The Bioscan 8(3): 1079-1081, 2013 (Supplement on Toxicology)
AN INTERNATIONAL QUARTERLY JOURNAL OF LIFE SCIENCES
www.thebioscan.in

RELATIVE EFFICACY OF NEWER INSECTICIDES AGAINST LINSEED BUD FLY, *DASYNEURA LINI* BARNES.

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KEYWORDS
Linseed bud fly
Dasyneura lini
Linseed
Insecticides.

Received on :
21.05.2013

Accepted on :
26.08.2013

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ABSTRACT
Bio-efficacy of eight newer insecticides including untreated control was conducted in the field in variety Neelum against linseed bud fly (*Dasyneura lini*) during *rabi* 2010-2011. In this trail two spray of Imidacloprid at 45 and 60 days after sowing exhibited least bud infestation fallowed by Spinosad treated plot found best in reducing bud infestation (7.25 per cent and 7.81 per cent respectively compared to 27.75 per cent in control). The significantly higher yield and per cent increased in yield over control was obtained in treated plot Spinosad and Imidacloprid (17.77 q/ha^{-1} with increase yield 37.47 per cent and 16.66 q/ha^{-1} with increase yield 33.31 per cent respectively compared to 11.11 q/ha^{-1} yield in control) and highest C: B ratio was received in treated plot Imidacloprid fallowed by Spinosad (1:29.52 and 1:14.64).

INTRODUCTION

Linseed, *Linum usitatissimum* Linni is one of the most important industrial oilseed crops of India. In India, linseed is cultivated in about 4.26 lakh hectares with a total linseed production of 1.67 lakh tonnes and 392 kg/ha productivity. Chhattisgarh is one of the important linseed growing states of India, which accounts for nearly 19.05 per cent area and 16.21 per cent production of the country. In Chhattisgarh, linseed is cultivated over 70 thousand hectare area with a production of 16.19 thousand tonnes and productivity of 231.31 kg/ha. Maximum area of this crop is grown as 'utera' during rabi season. The important linseed growing districts of Chhattisgarh are Rajnandgaon, Durg, Bilaspur, Kabirdham, Raipur, Dhamtari, Surguja, Kanker and Raigarh (Chhattisgarh Sandharb, 2007). Linseed crop is attacked by a number of insect pests at various phases of its growth. Linseed bud fly *Dasyneura lini* Barnes with 88 per cent grain yield losses is a key pest of this crop (Mukherji *et al*., 1999; Malik *et al*., 2000). Chemical insecticides have been recommended for the effective control of bud fly incidence in linseed. Being an oil seed crop indiscriminate use of pesticide may pose several problems such as pesticide residue, mortality of non-target organisms, secondary pest out-break and environmental pollution, upsetting of pest balance in nature and also due to abandonment of cultural control. Keeping in view of limited study regarding relative efficacy of newer insecticides against linseed bud fly, present investigation was under taken to develop effective management strategy.

MATERIALS AND METHODS

To determine the effect of new molecules insecticides in the management of bud fly, a field trial was conducted at college farm Raipur Chhattisgarh in Randomized Block Design (RBD) using susceptible variety Neelum with nine treatments including control in three replications. The sowing were taken up on the first week of December month during *rabi* season 2010-11.The net plot size 4x3m was maintained for each treatment. All the recommended package of practices was fallowed. The insecticide application was done as per the schedule and dosages mentioned in each treatments, wherein, first foliar application of the insecticides was done at 45 Das followed by the other application at 60 DAS using a hand compression sprayer during morning hours. The treatment details are as follows:

T_1 Spray of Imidacloprid 17.8 SL @ 0.0045% at 45 and 60 DAS

T_2 Spray of Acetamiprid 20 SP @ 0.004% at 45 and 60 DAS

T_3 Spray of Thiomethoxam 25 WP @ 0.005% at 45 and 60 DAS

T_4 Spray of Abamectin 1.8 EC @ 0.0009% at 45 and 60 DAS

T_5 Spray of Fiprolnil 5 SC @ 0.01% at 45 and 60 DAS

T_6 Spray of Thiodiocarb 75 WP @ 0.075% at 45 and 60 DAS

T_7 Spray of Spinosad 48 EC @ 0.0096% at 45 and 60 DAS

T_8 Spray of Indoxacarb 15 SC @ 0.006% at 45 and 60 DAS

T_9 Untreated check

Observation

In each treatment, data on population of linseed bud fly were recorded from ten randomly tagged plants and the total buds as well as infested buds were counted for per cent bud infestation. The bud fly infestation was recorded one day

before treatment and 15 days after first and second spraying. Observation on yield parameters were recorded at the time of harvest from each treatment and yield were analyzed statistically and converted into q/ha $^{-1}$

Increase in grain yield was calculated as yield increase in treated plots compared to control plot as follows:

$$\text{Per cent increase in yield} = \frac{\text{Increased yield in treatment plot}}{\text{Yield in control plots}} \text{ X } 100$$

Avoidable yield loss was calculated as per cent yield loss in control when composed to treated crop as follows:

$$\text{Per cent Avoidable yield loss} = \frac{\text{Yield obtained from treatment plot - Yield obtained from control plot}}{\text{Yield obtained from control plot}} \text{ X } 100$$

RESULTS AND DISCUSSION

Efficacy of newer insecticides against linseed bud fly, significant differences were observed among the different treatments with respect to linseed bud fly incidence at 45, 60 and 75 DAS (Table-1) during rabi 2010-11. Per cent bud fly incidence was significantly low at 45, 60 and 75 DAS in treatment (T_1) Imidacloprid (10.84, 8.90 and 7.25 per cent bud damage) followed by foliar spray with (T_7) Spinosad (10.90, 8.97 and 7.81 per cent bud damage) as compared to (T_9) untreated check (27.75 per cent bud damage) The next best treatment were (T_2) spray of Acetamiprid (11.32, 10.24 and 9.30per cent) and (T_6) spray with Thiodicarb (10.80, 10.18 and 9.54 per cent). All other treatments recorded significantly lower per cent bud fly incidence compared to untreated check.

Similar reports by Kumar *et al*. (2008), Prasad *et al*. (2007) and Mishra *et al*. (2009) supported the present findings that Imidacloprid is highly effective to suppress the population of internal feeder linseed bud fly. On the other hand Spinosad is found effective against bud fly as reported in AICRP linseed Annual Report 2009-10 from Mauranipur, Raipur and Nagpur.

Effect on different treatment on yield

During rabi 2010-11 foliar spray with Spinosad (T_7) at 45 and 60 DAS recorded significantly maximum yield 17.77 q ha^{-1} with 37.47 per cent increase in yield followed by spray with Imidacloprid (T_1) 16.66 q ha^{-1} with 33.31 per cent yield increase as compared to the untreated check which was recorded 11.11 q ha^{-1} . Singh *et al*. (1991) and Singh *et al*. (1995) have also obtained similar increase in seed yield by controlling the incidence of bud fly with insecticides on linseed.

Economics of different treatments

During rabi 2010-11 maximum additional returns was gained from Spinosad (T_7) Rs. 19980 fallowed by Imidacloprid (T_1) Rs. 16650 whereas, highest cost benefit ratio was earned from Imidacloprid (T_1) 1:29.52 treated plots fallowed by Spinosad (T_7) 1:14.64. Kumar *et al*. (2008) also observed similar result in C: B ratio (Table 2).

It is interested to point out that Spinosad (T_7) had higher grain

Table 1: Effectiveness of newer insecticides against bud flies in linseed

S.N.	Treatment	Concentration (%)	Bud fly infestation per cent			Yield (q/ha)	Per cent Increased in yield over control
			One day before treatment(45 DAS)	15 days after first spraying (60 DAS)	15 days after second spraying (75 DAS)		
T_1	Imidacloprid 17.8 SL	0.0045	10.84 (3.36)	8.90(3.06)	7.25(2.73)	16.66	33.31
T_2	Acetamiprid 20SP	0.004	11.32(3.43)	10.24(3.27)	9.30(3.12)	12.50	11.12
T_3	Thiomethoxam 25WG	0.005	14.65(3.88)	12.52(3.51)	11.36(3.44)	13.61	18.36
T_4	Abamectin 1.8 EC	0.0009	14.87(3.91)	12.29(3.57)	11.21(3.44)	14.33	22.47
T_5	Fipronil 5SC	0.01	13.14(3.68)	11.39(3.44)	10.65(3.33)	16.11	31.03
T_6	Thiodiocarb 75WP	0.075	10.80(3.36)	10.18(3.24)	9.54(3.16)	13.47	17.52
T_7	Spinosad 48 EC	0.0096	10.90(3.37)	8.97(3.36)	7.81(2.93)	17.77	37.47
T_8	Indoxacarb 15SC	0.006	12.19(3.56)	10.96(3.38)	10.31(3.28)	13.33	16.65
T_9	Untreated	-	12.41(3.58)	22.80(4.82)	27.75(5.31)	11.11	-
S.Em		0.11	0.07	0.07	1.00		
C.D. 5%			0.33	0.21	0.20	3.02	

Table 2: Cost-benefit ratio of different treatments in linseed against *D. lini*

SN	Treatments	Total cost of spraying Rs/ha	Yield Qt/ ha	Additional Yield over control Q/ha	Additional return Rs/ha	Cost benefit ratio
1	Imidacloprid 17.8 SL	564	16.66	5.55	16650	1:29.52
2	Acetamiprid 20SP	524	12.50	1.39	4170	1:7.95
3	Thiomethoxam 25WG	584	13.61	2.5	7500	1:12.84
4	Abamectin 1.8 EC	1214	14.33	3.22	9660	1:7.95
5	Fipronil 5SC	1264	16.11	5	15000	1:11.86
6	Thiodiocarb 75WP	1214	13.47	2.36	7080	1:5.83
7	Spinosad 48 EC	1364	17.77	6.66	19980	1:14.64
8	Indoxacarb 15SC	984	13.33	2.22	6660	1:6.76
9	Untreated Control		11.11	-	-	-

Labour charges Rs 116/- par day; Price of grain yield Rs. 3000/- per qt

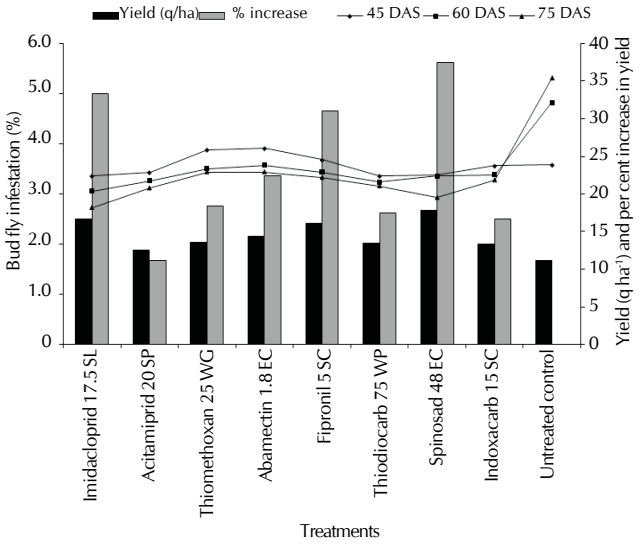

Figure 1: Relative efficacy of different newer insecticides against bud fly population

yield and safer to environment but due to higher cost of insecticides, it was become second position after Imidacloprid (T_1) in the economics of different treatments.

ACNOWLEDGEMENT

The authors are grateful to the PC Unit Kanpur and IGKV, All India Crop Research Project in linseed, Raipur (C.G.) for providing necessary facilities.

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