Comparative efficacy of green labeled insecticides against *Spodoptera litura* on bidi tobacco at scarce rainfall zone of A.P

J Manjunath and S Jaffarbasha

Abstract

An experiment was conducted for three seasons at Regional Agricultural Research Station, Nandyal. Comparative efficacy of insecticides, viz Rynaxpyr 0.3ml/l, Spinosad 0.25ml/l, Novaluron 1ml/l, Emamectin benzoate 0.4gm/l and Chlorpyriphos 2.5ml of water against *Spodoptera litura* was carried out. All three insecticides Rynaxpyr 0.3ml/l, Spinosad 0.25ml/l, Novaluron 1ml/l, Emamectin benzoate 0.4gm/l and Chlorpyriphos 2.5ml, had non-significant difference among themselves in reducing the larval population of *Spodoptera litura*. at 3, 5 and 7 following the application of the insecticides. Rynaxpyr 0.3ml/l, Emamectin benzoate 0.4gm/l in reducing number of larvae on the basis of pre-spray data. Toxicity of Rynaxpyr 0.3ml/l, Emamectin benzoate 0.4gm/l and Spinosad 0.25ml/l was discussed.

Keywords: Bidi tobacco, insecticides, *Spodoptera litura*

Introduction

Tobacco, one of the important high value commercial crops in India, is valued for its potential to generate farm income and employment to farmers and farm labours and revenue to the government. Its is grown in area of 0.433 M ha in the country with a production of 721M kg (Anonymous, 2017) [1]. Tobacco leaf eating, caterpillar (*Spodoptera litura* F.) is a serious pest in tobacco nurseries and main field. The pest causes damage to an extent of 80-100% in the nurseries under favourable conditions (Chari et al., 1994) [2] and loss in the field crop (Sitararnaiah et al., 2001) [9] and hence is a limiting factor in the production of quality leaf. Farmers resort to chemical sprays to limit the menace by this pest. Application of mon cooktrophos or endosulfan or quinalphos as spray was found highly effective in managing the larval population (Prasad et al., 1980). Among the various insect pests attacking this crop, leaf eating caterpillar, *S. litura*, commonly known as tobacco caterpillar, a polyphagous pest is found in entire groundnut growing countries in Asia, Australia and the Pacific basin (Feakin, 1973) [3] and causes extensive damage to the crop at its initial stage. This pest now became serious one on groundnut crop in Gujarat State. Hence, this type of study is now became useful for the long term management of this pest. As *S. litura* is one of the important pests and causes considerable damage to the crop, blanket use of insecticides have recommended for the effective and economic control of the pest in groundnut. The injudicious application of insecticides created many adverse effects resulting into environmental pollution and health hazards and development of resistance in *S. litura* to several insecticides.

Previously tried insecticides against insect pests of tobacco crop included endosulfan 35EC, deltamethrin 2.3EC, ethoprophos 30EC, monocrotophos 40WSC, demeton S-methyl 45EC, dimethoate 40EC, methamidophos 60SI (Hussain & Shah, 1998) [6]. Insecticides from different sources ought to be tested against *H. armigera* and *Spodoptera* spp., because both pests insects are polyphagous and they shift to sunflower following tobacco in certain places where tobacco is extensively grown such as Kurnool Dist. A.P

Materials and Methods

The experiment was carried out during 2012-13, 2015-16 and 2016-17 at Regional Agricultural Research Station, Nandyal. The trial was laid out in Randomized Block Design (RBD) with four treatments including a control and replicated thrice with A119 bidi variety. Plot size was 6 X 6 m² with row to row and plant to plant distance were 75 X 75 cm,
respectively. Five insecticides Rynaxpyr 20SC @ 0.3 ml/l, Spinosad 45 SC @ 0.25 ml/l, Novaluran 10EC @ 1 ml/l, Emamectin benzoate 5% SG @ 0.4 gm/l and Chloropyriphos 20 EC @ 2.5 ml of water. The control plots were sprayed with water only. Data on number of larvae of Spodoptera litura were taken from five randomly selected plants from each treatment plot just before and then after 3, 5 and 7 days of application of the insecticides.

The data thus obtained were converted into per cent mortality by using the formula given by Abbott (1925) and modified by Henderson and Tilton (1955) and analyzed statistically. Corrected per cent mortality = 100 x \[ \frac{(C - T_a)}{C} \] Where, \( T_a \) = Number of larvae recorded after treatment

\( T_b \) = Number of larvae recorded before treatment

\( C \) = No of larvae recorded from check plot after treatment

\( C_b \) = No of larvae recorded from check plot before treatment

Yield components were recorded in the treatment rynaxpyr 0.3 ml/lit which was at par with treatment Novaluran 1 ml/lit and Emamectin benzoate 0.4 gm/lit which recorded 15.83 mean no. of larvae/plant. The lowest mean number of larvae population was recorded in the control treatment with 910 kg/ha.

At 5 days after spray all the treatments superior over the control Spodoptera litura larva except control treatment which recorded 15.83 mean no. of larvae/plant. The lowest mean no. of Spodoptera litura larva population was recorded in the treatment rynaxpyr 0.3 ml/lit with 96.50% ROC which was followed by Emamectin benzoate 0.4gm/lit which recorded 0.45 mean no. of larvae/plant with 91.37% ROC.

Overall average larvae ROC was noticed in treatments rynaxpyr 0.3ml/lit with 96.50 and which was followed on par with Emamectin benzoate 0.4 gm/lit Novaluron 1ml/lit 89.18 and 87.36 in ROC respectively.

### B) Cured leaf yield and Cost benefit ratio

The pooled cured leaf yield was recorded the highest cured leaf yield was recorded in this treatment Rynaxpyr 0.3 ml/lit with 1161 which was followed with treatment Novaluron 1ml/lit and Emamectin benzoate which recorded 1151 and 1089 kg/ha respectively and least cured leaf yield was noticed in the control treatment with 910 kg/ha.

These results are in agreement with Patil et al 2014, Evaluated the various insecticides against S. litura and found chlorantraniliprole 30 g a.i ha-1, methomyl1300 g a.i ha-1 and spinosad 75 g a.i. ha-1 were most effective insecticides in protecting the soybean crop from infestation of S. litura. The results of the present investigation substantially supported by the findings Hanning et al. (2009) concluded that Ecotoxicological safe profile with reducing risk to the applicator novel molecule, chlorantraniliprole induce feeding cessation in time span when compared with broad spectrum insecticides like Methomyl. Gadihya et al. (2014) [4] also found chlorantraniliprole (0.006%) and spinosad (0.018%) were found effective and statistically at par with each other in protecting the groundnut crop from the infestation of Spodoptera litura (Fab.) and Helicoverpa armigera (Hubner).

### Table I: Mean larval number plant-'of Spodoptera litura' at pre- and post-spray intervals of application of insecticides

<table>
<thead>
<tr>
<th>Treatments</th>
<th>DBS</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>T4</th>
<th>T5</th>
<th>T6</th>
<th>Overall mean% ROC</th>
<th>Cured leaf ROG</th>
<th>CB ratio</th>
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<tbody>
<tr>
<td></td>
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<td>Mean ROC</td>
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<tr>
<td>Rynaxpyr 0.3 ml/l</td>
<td></td>
<td>99.54</td>
<td>97.08</td>
<td>96.21</td>
<td>95.72</td>
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<tr>
<td>Spinosad 0.25 ml/l</td>
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<td>97.45</td>
<td>98.04</td>
<td>96.21</td>
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<td>Novaluran 1 ml/l</td>
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<td>1.28</td>
<td>0.90</td>
<td>1.11</td>
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<td>Emamectin benzoate</td>
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<td>65.83</td>
<td>86.21</td>
<td>79.96</td>
<td>84.54</td>
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<tr>
<td>Chloropyriphos 2.5 ml/l</td>
<td>97.96</td>
<td>81.08</td>
<td>82.08</td>
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<tr>
<td>Control</td>
<td></td>
<td>1.08</td>
<td>0.81</td>
<td>0.72</td>
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<td>CD(0.05)</td>
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<td>0.72</td>
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DBS: Days before Spraying
DAS: Days after Spraying
Values in Parentheses are square root transformed value
Means followed by same letters are not significantly different at \( p < 0.05 \) by DMRT

% ROC – Per Cent Reduction over Control

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