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BIO-EFFICACY OF CERTAIN BOTANICALS AND AZADIRACTIN AGAINST LINSEED BUD FLY, *DASYNEURA LINI* BARNES

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KEYWORDS

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ABSTRACT

The experiment was studiedat farm of Entomology Section, College of Agriculture, Nagpur, during *rabi*2012–13. The treatment azadiractine 1500 ppm recorded highest per cent reduction, 52.83, 51.52 after 7 and 14 days of first spray and 55.40, 53.70 after 7 and 14 days of second spray of bud/capsule damage over control. Among the botanicals NSE(10%) was found most effective treatment with 42.80, 45.87 and 48.91, 49.76 per cent after 7 and 14 days of first and second spray. The maximum Incremental cost benefit ratio (ICBR) was registered in the treatment azadirachtin 1500 ppm (1:7.22) having first rank against all other treatments followed by neem seed extract 5 per cent (1:2.42).

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INTRODUCTION

Linseed is one of the most important *rabi*oilseed as well as fibre crop. It cultivated in about 4.26 lakh hectares with total production of 1.67 lakh tones and 392 kg/ha productivity(Savita Kumari and Katlam 2013). Presently, it is grown on 4.36 lakh hectares contributing 1.68 lakh tones in production in the oilseed scenario of the country with a productivity level of 408 kg ha^{-1} during 2011-12 (AICRP., 2012). Flax means linseed contains about 30-40 per cent oil (Anon., 2005) with Omega-3 fatty acid which is the richest source of antioxidant. flax seed is used in cancer, in cardiovascular disease, in nephrology and in bone health (Katare *et al.,* 2012).

Linseed is a crop which badly suffers yield losses due to the attack of various insect pests, of which the bud fly (*Dasyneurali*niBarnes) is the most harmful pest at the reproductive phase of crop. Bud fly damage is caused by maggots initially to leaf bud and then to flower buds and ultimately to capsules due to gall formation. About 60 per cent losses were recorded by Chauhan and Srivastava, (1975). Some physico-morphic characters also affect on yield of linseed, Rajanna *et al*. (2013).

Prasad *et al*. (2005) recorded the lowest infestation of buds (15.53 per cent) by *D. lini* .The increasing concern for environmental safety and global demand for pesticide residue free food has evoked keen interest in pest control through eco-friendly plant products which are easily biodegradable and do not leave any harmful toxic residues besides conserving natural enemies. Keeping the above mentioned facts in mind, the present experiment was to study the efficacy of plant extract andtofind out the ICBR ratio of botanicals and Azadiractin against linseed bud fly *D. lini*.

MATERIALS AND METHODS

The experiment was conducted at research farm, Entomology section, College of Agriculture, Nagpur (Maharashtra) during rabi season of 2012–13 in a Randomized Block Design (R.B.D.) with nine treatments, each consisting of three replicates. Nagpur is situated at an altitude of 21.09N, latitude of 79.22E, and 321 meters above the sea level. The linseed seeds of variety 'Neelam' were sown in gross plots of size3.9 x 2.5 $m^2$with row spacing 30 cm and plant to plant distance 10 cm. All the seven botanicals and azadiractine 1500 ppm under study were applied as foliar spray using Knapsack sprayer. To determine the bio-efficacy of botanicals and azadiractin 1500 ppm, two sprays were conducted on lined crop. The first spray was done at30 days after sowing and second sprayat 15 days of first spray. The details of treatments with respective dose has been given in Table 1.

Counting of damaged buds/capsules

Observations were recorded on the number of infested buds/capsules in each plot a day before spray and at 7 and 14 days after each spray from five randomly selected plants in each plot. The cumulative per cent buds/capsules damage was worked out using the formula.

$$\text{Per cent buds/capsules damaged} = \frac{\text{Number of infested buds/ capsules}}{\text{Total number of buds/capsules}} \times 100$$

14 day count after first spray was considered pre-treatment count for the second spray.

The mean original data of percentage bud/capsule damage was calculated as percentage reduction over control with the following formula

$$\text{Percent Reduction} = \frac{C - T}{C} \times 100$$

Where,

C: Percentage bud/capsule damage of control

T: Percentage bud/capsule damage of treatments

The incremental cost -benefit ratio was calculated finally for each treatment.

RESULTS AND DISCUSSION

Effect of first spray on per cent bud/capsule damaged by *D. lini*

After 7 days of first spray

The data presented in Table 2 on per cent reduction of infestation, 7 days after first spray revealed that, all the treatments were statistically significant and superior. The treatment azadirachtin 1500 ppm was found statistically most superior and recorded highest per cent reduction in bud/ capsule damage over control (52.83%). It was followed by NSE (10 %) and NSE (5%) which recorded 42.80 and 39.87 per cent reduction in bud/capsule damage over control respectively and statistically at par with each other. Yadav and Ali (2008) reported similar result to the present findings who concluded that the treatment nimbicidine at 0.5 per cent or azadirachtin 1500 ppm was superior treatment.

Table1: Treatment Details

	Treatment	Dose
T_1	Neem seed extract	5%
T_2	Neem seed extract	10%
T_3	Karanj seed extract	5%
T_4	Tobacco leaf extract	5%
T_5	*Lantena camera* leaf extract	5%
T_6	Garlic extract	2%
T_7	Green chilli extract	2%
T_8	Azadirachtin 1500 ppm	2 ml/l
T_9	Control	

After 14 days of first spray

The treatment azadirachtin 1500 ppm was found best over all other treatments in recording the per cent reduction in bud/ capsules infestation over control by linseed budfly upto 51.52 per cent followed by neem seed extract 10 per cent, neem seed extract 5 per cent, karanj seed extract 5 per cent which recorded budfly damage 45.87,42.22and 38.99 per cent respectively. However all these treatments were found on par with each othere.Rajeet *al*. (2006) who reported the similar findings with present investigation that, azadirachtin 1500 ppm was statistically significant and superior treatment among the other botanicals followed by neem seed extract 5 per cent andkaranj seed extract 5 per cent respectively.

Effect of second spray on per cent bud/capsule damaged by *D. lini*

After 7 days of second spray

The statistically analyzed data presented in Table 2 showed that all botanicals and azadiractin 1500ppm reduced per cent bud/capsule damaged by linseed bud fly ranged from 55.40 to 24.24 per cent over control. The azadiractin 1500ppm was found highly effective among all the treatments with of 55.40 per cent reduction over control. The next treatments in order were NSE (10%) and NSE (5%) found effective.Prasad *et al*. (2008) revealed that nimbicidine 0.5 per cent (azadirachtin 1500 ppm) was statistically superior treatment among botanicals but not effective than other chemical insecticides i.e. oxydemeton methyl and cypermethrin respectively against linseed budfly.

After 14 days of second spray

The per cent reduction in bud/capsule damagewas recorded at fourteen days after second spray showed in Table 2.

Table 2: Effect of certain botanicals and azadiractinon infestation of linseed bud fly, *D. lini*

Sr. No.	Treatment Details	Dose	Per cent reduction in bud/capsule damage over control			
			First spray	Second spray		
			7 DAS	14 DAS	7 DAS	14 DAS
1	Neem seed extract	5%	39.87(39.03)	42.22(40.44)	46.87(43.18)	44.51(41.83)
2	Neem seed extract	10%	42.80(40.83)	45.87(42.62)	48.91(44.37)	49.76(44.86)
3	Karanj seed extract	5%	35.01(36.13)	38.99(38.47)	44.09(41.54)	43.62(41.24)
4	Tobacco leaf extract	5%	33.38(35.07)	33.03(34.94)	40.19(39.28)	39.88(39.12)
5	*Lantena camera* leaf extract	5%	23.27(28.81)	15.59(21.77)	24.24(28.64)	27.69(31.46)
6	Garlic extract	2%	27.14(31.39)	30.36(33.20)	36.73(37.06)	38.24(38.17)
7	Green chilli extract	2%	25.70(30.45)	26.89(30.81)	33.93(35.45)	33.17(35.14)
8	Azadirachtin 1500 ppm	2 ml/l	52.83(46.64)	51.52(45.89)	55.40(48.15)	53.70(47.14)
9	Control		00.00	00.00	00.00	00.00
F″ test	Sig.	Sig.	Sig.	Sig.		
SE (M) ±	2.98	4.08	3.62	2.34		
CD at 5%	9.03	12.38	10.98	7.09		

(Values in parentheses are arcsine transformations)

Table 3: Economics of botanicals and azadiractin against linseed bud fly *D. lini.*

Sr. No.	Treatments	Dose	Cost of Treatments Cost of insecticides of 2 sprays (Rs ha^{-1})	Quantiy required/ spray/ha	Labour charges (Rs ha^{-1})	Equipment Charges (Rs ha^{-1})	Total Cost(Rs ha^{-1}) "A"	Yield (q ha^{-1})	Yield increased overcontrol (q ha^{-1})	Value of increased Yield(Rs ha^{1}) "B"	Incremental Cost Benefit ratio"c" (B-A)	ICBR (C/A)
1	Neem seed extract	5%	1000	25 kg	720	110	1830	7.53	1.25	6250	4420	1:2.42
2	Neem seed extract	10%	2000	50 kg	720	110	2830	7.81	1.53	7650	4820	1:1.70
3	Karanj seed extract	5%	1500	25 kg	720	110	2330	7.33	1.05	5250	2920	1:1.25
4	Tobacco leaf extract	5%	2250	25 kg	720	110	3080	7.05	0.77	3850	770	1:0.25
5	*L. camera* leaf extract	5%	750	25 kg	720	110	1580	6.79	0.51	2550	970	1:0.61
6	Garlic extract	2%	1200	10 kg	720	110	2030	6.99	0.71	3550	1520	1:0.75
7	Green chilli extract	2%	500	10 kg	720	110	1330	6.87	0.59	2950	1620	1:1.22
8	Azadirachtin 1500 ppm	2 ml/l	520	1 L	480	70	1070	8.04	1.76	8800	7730	1:7.22
9	Control	-	-	-	-	-	-	6.28	-	-	-	-

Market Costs of botanicalsNeem seeds, Rs 20 kg^{-1};Karanj seeds, Rs 30 kg^{-1},Tobacco leaves, Rs 45 kg^{-1}, Lantana leaves, Rs 15 kg^{-1}, Garlic, Rs 60 kg^{-1},Green chilli ,Rs 25 kg^{-1},Azadarachtin, Rs 260 L^{-1}, Labour charges, Rs 120 day^{-1}, Market price of product, Rs 5000 q^{-1}

Azadiractin 1500 ppm was found statistically superior among all the treatments. NSE (10%) and NSE (5%) respectively took second and third position in per cent reduction in bud/capsule damaged by linseed bud fly recorded49.76 and 44.51 per cent reduction respectively. *Lantena camera* leaf extract (5%) also contributed in reduction in bud/capsule damage and recorded lowest per cent reduction in bud/capsule damage (27.69%).

Economics of botanicals and azadiractin against linseed bud fly *D. lini*

The data pertaining to the influence of treatments on the yield of linseed was statistically analyzed and presented in the table 3 illustrated that, all the treatments were found statistically significant over control. The plot treated with azadirachtin 1500 ppm recorded highest yield 8.04 q/ha. These finding are in good agreement with the result of Pal and Nagaich (2012) who concluded that highest seed yield (1176.2 kg ha^{-1})was obtained with nimbicidine 0.5 per cent (azadirachtin 1500 ppm). The treatment NSE 10 per cent (7.81 q/ha) and NSE 5 per cent (7.53 q/ha) were found on par with each other. NSE 5 per cent (7.53 q/ha) was also found on par with karanj seed extract 5 per cent (7.33 q/ha).

The maximum ICBR was registered in the treatment azadirachtin 1500 ppm (1:7.22) having first rank against all other treatments followed by neem seed extract 5 per cent (1:2.42), neem seed extract 10 per cent (1:1.70) and then after karanj seed extract 5 per cent (1:1.25). greenchilli extract 2 per cent (1:1.22), garlic extract 2 per cent (1:0.75), *lantena camera* leaf extract 5 per cent (1:0.61) and tobacco leaf extract 5 per cent (1:0.25). Similar findings were found with Yadav and Ali (2008) who obtained the highest B:C ratio in nimbicidine 0.5 per cent (azadirachtin 1500 ppm) followed by neem seed kernel extract 5 per cent, neem oil 0.5 per cent.

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