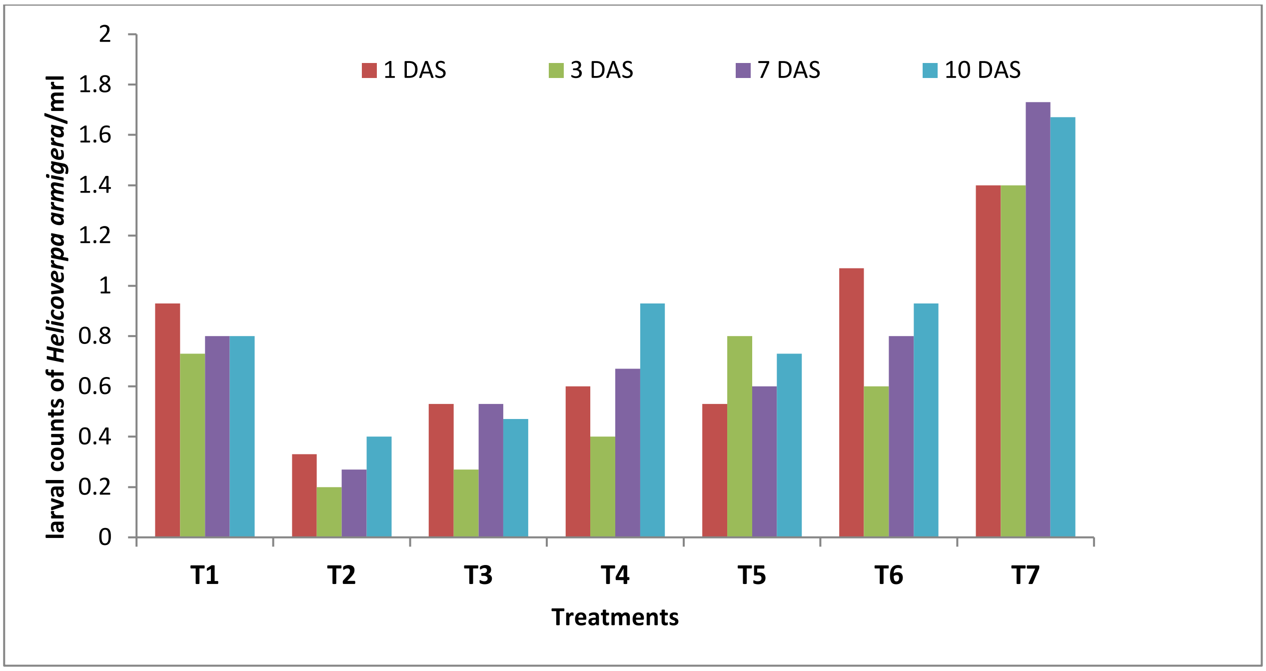

Fig.1: Efficacy of different new Insecticides against gram pod borer, *Helicoverpa armigera* infesting chickpea at First Spray

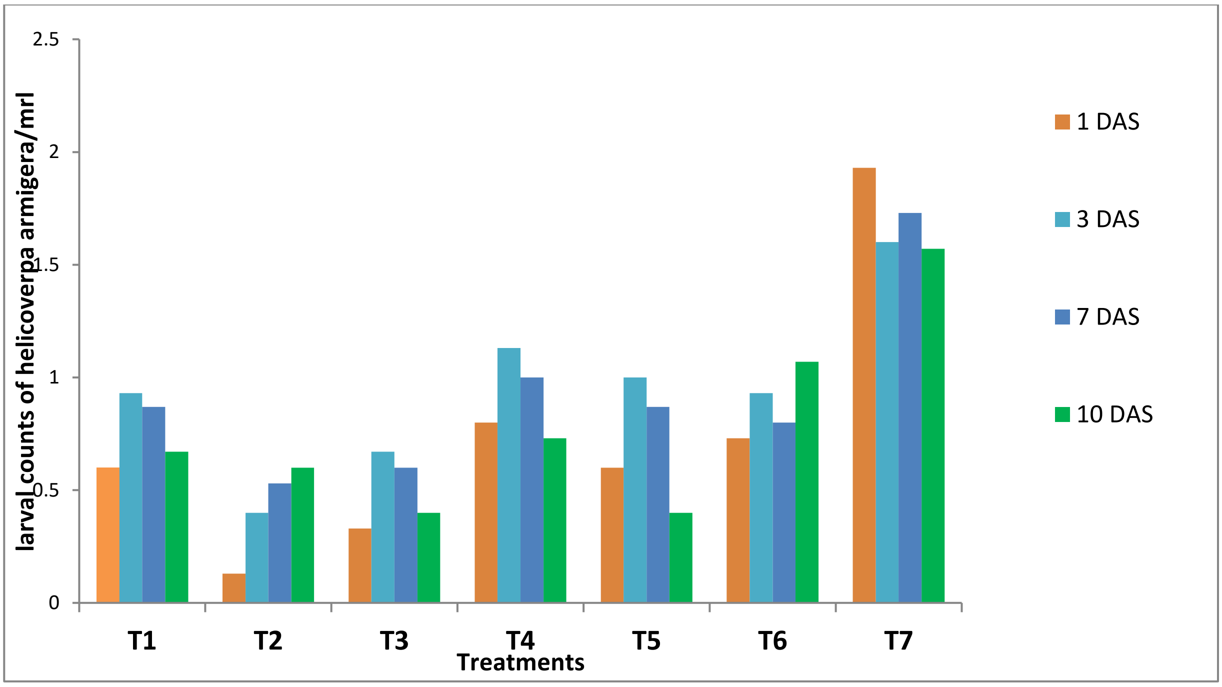

Fig.2: Efficacy of different new Insecticides against gram pod borer, *Helicoverpa armigera* infesting chickpea at Second Spray

Table 7: Efficacy and economics of different Insecticides on chickpea grain yield

Treatments	Grain yield q/ha	Increase in yield over control (q/ha)	Percent avoidable losses	Cost of insecticides /ha+ labour	Cost of increased yield over control @ Rs. 5650 per q	Net profit (Rs/ha)	Cost benefit ratio
Flubendamide 20WDG	17.30	6.61	61.79	4190.0	33050.0	28860.0	1:6.89
Cyclaniliprole 100 DC	22.56	11.95	47.03	7023.0	59750.0	52727.0	1:7.51
Chlorantraniliprole 18.5 SC	21.13	10.52	50.21	5752.0	52600.0	46848.0	1:8.14 H

Flubendiamide 8.33 % + Deltamethrin 5.56 % SC	17.83	7.22	59.51	4260.0	36100.0	31840.0	1:7.47
Novaluron 5.25 % + Indoxacarb 4.50 % SC	16.24	5.63	65.33	7293.0	28150.0	20857.0	1:2.86 **L**
Chlorantraniliprole 9.30 % +Lambda-cyhalothrin 04.60 % ZC	15.71	5.10	67.54	5536.0	25500.0	19964.0	1:3.61
Water spray @ 500 lit/ha	10.61	-	-	-	-	-	-
SEm ±	0.83	-	-	-	-	-	-
CD at 5%	2.55	-	-	-	-	-	-

BCR= Benefit Cost Ratio, Minimum support price of chickpea during 2024-25 = Rs. 5650/q, Labour charge = Rs. 500/day/labour.

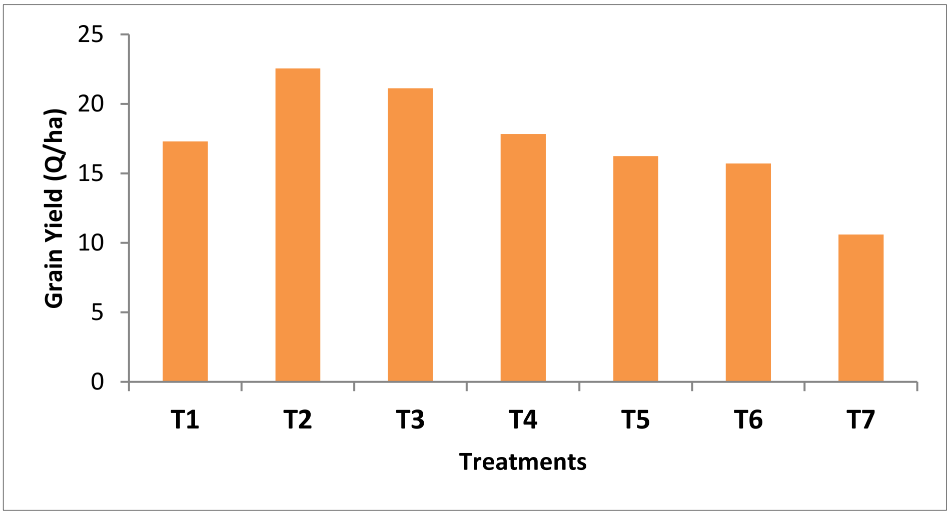

Fig.3: Efficacy of different insecticides on chickpea grain yield

Effect of certain new molecule of insecticides on yield of chickpea

The study made on the effect of insecticidal treatments on yield is shown in Table 2. All treatments showed superior with less pod damage compared to untreated control (Water Spray). Among all treatments the minimum pod damage was 4.50 percent with highest yield of chickpea pods (22.56q/ha) was recorded in T2- Cyclaniliprole 100 DC @ 40 g.a.i/ha. The succeeding best treatment was T3-Chlorantraniliprole 18.5 SC 21.13 q/ha yield and next best treatment was T4- Flubendiamide 8.33 % + Deltamethrin 5.56 % SC @ 22.50 + 15 g.a.i./ha a.i./ha with 17.83 q/ha yield which are at par with T1 Flubendamide 20WDG @ 50 g.a.i/ha with 17.30 q/ha yield. Among all the treatments lowest yield recorded in T5- Chlorantraniliprole 9.30 % + Lambda-cyhalothrin 04.60 % ZC @ 30 g.a.i./ha with 15.25 q/ha yield. The results are inconformity with the Prasanna PM *et al.* (2020) found that the highest yield was recorded in the treatment T2-Cyclaniliprole 100 DC @ 40 g.a.i/ha (13.25 q/ha), Upadhyay et al. (2020) who found that the highest yield was recorded in the treatment Chlorantiniprole 18.5 SC 92g a.i./ha (17.33 q/ha) followed by Flubendamide 39.35 EC 49g a.i./ha (16.44 q/ha) and Spinosad 45 SC 74g a.i./ha (15.55 q/ha). Rani et al. (2018) found that use of Chlorantraniliprole in red gram produced higher yield against gram pod borer.

Economics of new molecule of insecticides in Chickpea

The data pertaining to economics of various treatments are presented in Table 2. The highest net return was recorded from T2- Cyclaniliprole 100 DC @ 40 g.a.i/ha (Rs. 52727), T3- Chlorantraniliprole 18.5 SC recorded (Rs.46848) was on par with T_2 and the minimum in tratment T6- Chlorantraniliprole 9.30 % +Lambda-cyhalothrin 04.60 % ZC (Rs. 19964). The benefit: cost ratio of different insecticides revealed that T3-Chlorantraniliprole 18.5 SC @ 25 g.a.i/ha (8.14:1) was the most economical treatment followed by T2-Cyclaniliprole 100 DC @ 40 g.a.i/ha (7.51:1), T4- Flubendiamide 8.33 % + Deltamethrin 5.56 % SC @ 22.50 + 15 g.a.i./ha (7.47:1), T1- Flubendamide 20WDG @ 50 g.a.i/ha (6.89:1), T6- Chlorantraniliprole 9.30 % + Lambda-cyhalothrin 04.60 % ZC @ 30 g.a.i./ha (3.61:1) and treatment Novaluron 5.25 % + Indoxacarb 4.50 % SC @ 43.31 + 37.13 g.a.i./ha (825ml/ha) (2.86:1) was least economical treatment. The present findings are in agreement with Alok et al. (2022) who reported that was third most economical treatment after Lambda

Cyhalothrin 30 g.a.i. and Emamectin benzoate 12 g.a.i. Chouhan etal. (2023) also found treatment with Novaluron + Indoxacarb 5.25% + 4.5% SC (1:1.36) was least cost-effective treatment in chickpea against gram pod borer.

Conclusion:

Application of newer insecticides for the management of insect pests in agriculture ecosystem is one of the most common activities as new insecticides provide good control of insect pests in very short span of period. Foliar spray of Cyclaniliprole 100 DC @ 40 g.a.i/ha and Chlorantraniliprole 25g a.i. /ha were the most effective insecticides against *Helicoverpa armigera* with minimum larval population, lowest pod damage and highest yield per hectare. Cyclaniliprole 100 DC @ 40 g.a.i/ha had highest net return while Chlorantraniliprole 25g a.i./ha was most cost-effective treatment with highest benefit cost ratio. These insecticides belong to newer group, relatively safer and more effective at lower doses against gram pod borer as comparison to conventional insecticides for management of this key pest of chickpea.

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