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Evaluation of bioefficacy, phytotoxicity of bas 325 01 i 150 SC against pest complex and its safety to non-target invertebrates in Chilli. During *kharif* 2017-2018 and 2018-2019

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Abstract
Two field experiments were carried out at research farm of College of Agriculture, Raipur to assess the bioefficacy, effect on natural enemies and phytotoxicity effect of eight insecticides BAS 325 01 I 150 SC @ 30, 45, 60, 75 g a.i./ha, Teflubenzuron 150 SC, Alphacypermethrin 10% SC, Emamectin Benzoate 5% SG and Triazophos 40% SC against major insect pests of Chilli *viz*., thrips, whitefly and fruit borers. Treatment BAS 325 01 I 150 SC @ 75 g a.i./ha (T4) outperformed over all other treatments with lowest pest population and highest yield 104.08 q/ha. The applied treatments were found safer to natural enemies like coccinellids and spider. Moreover, no phytotoxic effect was noticed in any of the treatment imposed.

Keywords: Bioefficacy, phytotoxicity, thrips, whitefly, Fruit bores

Introduction
Chilli (*Capsicum annum*) belongs to family solanaceace, originated from South America is one of most versatile and important vegetable grown all over the world. It is self-pollinating crop, facultative and diploid crop, very much allied to tomato, potato, brinjal and tobacco. The green and ripened frits are valuable and of commercial importance. The flavor and pungency of Chillies is due presence of high concentration of an alkaloid “capsaicin” and its analogues. Capsicin is present in pericarp and placenta of fruits. Chilli is widely grown in tropical and subtropical areas with warm and humid climate. It is also named as “wonder spice” because of its extensive uses in making vegetables, pickles, condiments, etc. (Pawar *et al*, 2011) [3]. About five species of Chilli have been domesticated in India. They are annuum, frutescens, chinense, baccatum and pubescens. India is chief producer of Chillies with annual production of 1.4 million tons (Agricultural Statistics at a glance, 2015) [1] constituting about 24.12% of Indian spice exports in value (Geetha *et al*, 2017) [4]. In India, the major Chilli producing states are Andhra Pradesh, Karnataka, Tamil Nadu, Maharashtra, etc. (Indian Horticulture Database, 2015) [2].
Inspite of widespread cultivation, chili crop is susceptible to many biotic and abiotic stresses all through its growth period. Among biotic factors, insect-pests are major threat which poses significant damage to the crop. *Scirtothrips dorsalis (Hood), Aphis gossypii (*Glover), *Myzus persicae* (Sulzer) as sucking complex and *Spodoptera litura* (Fabricius) and *Helicoverpa armigera(*Hubner) as pod borer are most destructive pest of Chilli which causes significant damage to crop. Thrips, vector of Chilli leaf curl virus causes a yield loss of about 50-90% (Reddy *et al*, 2015) [5]. Similarly Podborer causes 20-30% yield reduction (Shivramu and Kulkarni, 2001) [6].
To combat these, farmers are using chemical insecticides and An array of insecticides are available in market for management of pests but efficient management of these pests is still a trouble for farmers, agriculturalists and scientists. Moreover, repeated application of insecticides leaves residues in fruits and ultimately pollutes the soil and water. High pesticide residue also cause troublesome during export of fruits. To overcome these problems, a novel insecticide with unique mode of action, high selectivity and no toxic effects to natural enemies should be used.

Materials and Methods

The present investigation was carried out during two consecutive year *kharif* 2017-2018 and 2018-2019 at research farm of College of Agriculture, Raipur, Indira Gandhi Krishi Vishwavidhyalaya. The design followed for experiment was randomized block design with three replications. The chili seedlings of Shilpa variety (25 days old) were transplanted at spacing of 60 × 60 cm during forenight of August month in a plot size of 4× 3 m^2. The treatments were imposed on 45 days old crop and applied twice at 15 days interval. Spraying of insecticides was done immediately as and when pest infestation was observed. The treatments were sprayed with High Volume knapsack sprayer using 500 liters of spray fluid per hectare fitted with flood jet or flat fan nozzle.

Table 1: Treatment Details

Tr. No.	Treatment Details	Dose/ha		
		a.i. (g)	Formulation (ml)	Water volume (L)
T_1	BAS 325 01 I 150 SC	30	200	500
T_2	BAS 325 01 I 150 SC	45	300	500
T_3	BAS 325 01 I 150 SC	60	400	500
T_4	BAS 325 01 I 150 SC	75	500	500
T_5	Teflubenzuron 150 SC	30	200	500
T_6	Alphacypermethrin 10% SC	30	300	500-1000
T_7	Emamectin Benzoate 5% SG	10	200	500
T_8	Triazophos 40% SC	10	250	500
T_9	Untreated control	-	-	-

Assessment of pest and natural enemies' population

1. Fruit borer: Larval population and fruit damage by fruit borer were recorded before spraying (Pre-treatment) and at 1, 3, 5, 7 and 10 days after spraying. The number of larvae was recorded on ten randomly selected plants per plot and the fruit damage was assessed based on number of fruits with bore holes and total number of fruits in ten randomly selected plants per plot and expressed as per cent fruit damage per ten plants and percent reduction of over untreated control pest population.

2. Sucking pests: The population of sucking pest *viz*., whitefly and thrips were recorded on three leaves per plant of five randomly selected plants per plot prior to spraying followed by 1, 3, 5, 7 and 10 days after each spray and expressed as number per five leaves. The day observations were pooled, mean population and per cent reduction over control was calculated after each spray.

$$\text{Percent reduction over control (\% ROC)} = \frac{\text{Mean population in control} - \text{mean population in treatment}}{\text{Mean population in control}} * 100$$

3. Natural enemies

The population of non target invertebrates coccinellids was recorded to assess the safety of insecticides at five randomly selected plants and expressed as numbers per five plants. Fruit yield was recorded from each plot and pooled to express as tonnes ha-1.

Result and Discussion

a. Bioefficacy against thrips, whitefly and fruit borer

The field experiment showed that BAS 325 01 I 150 SC @ 75 g a.i. ha^{-1} was most promising treatment in reducing the damage caused thrips, whiteflies and fruit borer. In pooled data of two season, the minimum thrips population was recorded from plot treated with BAS 325 01 I 150 SC @ 75 g a.i. ha^{-1} with mean population of 1.12 insects/3 leaves/5 plant followed by BAS 325 01 I 150 SC @ 60 g a.i. ha^{-1} with mean thrip population of 2.55 insect/3 leaves/5 plant. The reference check, Emamectin Benzoate 5% SG @ 10g a.i. ha^{-1} was also found to be effective in managing the thrips population with 3.20 insect/3 leaves/5plants. Maximum thrips population was recorded from untreated plot with mean thrips population of 5.95 insect/3 leaves/5 plants. The percentage reduction over control (PROC) was found highest in treatment BAS 325 01 I 150 SC @ 75 g a.i. ha^{-1} (T4) with 81.18% followed by treatment BAS 325 01 I 150 SC @ 60 g a.i. ha^{-1} with 57.14% (Table 2).

The maximum whitefly population was noted in untreated plot 5.68 Whitefly /3 leaves/5 plant while minimum population was observed in plot treated with BAS 325 01 I 150 SC @ 75 g a.i. ha^{-1} (T_4) with mean population of 1.81 Whitefly /3 leaves/5 plant and percentage with reduction over control 68.13% followed by plot treated with BAS 325 01 I 150 SC @ 60 g a.i. ha^{-1} (T_3) with mean whitefly population of 2.04 insect/3 leaves/5 plants (Table 3).

In management of fruit borer, BAS 325 01 I 150 SC @ 75 g a.i. ha^{-1} (T_4) outperformed over other treatments with minimum pest population of 2.14 larvae/ 10 plants. It was followed by BAS 325 01 I 150 SC @ 60 g a.i. ha^{-1} with 2.20 larvae/10 plants followed by BAS 325 01 I 150 SC @ 45g a.i. ha^{-1} with 2.45 larvae/10 plants. Maximum fruit borer population was recorded in untreated plot with 5.72 larvae/ 10 plants. Percentage reduction over control of the two treatment BAS 325 01 I 150 SC @ 75 g a.i. ha^{-1} (T_4) and BAS 325 01 I 150 SC @ 60 g a.i. ha^{-1} (T3) were 62.59% and 61.54%, respectively (Table 4).All other treatments were significantly effective than control in controlling the various pest of chilli crop.

b. Effect on natural enemies

The population of natural enemies coccinellids was recorded to assess the safety of insecticides at five randomly selected plants and expressed as numbers per five plants. Maximum population of coccinellid beetles was recorded from untreated plot in both experimental years with mean population of 3.67beetles per 5 plants (Table 5). However, non-significant differences was found among all other treatments.

c. Phytotoxicity assessment

The plants were sprayed with BAS 325 01 I 150 SC @ 75 g a.i. $ha\text{-}^{1}$ and BAS 325 01 I 150 SC @ 60 g a.i. $ha\text{-}^{1}$ to assess the occurrence of phytotoxicity. The plants were observed on 1, 3, 7, 10, 14 and 21 days after spraying as per the protocol of Central Insecticide Board Registration Committee (C.I.B. and R.C) for the phytotoxic symptoms like injury to leaf tip and leaf surface, Wilting, Vein clearing, Necrosis, epinasty and hyponasty which were recorded based on the following visual rating scale.

All insecticidal treatment was statistically better than untreated control. The entire treated plot had significant lower population as compared to control. The data of two years mean total healthy Chilli green fruit yield of all the treatment was significantly higher over untreated control. Yield of healthy fruit of Chilli ranged between 53.85 to 104.08 q/ha (Table 6). Maximum yield was recorded from treatment (T4) BAS 325 01 I 150 SC @ 75 g a.i./ha (104.08 q/ha.) followed by (T3) BAS 325 01 I 150 SC @60 g a.i./ha (98.95 q/ha.). The lowest yield was recorded from untreated control (T9) (53.85 q/ ha) (Table 6).

Table 2: Bio-efficacy of BAS 325 01 I 150 SC against Thrips on Chilli after Pre and post treatment pooled data 2017-18 & 2018-19.

Treatment	Insecticide	Dose	Pre treatment	Average no. of thrips/3 leaves/5 plant										Over all mean	PROC (%)
				I Spray					II Spray						
				1 DAS	3 DAS	5 DAS	7 DAS	10 DAS	1 DAS	3 DAS	5 DAS	7 DAS	10 DAS		
T_1	BAS 325 01 I 150 SC	30 g a.i./ha	3.12 (1.88)	2.89 (1.82)	2.55 (1.74)	2.11 (1.30)	3.09 (1.89)	3.12 (1.88)	2.11 (1.60)	1.79 (1.48)	1.45 (1.38)	2.00 (1.58)	3.46 (1.99)	3.11	47.73
T_2	BAS 325 01 I 150 SC	45g a.i./ha	3.68 (2.11)	2.08 (1.57)	1.55 (1.38)	0.52 (0.93)	1.10 (1.27)	1.49 (1.26)	1.07 (1.02)	0.78 (0.79)	0.46 (0.69)	0.38 (0.71)	0.73 (0.71)	2.67	55.13
T_3	BAS 325 01 I 150 SC	60g a.i./ha	3.54 (2.02)	3.47 (1.97)	3.49 (1.99)	2.91 (1.86)	3.48 (1.97)	3.54 (2.02)	2.80 (1.80)	2.57 (1.72)	2.25 (1.66)	2.70 (1.81)	3.47 (2.02)	2.55	57.14
T_4	BAS 325 01 I 150 SC	75 g a.i./ha	3.59 (2.07)	3.41 (1.96)	2.80 (1.81)	2.43 (1.70)	2.63 (1.62)	2.52 (1.92)	2.66 (1.64)	2.11 (1.30)	1.71 (1.45)	1.82 (1.61)	3.34 (1.97)	1.12	81.18
T_5	Teflubenzuon 150 SC	30 g a.i./ha	3.74 (2.16)	3.60 (2.01)	3.27 (1.88)	2.78 (1.66)	2.64 (1.85)	3.00 (2.06)	2.64 (1.77)	1.76 (1.55)	1.38 (1.43)	1.67 (1.65)	3.12 (1.87)	2.74	53.95
T_6	Alphacypermethrin 10% SC	30 g a.i./ha	3.84 (2.24)	3.50 (2.03)	3.28 (1.93)	2.87 (1.81)	3.00 (2.06)	3.45 (1.96)	3.49 (1.99)	3.00 (1.89)	2.78 (1.72)	2.86 (1.87)	3.90 (2.12)	3.27	45.04
T7	Emamectin Benzoate5%SG	10 g a.i./ha	3.80 (2.20)	3.64 (2.07)	3.31 (1.99)	2.88 (1.80)	3.40 (1.98)	3.55 (2.07)	2.84 (1.84)	2.80 (1.82)	2.24 (1.65)	2.86 (1.81)	3.49 (2.05)	3.20	46.22
T8	Triazophos 40% SC	10 g a.i./ha	3.70 (2.13)	3.10 (1.86)	2.72 (1.83)	2.10 (1.30)	2.56 (1.70)	2.28 (1.69)	3.30 (1.95)	2.90 (1.86)	2.63 (1.87)	1.76 (1.55)	1.45 (1.38)	2.59	56.47
T9	Untreated control	-	3.8 (2.07)	4.4 (2.21)	5.5 (2.46)	5.7 (2.49)	6.0 (2.56)	3.8 (2.07)	6.5 (2.72)	7.6 (2.84)	7.8 (2.90)	8.1 (2.93)	6.2 (2.59)	5.95	
S.Em+			NS	0.0875	0.077	0.115	0.071	0.072	0.0715	0.0575	0.064	0.0825	0.0925		
CD at 5%			NS	0.2615	0.2345	0.357	0.218	0.2215	0.2135	0.179	0.201	0.258	0.2745		

Note: * Figure in parentheses are transformed value √x + 0.5
DAS: Days after Spray.

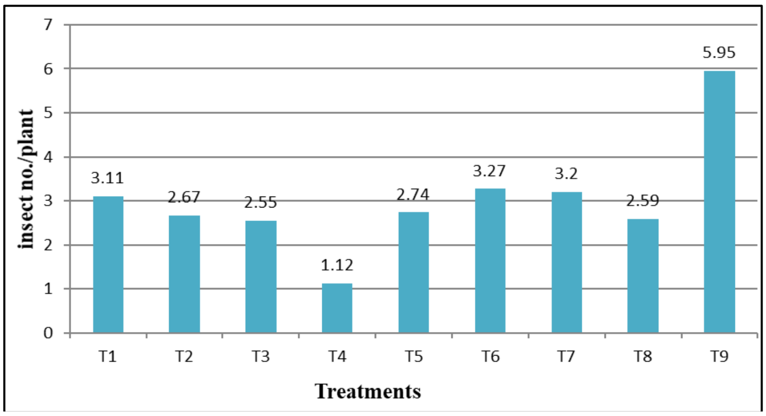

Fig 1: Bio - efficacy of BAS 325 01 I 150 SC against thrips on Chilli after first and second spray

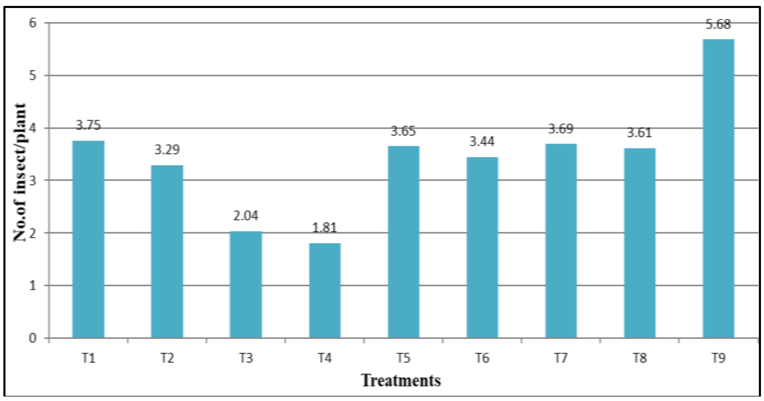

Fig 2: Bio-efficacy of BAS 325 01 I 150 SC against whitefly on Chilli after first and second spray

Table 3: Bio-efficacy of BAS 325 01 I 150 SC against Whitefly on Chilli after Pre and post treatment pooled data 2017-18- 2018-19.

Treatment	Insecticide	Dose	Pre treatment	Average no. of Whitefly /3 leaves/5 plant										Overall mean	PROC (%)
				I Spray					II Spray						
				1 DAS	3 DAS	5 DAS	7 DAS	10 DAS	1 DAS	3 DAS	5 DAS	7 DAS	10 DAS		
T_1	BAS 325 01 I 150 SC	30 g a.i./ha	3.38 (1.88)	3.26 (1.82)	2.86 (1.74)	2.93 (1.60)	3.12 (1.89)	3.72 (1.88)	3.65 (1.60)	3.16 (1.86)	2.64 (1.38)	3.04 (1.58)	3.96 (1.99)	3.75	33.97
T_2	BAS 325 01 I 150 SC	45 g a.i./ha	4.04 (2.02)	3.59 (1.97)	3.29 (1.99)	3.48 (1.86)	3.44 (1.97)	4.02 (2.12)	3.77 (1.80)	3.58 (1.72)	3.17 (1.66)	3.57 (1.81)	4.06 (2.02)	3.29	42.08
T_3	BAS 325 01 I 150 SC	60 g a.i./ha	3.39 (2.02)	2.74 (1.57)	2.30 (1.38)	1.45 (0.93)	1.15 (1.27)	2.62 (1.26)	2.00 (1.02)	1.53 (0.79)	1.06 (0.69)	0.99 (0.71)	1.00 (0.71)	2.04	64.08
T_4	BAS 325 01 I 150 SC	75 g a.i./ha	3.88 (2.00)	2.72 (1.96)	2.21 (1.81)	1.09 (1.70)	1.31 (1.87)	2.75 (1.92)	2.26 (1.64)	1.73 (1.61)	1.43 (1.45)	1.11 (1.61)	2.18 (1.97)	1.81	68.13
T_5	Teflubenzuon 150 SC	30 g a.i./ha	3.89 (2.04)	3.44 (2.01)	3.18 (1.88)	3.25 (1.66)	3.46 (1.85)	4.20 (1.89)	3.98 (1.77)	3.46 (1.55)	3.07 (1.43)	3.34 (1.65)	4.08 (1.87)	3.65	35.74
T_6	Alphacypermethrin 10% SC	30 g a.i./ha	3.77 (2.06)	3.47 (2.03)	3.19 (1.93)	3.29 (1.81)	3.53 (2.06)	4.10 (2.16)	3.78 (1.96)	3.20 (1.89)	2.73 (1.72)	2.79 (1.87)	3.22 (2.12)	3.44	39.44
T7	Emamectin Benzoate 5% SG	10 g a.i./ha	3.98 (2.07)	3.64 (2.07)	3.39 (1.99)	3.62 (1.80)	3.78 (1.98)	3.37 (2.07)	4.05 (1.84)	3.49 (1.82)	3.06 (1.65)	3.36 (1.81)	4.03 (2.05)	3.69	35.03
T8	Triazophos 40% SC	10 g a.i./ha	4.08 (2.04)	3.30 (1.61)	3.50 (1.88)	3.74 (1.90)	3.96 (1.97)	4.02 (2.10)	3.89 (2.04)	3.80 (1.98)	3.44 (1.53)	2.76 (1.84)	3.20 (2.10)	3.61	36.44
T9	Untreated control	-	3.96 (2.07)	4.10 (2.21)	4.77 (2.46)	4.63 (2.49)	5.48 (2.56)	5.40 (2.07)	6.36 (2.72)	6.47 (2.84)	6.56 (2.90)	7.27 (2.93)	7.5 (2.59)	5.68	
S.Em+			NS	0.132	0.091	0.095	0.059	0.065	0.072	0.107	0.072	0.084	0.079		
CD at 5%			NS	0.387	0.266	0.283	0.178	0.187	0.217	0.328	0.224	0.243	0.266		

Note: * Figure in parentheses are transformed value $\sqrt{x + 0.5}$ DAS: Days after Spray.

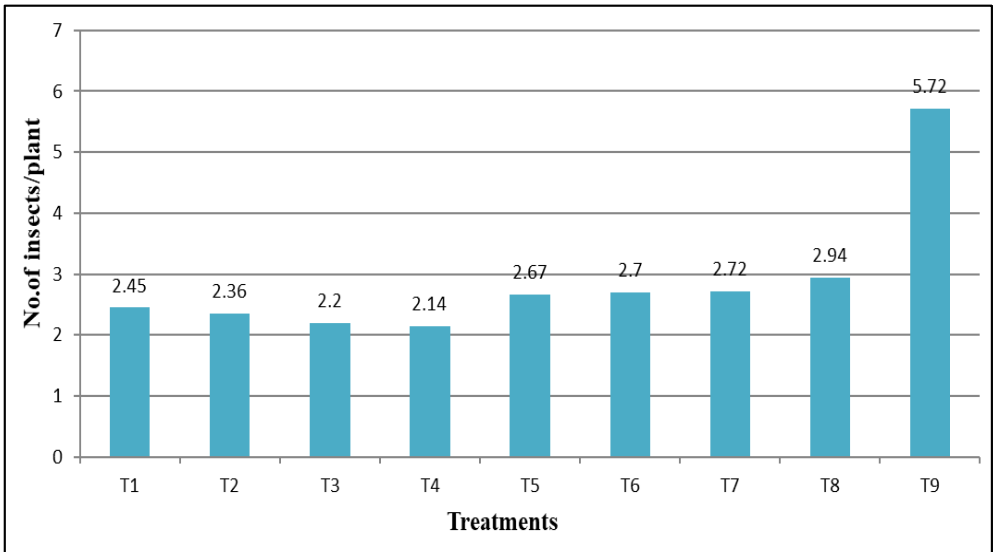

Fig 3: Bio - efficacy of BAS 325 01 I 150 SC against whitefly on fruit bores after first and second spray.

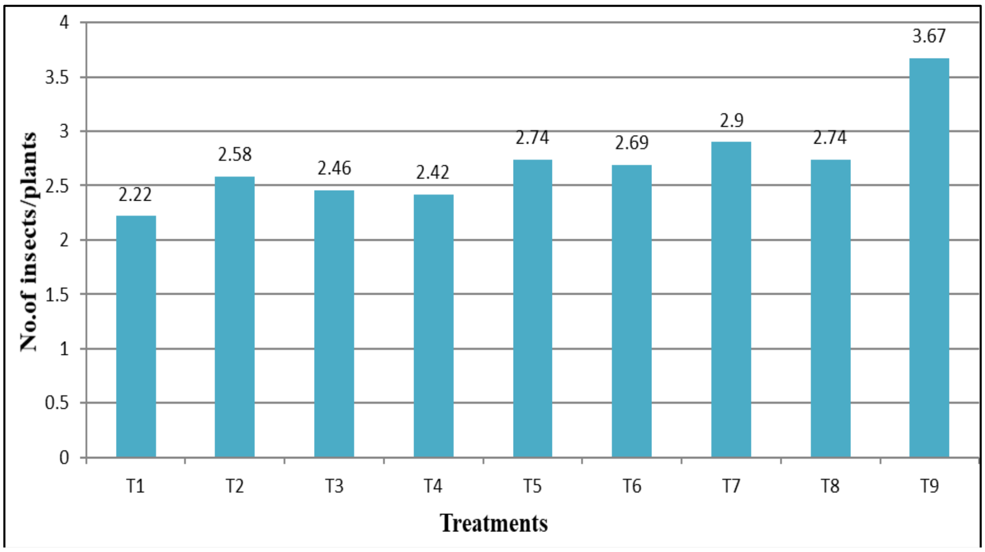

Fig 4: Influence of BAS 325 01 I 150 SC on the occurrence of Coccinellids on Chilli

Table 4: Bio-efficacy of BAS 325 01 I 150 SC against fruit borer on Chilli after Pre and post treatment pooled data 2017-18 & 2018-19.

Treatment	Insecticide	Dose	Pre treatment	I Spray					II Spray					Over all mean	PROC (%)
				1 DAS	3 DAS	5 DAS	7 DAS	10 DAS	1 DAS	3 DAS	5 DAS	7 DAS	10 DAS		
T_1	BAS 325 01 I 150 SC	30 g a.i./ha	4.15 (2.06)	3.25 (1.85)	2.48 (1.54)	2.66 (1.63)	2.26 (1.50)	2.73 (1.63)	2.22 (1.46)	0.92 (0.83)	0.82 (0.71)	2.02 (1.25)	3.40 (1.84)	2.45	60.33
T_2	BAS 325 01 I 150 SC	45 g a.i./ha	3.85 (1.95)	2.98 (1.72)	1.92 (1.38)	1.33 (1.14)	1.38 (1.40)	2.76 (1.65)	2.48 (1.57)	1.30 (1.13)	1.20 (`1.08)	1.11 (1.04)	3.15 (1.78)	2.36	58.74
T_3	BAS 325 01 I 150 SC	60 g a.i./ha	3.71 (1.94)	3.09 (1.72)	2.88 (1.60)	1.89 (1.39)	1.91 (1.38)	3.13 (1.76)	1.21 (1.10)	1.14 (1.07)	1.36 (1.15)	1.73 (1.32)	2.15 (1.48)	2.20	61.54
T_4	BAS 325 01 I 150 SC	75 g a.i./ha	3.50 (1.85)	3.07 (1.70)	1.72 (1.30)	0.95 (0.85)	1.62 (1.32)	3.26 (1.86)	3.33 (1.78)	2.59 (1.63)	1.67 (1.26)	2.20 (1.45)	3.06 (1.68)	2.14	62.59
T_5	Teflubenzuon 150 SC	30 g a.i./ha	4.39 (2.17)	3.08 (1.70)	2.83 (1.56)	2.49 (1.58)	2.45 (1.56)	3.41 (1.84)	2.66 (1.67)	1.74 (1.32)	1.56 (1.26)	1.15 (1.08)	3.64 (1.93)	2.67	53.32
T_6	Alphacypermethrin 10% SC	30 g a.i./ha	4.14 (2.05)	3.50 (1.85)	2.56 (1.60)	2.23 (1.48)	2.74 (1.64)	2.99 (1.72)	1.94 (1.40)	1.92 (1.38)	1.80 (1.36)	2.40 (1.50)	3.15 (1.78)	2.70	52.79
T7	Emamectin Benzoate5%SG	10 g a.i./ha	4.09 (2.00)	3.33 (1.78)	2.21 (1.46)	1.61 (1.32)	2.05 (1.27)	2.67 (1.64)	2.99 (1.70)	3.01 (1.64)	2.35 (1.52)	2.33 (1.50)	2.96 (1.70)	2.72	52.45
T8	Triazophos 40% SC	10 g a.i./ha	4.42 (2.20)	3.80 (1.90)	2.65 (1.62)	2.48 (1.57)	2.22 (1.48)	2.40 (1.50)	2.98 (1.70)	3.35 (1.80)	3.24 (1.85)	2.28 (1.52)	2.50 (1.56)	2.94	48.60
T8	Untreated control		6.23 (2.42)	6.05 (2.16)	5.36 (1.47)	5.12 (1.28)	5.40 (1.44)	6.26 (2.46)	5.23 (2.36)	5.55 (2.33)	5.08 (2.24)	6.11 (2.38)	6.53 (2.54)	5.72	
S.Em+			0.08	0.50	0.05	0.05	0.06	0.06	0.06	0.07	0.04	0.04	0.05		
CD at 5%			NS	0.15	0.15	0.14	0.15	0.16	0.19	0.21	0.13	0.13	0.14		

Note: * Figure in parentheses are square root transformed value. **DAS:** Days after Spray.

Table 5: Bio-efficacy of BAS 325 01 I 150 SC against Coccinellids on Chilli after Pre and post treatment pooled data 2017-18 & 2018-19.

Treatment	Insecticide	Dose	Pre treatment	I Spray					II Spray					Over all mean
				1 DAS	3 DAS	5 DAS	7 DAS	10 DAS	1 DAS	3 DAS	5 DAS	7 DAS	10 DAS	
T_1	BAS 325 01 I 150 SC	30 g a.i./ha	2.46 (1.66)	1.60 (1.40)	1.74 (1.43)	2.03 (1.57)	2.23 (1.66)	2.35 (1.69)	2.00 (1.58)	2.14 (1.64)	2.26 (1.67)	2.62 (1.72)	2.68 (1.78)	2.22
T2	BAS 325 01 I 150 SC	45 g a.i./ha	2.45 (1.76)	2.28 (1.64)	2.57 (1.76)	2.68 (1.72)	2.95 (1.86)	3.10 (1.60)	2.85 (1.70)	3.24 (1.80)	3.58 (1.76)	3.85 (2.09)	3.90 (2.10)	2.58
T_3	BAS 325 01 I 150 SC	60 g a.i./ha	2.08 (1.52)	1.80 (1.51)	2.00 (1.60)	2.20 (1.62)	2.46 (1.72)	2.55 (1.74)	2.30 (1.65)	2.53 (1.74)	2.74 (1.78)	3.00 (1.87)	3.10 (1.91)	2.46
T_4	BAS 325 01 I 150 SC	75 g a.i./ha	2.48 (1.65)	1.90 (1.53)	2.00 (1.58)	2.06 (1.51)	2.32 (1.66)	2.54 (1.73)	2.20 (1.62)	2.36 (1.70)	2.56 (1.76)	3.02 (1.88)	3.08 (1.90)	2.42
T_5	Teflubenzuon 150 SC	30 g a.i./ha	2.45 (1.65)	2.00 (1.60)	2.36 (1.69)	2.58 (1.76)	2.85 (1.70)	2.46 (1.72)	2.54 (1.74)	2.96 (1.86)	3.26 (1.82)	3.00 (1.87)	3.14 (1.94)	2.74
T_6	Alphacypermethrin 10% SC	30 g a.i./ha	2.40 (1.63)	2.16 (1.66)	2.34 (1.68)	2.56 (1.76)	2.46 (1.90)	2.59 (1.76)	2.40 (1.68)	2.87 (1.72)	3.00 (1.87)	3.08 (1.90)	3.10 (1.60)	2.69
T7	Emamectin Benzoate 5% SG	10 g a.i./ha	2.32 (1.66)	2.22 (1.64)	2.40 (1.70)	2.67 (1.78)	2.93 (1.85)	3.10 (1.91)	2.68 (1.71)	2.96 (1.85)	3.10 (1.60)	3.55 (1.74)	3.74 (2.10)	2.90
T8	Triazophos 40% SC	10 g a.i./ha	2.52 (1.80)	2.26 (1.62)	2.38 (1.70)	2.26 (1.62)	2.48 (1.74)	2.56 (1.74)	2.96 (1.87)	2.87 (1.71)	2.98 (1.88)	3.04 (1.92)	3.87 (2.11)	2.74
T9	Untreated control	-	2.82 (1.84)	2.88 (1.84)	3.10 (1.60)	3.33 (1.96)	3.64 (2.04)	3.78 (2.14)	3.96 (2.13)	4.16 (2.17)	4.38 (2.20)	4.46 (2.24)	3.68 (2.06)	3.67
S.Em+			0.066	0.066	0.066	0.075	0.070	0.070	0.080	0.075	0.070	0.078	0.084	
CD at 5%			NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	

Note: * Figure in parantheses are transformed value √x +0

Table 6: Pooled mean yield data of Chilli to application of different insecticides against different insect pest of Chilli crops during 2017-18 & 2018-19

S. No.	Name of treatment	Dose	Green Chilli Yield (q/ha)
T1	BAS 325 01 I 150 SC	30 g a.i./ha	93.83
T2	BAS 325 01 I 150 SC	45g a.i./ha	78.50
T3	BAS 325 01 I 150 SC	60g a.i./ha	98.95
T4	BAS 325 01 I 150 SC	75 g a.i./ha	104.08
T5	Teflubenzuon 150 SC	30 g a.i./ha	87.21
T6	Alphacypermethrin 10% SC	30 g a.i./ha	87.39
T7	Emamectin Benzoate5%SG	10 g a.i./ha	96.11
T8	Triazophos 40% SC	10 g a.i./ha	94.105
T9	Control	Untreated	53.85

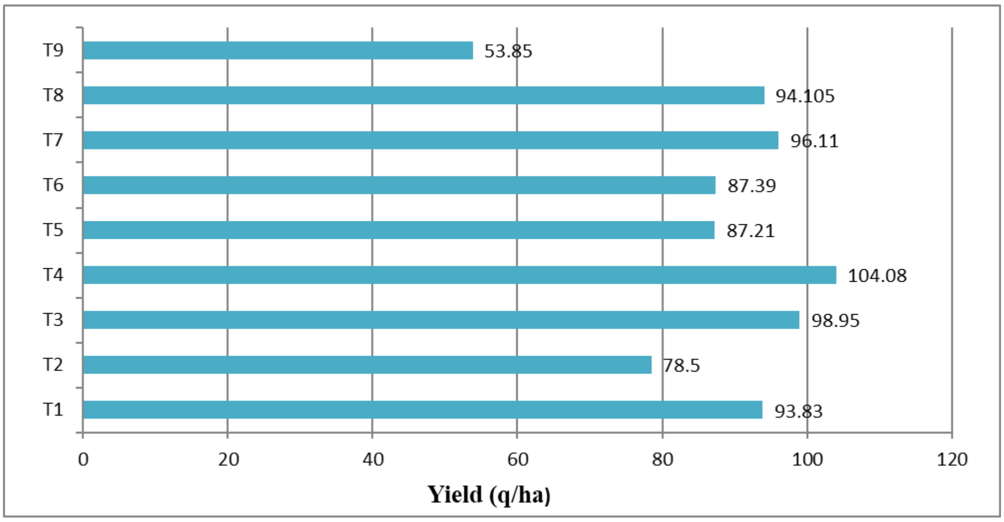

Fig 5: Pooled mean yield of Chilli crops during 2017-18 & 2018-19

Conclusion

On the basis of two years data, during 2017-18 and 2018-19 indicated that, the effect of all tested doses of BAS 325 01 I 150 SC effectively control the population of major insect pests of Chilli. It was also observed that treatment T_4 BAS 325 01 I 150 SC @ 75 g a.i./ha followed by T3 BAS 325 01 I 150 SC @ 60 g a.i./ha effectively control the population of major insect pests of Chilli and increase yield was found 53.85 q/ha over the untreated control. All the insecticidal treated plots had comparatively lower population of natural enemies as compared to untreated though there were non-significant differences among them.

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