

Efficacy of Newer Molecules of Insecticides against Gram Pod Borer, *Helicoverpa armigera* (Hub.) on Chickpea

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Abstract: Field study was conducted to determine the efficacy of Clothianidin 50 WDG, Indoxacarb, Flubendiamide 480 SC, Fipronil 5 SC, Spinosad 45 SC, Indoxacarb 14.5 SC, Rynaxypyr 20 SC, Chorpyriphos 20 EC against the surviving larval population of gram pod borer, *Helicoverpa armigera* (Hub.) on chickpea in the experimental research area of farmers field in Chandre village, Dist -Kolhapur during Rabi season 2009-10. In newer insecticides lowest number of surviving population of larvae was recorded in treatment Rynaxypyr 20 SC @ 40 g a.i./ha 0.70 larvae/plant, highest yield recorded 15.00q/ha and lower pod damage recorded 8.10 per cent.

Keywords: *Helicoverpa armigera*, Clothianidin 50 WDG, Indoxacarb, Flubendiamide 480 SC, Fipronil 5 SC, Spinosad 45 SC, Indoxacarb 14.5 SC, Rynaxypyr 20 SC,

1. Introduction

Chickpea, *Cicer arietinum* Linn. is constitutes as world's third most important pulse crop and India contributes 80 per cent of the total world's production. Due to its richness in proteins and amino acids, it plays vital role in vegetarian diet. Southern and central part of India one of the major constrains for lower yield of crop is the damage caused by the pod borer, *Helicoverpa armigera* (Hub.) right from vegetative to podding stage. A number of chemical insecticides have been reported to be effective in chickpea (Khurana, 1996 and Dhingara et al.2003). Most of the insecticides belonging to organophosphates, carbamates and synthetic pyrethroids etc. Their indiscriminate use has created number of well known problems. Hence there is a need to use never insecticides which are selective and are effective at lower doses against pod borer in chickpea.

2. Material and Methods

The experiments was laid out in randomised block design with eight treatments (Table 1) including control and replicated thrice in 4.2 X 3.60 M² plot size during 2009-2010 at farmer's field in Chandre village in Tal - Radhanagari, Dist-Kolhapur. The chickpea variety Digvijay was raised as per the recommended package of practices except plant protection measures. The required quantity of spray solution was calibrated by spraying the control plot with water. Spray fluid were prepared by adding required quantity of pesticide. Spraying was undertaken in the evening hours (4.30 to 5.30 p.m.) using hand compression sprayer.

3. Observations

A. Assessment of Larval Population

Five plants per plot were selected randomly and were tagged for recording observations. The pre count and post larval count were recorded a day before treatment and three, seven, and ten days after the application of the treatment. Efficacy of different fungi at different concentration were calculated on the basis of surviving larval populations per plant after the treatment. The data on surviving larval population of

larvae were subjected to square root transformation ($\sqrt{x + 0.5}$) and then subjected to statistical analysis. At harvest, the observations on damaged healthy pod and yield were recorded and the per cent pod damage was calculated.

B. Assessment of Pod Damage and Yield

Pod damage

Pod damage was taken at the time of harvesting, total number of pods and number of damaged pods was taken and per cent pod damage was worked by using following formula.

$$\text{Percent Pod damage} = \frac{\text{Number of affected pods/plants} \times 100}{\text{Total Number of pods/plants}}$$

Yield

The yield obtained in individual treatment of chickpea crop was recorded separately for assessing the efficacy of different treatments. Data of yield Kg/plot was converted into q ha⁻¹ and it was subjected to analysis of variance.

4. Results and Discussion

The effect of various treatments under investigation on the *H. armigera* are presented in Table 1. Pretreatment larval population of *H. armigera* was nonsignificant indicating uniform larval population but larval population differed significantly among the treatments after the application of insecticides (Table 1). A sharp decline in the surviving population density of *H. armigera* was noted third day after the application of each spray compared to control. Minimum surviving population of gram pod borer was observed on seven day after the application of each spray. In newer insecticides lowest number of surviving population of larvae was recorded in treatment rynaxypyr 20 SC @ 40 g a.i./ha 0.70 larvae/plant which was at par with treatment flubendiamide 480 SC @ 48 g a.i./ha 0.90 larvae/plant. The treatment with clothianidin, spinosad and indoxacarb were next in orders of efficacy at seven days after second spray.

In present investigation highest yield recorded in the treatment with rynaxypyr 20 SC @ 40 g a.i./ha 15.00 q/ha and lowest pod damage recorded (8.10 per cent), followed

by high yield recorded in treatment flubendiamide 480 SC @ 48 g a.i./ha 14.40 q/ha and pod damage recorded 9.00 per cent, clothianidin, spinosad and indoxacarb was at par with each other. The lowest yield was recorded in untreated control 6.00 q/ha.

Moreover, the studies of Chowdary *et al.* (2010) and Babariya *et al.* (2010) were also in close conformity with the results of present study indicating that Rynaxypyr was the most effective insecticide. Rynaxypyr established itself as the most effective insecticide with respect to grain yield 15.00 q/ha and recorded lowest pod damage 8.10 per cent, followed by flubendiamide, clothianidin, spinosad and indoxacarb (Table 1). These findings are in general agreement with those of Zahid Ali Shan *et al.* (2003), Sidde Gowda *et al.* (2007) and Ashok Kumar and Shivaraju (2009) where they reported that the application of insecticides reduced the larval population of *H. armigera* to considerable extent and hence increased the yield.

In past, the best insecticide was reported to be the chlorpyrifos (Balasubramanian *et al.* 2001, Zahid Ali Shan *et al.* 2003, Sidde Gowda *et al.* 2007, but in the present study rynaxypyr (coragen) proved to be the best insecticide. Control of this pest was not adequate now probably due to in part to the development of insecticide resistance because of frequent use of insecticides. Rynaxypyr (corogen) was proved to be the best insecticides against the pest. However, other insecticides may also remain fully effective against *H. armigera* if used according to manufacturer's recommendations (Sharma and Chawla, 1992).

References

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Table 1: Efficacy of newer insecticides against larvae of *Helicoverpa armigera* under field conditions

Sr. No	Treatments	Dose (gm a.i. ha ⁻¹)	Pre Count	Surviving Larval Population per plant					
				First Spraying			Second Spraying		
				3DAT	7DAT	10DAT	3DAT	7DAT	10DAT
1	Clothianidin 50 WDG	250	8.66 (17.05)	2.75 (1.80)	2.40 (1.70)	2.40 (1.70)	2.10 (1.61)	1.80 (1.51)	1.90 (1.54)
2	Flubendiamide 480 SC	48	8.33 (16.74)	2.20 (1.64)	1.90 (1.54)	2.10 (1.61)	1.30 (1.34)	0.90 (1.18)	1.10 (1.26)
3	Fipronil 5 SC	30	9.85 (18.24)	4.10 (2.14)	3.40 (1.97)	3.80 (2.07)	3.50 (2.00)	2.86 (1.83)	3.10 (1.89)
4	Spinosad 45 SC	84.37	9.29 (17.66)	2.90 (1.84)	2.60 (1.76)	2.70 (1.78)	2.35 (1.68)	1.90 (1.54)	2.10 (1.61)
5	Indoxacarb 14.5 SC	60	6.66 (14.89)	3.10 (1.89)	2.70 (1.78)	3.00 (1.87)	2.60 (1.76)	2.20 (1.64)	2.40 (1.37)
6	Rynaxypyr 20 SC	40	9.46 (17.85)	2.10 (1.61)	1.80 (1.51)	1.90 (1.54)	1.10 (1.26)	0.70 (1.09)	0.90 (1.18)
7	Chlorpyrifos 20 EC	250	7.33 (15.68)	4.50 (2.23)	3.80 (2.07)	4.10 (2.14)	4.40 (2.21)	3.10 (1.89)	3.50 (2.00)
8	Control		10.22 (18.63)	8.10 (2.93)	8.90 (3.06)	9.50 (3.16)	10.20 (3.27)	12.10 (3.54)	13.5 (3.74)
	SE±		NS	0.08	0.06	0.09	0.12	0.11	0.09
	CD at 5%		NS	0.20	0.14	0.20	0.26	0.25	0.21

Figures in parentheses denote $\sqrt{x + 0.5}$ transformed values

Table 2: Efficacy of entomopathogenic fungi on pod damage and yield of chickpea

S. No.	Treatment	Concentration (Conidia ml ⁻¹)	%Pod damage due to <i>Helicoverpa armigera</i>	Yield q/ha
1.	<i>M. anisopliae</i>	1×10 ⁹	11.83 (20.09)	13.00
2.	<i>M. anisopliae</i>	1×10 ¹⁰	9.50 (17.95)	14.50
3.	<i>B. bassiana</i>	1×10 ⁹	17.16 (24.43)	10.00
4.	<i>B. bassiana</i>	1×10 ¹⁰	14.16 (22.06)	12.50
5.	<i>N.rileyi</i>	1×10 ⁹	19.50 (26.22)	9.76
6.	<i>N.rileyi</i>	1×10 ¹⁰	16.00 (23.58)	10.16
7.	Control		27.50 (31.63)	5.90
	SE±		0.86	0.49
	CD at 5%		1.88	1.08

Figures in parenthesis are arcsin values.