Relative Performance of Certain Newer Insecticides against Pod Bug \textit{[Clavigralla gibbosa (Spinola)]} on Long Duration Pigeonpea

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Field experiments were conducted to observe the relative performance of some new insecticides with novel mode of action (Acetamiprid 20 SP @20 g a.i./ha, Spinosad 45 % SC @73 g a.i./ha, Rynaxypyr 16.5 SC 30g a.i./ha, Dimethoate 30 EC @ 600 g a.i./ha, Profenophos+DDVP 20ml+0.5ml/l, Acephate 75 SP @ 750 g a.i./ha) for the management of Pod bug \textit{[Clavigralla gibbosa (Spinola)]} on Pigeon pea in field condition, during the \textit{kharif} season of 2012-13 and 2013-14 at Agricultural Research Farm, Banaras Hindu University, Varanasi. Among the insecticide tested, the lowest pod damage & grain damage by Pod bug was recorded in the plot treated with Rynaxypyr 18.5 SC @ 30g a.i./ha (10.33 & 9.00% and 3.65 & 2.05% respectively ) which is at par with Spinosad 45% SC @73 g a.i./ha (12.66% & 10.00 % and 3.84% & 2.51 % respectively ).

Key words: Rynaxypyr, Pod bug, Insecticides, Spinosad.

Pigeon pea (\textit{Cajanus cajan} L. Mills.) is known by more than 350 dialect names, the crop ranks fourth in importance as edible legume in the world. It is the second most important pulse crop after chickpea in India (Das \textit{et. al} 2015). It is estimated that India imported about 4 million tonnes of pulses during 2012-13, and the production of Pigeon pea faced a decrease from 3.07 to 3.04 million tonnes during 2012-13 to 2013-14 with an import pressure of 0.33 million tonnes to meet the demand of 3.30 million tonnes (Anonymous, 2015). Pigeon pea is mainly grown as marginal or a component of mixed cropping system in cotton, sorghum and soybean, receiving less attention off farmers (Sharma \textit{et al}., 2011). Yield of this crop remained stagnant for the past 3 to 4 decades, largely due to damage inflicted by insect pests Basand Rai \textit{et al}. (2011). Mandal \textit{et al} (2009) observed that Pigeon pea infested with as many as 21 insect pests and 2 species of mites at different stages of crop growth in an overlapping manner. Pigeon pea is attacked by insect/pests right from sowing to harvesting and also during the storage. Climate change may lead to shift in production areas of the pigeon pea as well as changes in geographical distribution, incidence and intensity of pests and diseases. Among insect pests, Tur pod bug \textit{Clavigralla gibbosa} (Spinola), is potential pests and occasionally cause significant grain yield losses in long duration pigeon pea (Singh & Nath 2011). Feeding by nymphs and adults of this bug causes premature shedding of flower-buds, flowers and pods, deformation of pods, and shriveling of grains, resulting in substantial losses to pigeon pea crops. Both adult and nymph of \textit{C. gibbosa} feed on pigeon pea by piercing the pod wall and extracting the nutrient from the developing seeds. Bio intensive integrated pest management allows selective use of eco friendly pesticides after maximizing effectiveness of natural control. Hence,
the present study was carried out on the role of bio
eral approaches in reducing pod and grain
damage by *C. gibbosa* to pigeon pea.

**MATERIALS AND METHODS**

The field experiments were conducted at
Agricultural Research Farm, Banaras Hindu
University, Varanasi during the *kharif* season 2012-
13 and 2013-14. The long duration pigeonpea
variety BAHAR, which is commonly cultivated in
this area, was grown in plots of 5 rows, 4 meters
following row to row and plant to plant spacing of
75 cm and 10 cm respectively. The crop was grown
following the normal agronomic practices in
“Randomized Block Design” with three replications
and seven treatments of insecticides i.e. Acephate
75 SP 750g a.i./ha, Acetamiprid 20 SP @20 g a.i./ha,
Spinosad 45 % SC @73 g a.i./ha, Rynaxypyr 18.5
SC 30g a.i./ha, Dimethoate 30 EC @ 600 g a.i./ha,
Profenophos+DDVP 20ml+0.5ml/lit and control. .
Three sprays were taken, first spray of insecticidal
treatments was given after 50% flowering and
subsequent sprays were applied at 15 days interval.
Five plants in each plot from the three rows were
selected randomly and all the pods from five plants
were pooled together and finally 200 pods were
picked up for pod and grain damage assessment
and yield was recorded for each plot.

**Statistical analysis**

The values were duly transformed and
subjected to statistical analysis. The significance
of data was analysed by analysis of variance
(ANOVA) and the means were compared. The
analysis was done by SPSS vs.16.0.

**RESULTS AND DISCUSSION**

**Pod damage by pod bug**

The treatment applied showed significant
differences in the percent pod damage by pod bug
and data are given in table (1,2). The percent pod
damage ranged from 10.33 &9.00% Rynaxypyr 18.5
SC @ 30g a.i./ha to 17.00 &15.00 in Acetamiprid
20SP @ 20 g a.i./ha during 2012-2013 & 2013-14
respectively. While in control plot the damage was
18.33 & 15.33% during both the year. All treatment
were found to be superior over control with respect
to percent pod damage. The relative performance
of various insecticide was found in order of
Rynaxypyr 18.5 SC @ 30g a.i./ha > Spinosad 45 %
SC @73 g a.i./ha > Dimethoate 30 EC @ 600g a./

**Table 1. Relative performance of newer insecticides against pod bug
*(Clavigralla gibbosa)* infesting long duration Pigeon pea at Varanasi during, 2012-13**

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Doses (a.i./ha)</th>
<th>Percent Damage by pod bug</th>
<th>Yield (kg/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pod</td>
<td>Grain</td>
<td></td>
</tr>
<tr>
<td>Acephate 75 SP</td>
<td>750g</td>
<td>15.66</td>
<td>1702</td>
</tr>
<tr>
<td></td>
<td>(23.29)</td>
<td>(12.96)</td>
<td></td>
</tr>
<tr>
<td>Spinosad 45% SC</td>
<td>20g</td>
<td>12.66</td>
<td>1851</td>
</tr>
<tr>
<td></td>
<td>(20.82)</td>
<td>(11.17)</td>
<td></td>
</tr>
<tr>
<td>Rynaxypyr 18.5 SC</td>
<td>73g</td>
<td>10.33</td>
<td>1900</td>
</tr>
<tr>
<td></td>
<td>(18.68)</td>
<td>(11.09)</td>
<td></td>
</tr>
<tr>
<td>Acetamiprid 20 SP</td>
<td>30g</td>
<td>17.00</td>
<td>1730</td>
</tr>
<tr>
<td></td>
<td>(24.15)</td>
<td>(13.09)</td>
<td></td>
</tr>
<tr>
<td>Profenophos+DDVP</td>
<td>2ml+0.5ml/lit</td>
<td>13.66</td>
<td>1645</td>
</tr>
<tr>
<td>Dimethoate 30EC</td>
<td>600g</td>
<td>13.33</td>
<td>1660</td>
</tr>
<tr>
<td></td>
<td>(21.62)</td>
<td>(12.77)</td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>-</td>
<td>18.33</td>
<td>810</td>
</tr>
<tr>
<td></td>
<td>(25.31)</td>
<td>(14.95)</td>
<td></td>
</tr>
<tr>
<td>SEM</td>
<td>-</td>
<td>1.28</td>
<td>0.70</td>
</tr>
<tr>
<td>C.D at p= 0.05%</td>
<td>-</td>
<td>3.99</td>
<td>2.20</td>
</tr>
</tbody>
</table>

Figures in parentheses are Angular transformed values
ha Profenophos + DDVP @ 2ml +0.5 ml/lit >Acephate 75SP @ 750 g a.i./ha > Acetamiprid 20SP @ 20g a.i./ha. The lowest pod damage by pod bug was recorded in the plot treated with Rynaxypyr 18.5 SC @ 30g a.i./ha (10.33 & 9.00%) which is at par with Spinosad 45 % SC @73 g a.i./ha (12.66% & 10.00%). Same trend of result was also showed by Pandey and Das (2014) Rynaxypyr 20% SC @ 30g a.i./ha was found to be most effective as it recorded lowest bug population after each spray intervals. Niraj et al. (2008) found that the $E_{0.45} 20$% SC (Rynaxypyr) @ 40 g a.i./ha is the best treatment against pod damage by pod bug with 15.7% compare to other treatments. Narasimhamurthy and Ram Keval (2013) and the study revealed that the treatments applied showed significant difference in the per cent pod damage by pod bug. The plot treated with Spinosad 45% SC showed minimum (8.30%) pod damage by pod bug during 2009-2010, which is at par with Indoxacarb 14.5% SC, Dimethoate 35% EC and Endosulfon 30% EC.

**Grain damage by pod bug**

The treatment applied showed significant differences in the percent grain damage by pod bug and data are given in table. The percent grain damage ranged from 3.64 & 2.05 percent in Rynaxypyr 18.5SC @ 30g a.i./ha to 5.16 &5.00 in Acetamiprid 20SP @ 20g a.i./ha during 2012-2013 & 2013-14 respectively. While in control plot the damage was 6.68 & 5.33 percent during both the year. All treatment were found to be superior over control with respect to percent grain damage. The relative performance of various insecticide was found in order of Rynaxypyr 18.5SC @ 30g a.i./ha > Spinosad 45% SC @73 g a.i./ha > Dimethoate 30 EC @ 600g a.i./ha > Profenophos + DDVP @ 2ml +0.5 ml/lit >Acephate 75SP @ 750 g a.i./ha > Acetamiprid 20SP @ 20g a.i./ha. The lowest grain damage by pod bug was recorded in the plot treated with Rynaxypyr 18.5SC @ 30g a.i./ha (3.65 &2.05%) which is at par with Spinosad 45% SC @73 g a.i./ha (3.84% & 2.51 %) (Table). Similar type of findings was reported by Rachappa et al. (2014) who observed that the Cyantraniliprole (Rynaxypyr) 10.26%w/w OD @ 60 g a.i./ha was highly effective in controlling pigeon pea pest by registering lowest seed damage by pod bug (1.55 %). Singh et al. (2008) found that the $E_{0.45} 20$% SC (Rynaxypyr) @ 40 g a.i./ha is most effective in controlling pigeon pea pod bug with 8.47% and 6.46% over control. Narasimhamurthy and Ram Keval (2013) recorded that the plot treated with Spinosad 45% SC showed minimum 2.36% grain damage by pod bug during

### Table 2. Relative performance of newer insecticides against pod bug (*Clavigralla gibbosa*) infesting long duration Pigeon pea at Varanasi during 2013-14

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<td>12.66</td>
<td>3.84</td>
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<td>3.65</td>
</tr>
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<td>30g</td>
<td>17.00</td>
<td>5.16</td>
</tr>
<tr>
<td>Profenophos+ DDVP</td>
<td>2ml+0.5ml/lit</td>
<td>13.66</td>
<td>4.96</td>
</tr>
<tr>
<td>Dimethoate 30EC</td>
<td>600g</td>
<td>13.33</td>
<td>4.24</td>
</tr>
<tr>
<td>Control</td>
<td>-</td>
<td>18.33</td>
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<td>-</td>
<td>3.99</td>
<td>2.20</td>
</tr>
</tbody>
</table>

Figures in parentheses are Angular transformed values
The grain yield under different insecticide treatments differed significantly during both the year. The relative performance of various insecticides in terms of grain yield was found in order of Spinosad 45% SC > 73 ga.i./ha > Acetamiprid 20 SP > Rynaxypyr 18.5 SC > Profenophos + DDVP > Acephate 75 SP > Dimethoate 30 EC. The highest grain yield was observed in the treatment with Spinosad 45% SC (1900 kg/ha & 1810 kg/ha) followed by treatment with Acetamiprid (1851 kg/ha & 1690 kg/ha) respectively during both the year, while the lowest yield was observed under control plot. The findings of present study are in accordance with Sreekanth et al. (2014) found that the maximum grain yield was observed in spinosad 45.1 SC @ 0.33 ml/litre treated plot 16.2 and 18.4 q/ha, respectively which was significantly superior over all the treatments. Manjunath et al. (2014) indicated that pesticide based IPM module comprising of thiodicarb 75 WP, rynaxypyr 18.5 SC, spinosad 45 SC, DDVP 76 EC and flubendiamide 480 SC proved to be cost effective by recording highest grain yield (2819 kg/ha) and benefit cost ratio (4.09).

REFERENCES