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

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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 ‘utra’ during rabi season. The important linseed growing districts of Chhattisgarh are Rajnandgaon, Durg, Bilaspur, Kabirdham, Raipur, Dhantari, 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 4×3m was maintained for each treatment. All the recommended package of practices was followed. 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:

T1 Spray of Imidacloprid 17.8 SL @ 0.0045% at 45 and 60 DAS
T2 Spray of Acetamiprid 20 SP @ 0.004% at 45 and 60 DAS
T3 Spray of Thiomethoxam 25 WP @ 0.005% at 45 and 60 DAS
T4 Spray of Abamectin 1.8 EC @ 0.0009% at 45 and 60 DAS
T5 Spray of Fipronil 5 SC @ 0.01% at 45 and 60 DAS
T6 Spray of Thiodiocarb 75 WP @ 0.075% at 45 and 60 DAS
T7 Spray of Spinosad 48 EC @ 0.0096% at 45 and 60 DAS
T8 Spray of Indoxacarb 15 SC @ 0.006% at 45 and 60 DAS
T9 Untreated check

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 trial two spray of Imidacloprid at 45 and 60 days after sowing exhibited least bud infestation followed 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 + with increase yield 37.47 per cent and 16.66 q/ha + with increase yield 33.31 per cent respectively compared to 11.11 q/ha + yield in control) and highest C: B ratio was received in treated plot Imidacloprid followed by Spinosad (1:29.52 and 1:14.64).

KEYWORDS
Linseed bud fly
Dasyneura lini
Linseed
Insecticides.

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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 (T1) Imidacloprid (10.84, 8.90 and 7.25 per cent bud damage) followed by foliar spray with (T7) Spinosad (10.90, 8.97 and 7.81 per cent bud damage) as compared to (T9) untreated check (27.75 per cent bud damage). The next best treatments were (T2) spray of Acetamiprid (11.32, 10.24 and 9.30 per cent) and (T6) 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 Mauvaipur, Raipur and Nagpur.

Effect on different treatment on yield

During rabi 2010-11 foliar spray with Spinosad (T7) at 45 and 60 DAS recorded significantly maximum yield 17.77 q/ha with 37.47 per cent increase in yield followed by spray with Imidacloprid (T1) 16.66 q/ha with 33.31 per cent yield increase as compared to the untreated check which was recorded 11.11 q/ha. 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 (T7) Rs. 19980 followed by Imidacloprid (T1) Rs. 16650 whereas, highest cost benefit ratio was earned from Imidacloprid (T1) 1:29.52 treated plots followed by Spinosad (T7) 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 (T7) had higher grain

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

<table>
<thead>
<tr>
<th>S.N.</th>
<th>Treatment</th>
<th>Concentration</th>
<th>Bud fly infestation per cent (%)</th>
<th>Yield (q/ha)</th>
<th>Per cent Increase in yield over control (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Imidacloprid 17.8 SL</td>
<td>0.0045</td>
<td>One day before treatment (45 DAS) 10.84 (3.36)</td>
<td>16.66</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Acetamiprid 20SP</td>
<td>0.004</td>
<td>15 days after first spraying (60 DAS) 8.90 (3.06)</td>
<td>33.31</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Thiomethoxam 25WG</td>
<td>0.005</td>
<td>15 days after second spraying (75 DAS) 7.25 (2.73)</td>
<td>11.12</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Abamectin 1.8 EC</td>
<td>0.0009</td>
<td>22.80 (4.82)</td>
<td>17.52</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Fipronil 5SC</td>
<td>0.01</td>
<td>27.75 (5.31)</td>
<td>16.65</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Thiodicarb 75WP</td>
<td>0.075</td>
<td>16.65 (4.82)</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Spinosad 48 EC</td>
<td>0.0096</td>
<td>1.00 (0.21)</td>
<td>3.02</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Indoxacarb 15SC</td>
<td>0.006</td>
<td>C.D. 5%</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

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

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

<table>
<thead>
<tr>
<th>SN</th>
<th>Treatments</th>
<th>Total cost of spraying Rs/ha</th>
<th>Yield Q/ha</th>
<th>Additional Yield over control Q/ha</th>
<th>Additional return Rs/ha</th>
<th>Cost benefit ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Imidacloprid 17.8 SL</td>
<td>564</td>
<td>16.66</td>
<td>5.55</td>
<td>16650</td>
<td>1:29.52</td>
</tr>
<tr>
<td>2</td>
<td>Acetamiprid 20SP</td>
<td>524</td>
<td>12.50</td>
<td>1.39</td>
<td>4170</td>
<td>1:7.95</td>
</tr>
<tr>
<td>3</td>
<td>Thiomethoxam 25WG</td>
<td>584</td>
<td>13.61</td>
<td>2.3</td>
<td>7500</td>
<td>1:12.84</td>
</tr>
<tr>
<td>4</td>
<td>Abamectin 1.8 EC</td>
<td>1214</td>
<td>14.33</td>
<td>3.22</td>
<td>9660</td>
<td>1:7.95</td>
</tr>
<tr>
<td>5</td>
<td>Fipronil 5SC</td>
<td>1264</td>
<td>16.11</td>
<td>5</td>
<td>15000</td>
<td>1:11.86</td>
</tr>
<tr>
<td>6</td>
<td>Thiodicarb 75WP</td>
<td>1214</td>
<td>13.47</td>
<td>2.36</td>
<td>7080</td>
<td>1:5.83</td>
</tr>
<tr>
<td>7</td>
<td>Spinosad 48 EC</td>
<td>1364</td>
<td>17.77</td>
<td>6.66</td>
<td>19980</td>
<td>1:14.64</td>
</tr>
<tr>
<td>8</td>
<td>Indoxacarb 15SC</td>
<td>984</td>
<td>13.33</td>
<td>2.22</td>
<td>6660</td>
<td>1:6.76</td>
</tr>
<tr>
<td>9</td>
<td>Untreated Control</td>
<td>11.11</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
yield and safer to environment but due to higher cost of insecticides, it was become second position after Imidacloprid (T1) in the economics of different treatments.

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