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EVALUATION OF INSECTICIDES AGAINST BEAN BUG AND JUTE HAIRY CATERPILLAR INFESTING COUNTRY BEAN

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ABSTRACT

This research examined the efficiency of nine insecticides against the bean bug (*Riptortus pedestris* Fab.) and jute hairy caterpillar (*Spilosoma obliqua* Walk.) that attack country bean. When compared to an untreated control, Fenvalerate 20 EC, Neem oil (Fresh), and Cypermethrin 10 EC were shown to be effective in controlling the bean bug, while Esfenvalerate 5 EC, Deltamethrin 2.5 EC, and Neem oil (Fresh) were most effective against the jute hairy caterpillar. During the summer, Fenvalerate 20 EC or Esfenvalerate 5 EC in combination with Neem oil (Fresh) may be recommended to control bean bugs and jute hairy caterpillars.

Keywords: Insecticides, *Riptortus pedestris*, *Spilarctia obliqua,* country bean

Country bean (*Lablab purpureus* Lin.) is a high-nutritional vegetable-cum-pulse crop (Jayasinghe *et al*. 2015) that may be grown throughout the summer, when only approximately 30% of our country's vegetables are grown (Hossain and Awrangzeb 1992). Insect pests are prevalent throughout the summer season, resulting in low yield and poor quality. Among the insects found on country bean field, bean bug and jute hairy caterpillar cause damage throughout the season. Bean bug nymphs and adults cause damage to plant parts such as stems, leaves, flowers, pods and seeds, and exude watery saliva containing digestive enzymes that provides them with nutrients and water (Chen *et al*. 2018, Kim and Lim 2010). "Staygreen Syndrome" is caused by nutrient transport being disturbed in the injured areas (Gao and Shi 2019, Zhang *et al*. 2016). Bean bug also transmits yeast-spot disease (Kimura *et al*. 2008), which causes field-wide seed abortion (Li *et al*. 2019).

On the other hand, Jute hairy caterpillar is a widely dispersed, extremely polyphagous (Gupta and Bhattacharya 2008) and sporadic pest that causes damages by eating voraciously on the chlorophyllous portions of leaves, causing leaves to resemble thin white membranes (Mishra *et al*. 2017), resulting in a significant reduction in yield (Hath and Chakraborty 2004, Gupta and Bhattacharya 2008, Hussain and Begum 1995).

The research was carried out in a randomized complete block design (RCBD) with three replications. The synthetic insecticides were collected from the local market of Gazipur, Bangladesh. Fresh Neem oil was obtained from the Crashing mill at Kakonhat market, Godagari, Rajshahi.

To conduct this study, IPSA seem 2 was transplanted in the research field in March, 2017. Appropriate cultural practices were followed on necessity basis. The treatments comprised of: Cypermethrin 10 EC @ 1ml/L of water (T_1), Fenitrothion 50 EC @ 1.5 ml/L of water (T_2), Fenvalerate 20 EC @ 1 ml/L of water (T_3), Emamectin benzoate 5 SG @ 1g/L of water (T_4), Deltamethrin 2.5 EC @ 1ml/L of water (T_5), Esfenvalerate 5 EC @ 1ml/L of water (T_6), Curtap 50 SP @ 2 gm/L of water (T_7), Neem oil (fresh) @ 2.5 ml/ L of water (T_8), Neem oil (stored) @ 2.5 ml/ L of water (T_9) and untreated control (T_{10}). The insecticides were sprayed on entire plant at 10 days interval.

Table 1. List of insecticides used in this study

Trade name	Chemical Class	Common name	Trading Company
Ripcord 10EC	Synthetic Pyrethroid	Cypermethrin	Padma Oil Co. Ltd.
Sumithion 50EC	Organophosphate	Fenitrothion	Shetu Corporation Ltd.
Fenfen 20EC	Synthetic Pyrethroid	Fenvalerate	Alpha Agro Limited
Proclaim 5SG	Avermectin	Emamectin Benzoate	Syngenta Bangladesh
Decis 2.5EC	Pyrethroid	Deltamethrin	Bayer Crop Science
Sumialpha 5EC	Synthetic Pyrethroid	Esfenvalerate	BASF Bangladesh
Suntap 50SP	Carbamate	Curtap	McDonald BD Pvt. Ltd
Neem oil (Fresh)	Biopesticide	Azadirachtin	N/A
Neem oil (Stored)	Biopesticide	Azadirachtin	N/A

Visual searches were performed to determine the number of bean bug and jute hairy caterpillars. Data was obtained twice: first on day before spraying and second on the fifth day of spraying. Efficacy of insecticides were calculated based on percent reduction over control and the formula is given below:

Percent reduction over control

$$\frac{\text{Mean value of the control} - \text{Mean value of the treatment}}{\text{Mean value of the control}} = \times 100$$

Data were analyzed using MSTAT-C software. The means were separated for significant difference using the Duncan's Multiple Range Test (DMRT).

Insecticides have a significant impact on the number of bean bugs in country bean field. In comparison to the control (10.3/plot), Fenvalerate 20 EC (4.7/plot) was the most effective insecticide in reducing the bean bug population, which was followed by Neem oil (Fresh) (5.3/plot) and Cypermethrin 10 EC (6.0/plot). Based on the efficacy assessment of insecticides to control pest population compared to untreated control, Fenvalerate 20 EC (54.8 %), Neem oil (Fresh) (48.4%), and Cypermethrin 10 EC (41.9%) were found to be the most effective insecticides in declining bean bug population.

In comparison to the control (8.3/plot), all pesticides decreased the population of hairy caterpillars. Esfenvalerate 5 EC (2.7/plot) was the most effective insecticide in suppressing the jute hairy caterpillar population followed by Deltamethrin 2.5 EC (3.7/plot), Neem oil (Fresh) (3.7/plot), and Cypermethrin 10 EC (4.3/plot). These pesticides are responsible for reduction of a significant

Table 2. Effect of insecticides on bean bug in year-round country bean field grown during summer season

Treatments	Bean bug	
	Mean value	Reduction over control
Cypermethrin 10 EC	6.0 e	41.9 %
Fenitrothion 50 EC	9.0 b	12.9 %
Fenvalerate 20 EC	4.7 f	54.8 %
Emamectin benzoate 5 SG	7.7 c	25.8 %
Deltamethrin 2.5 EC	6.3 e	38.7 %
Esfenvalerate 5 EC	6.7 de	35.4 %
Curtap 50 SP	8.3 c	19.4 %
Neem oil (Fresh)	5.3 f	48.4 %
Neem oil (Stored)	7.7 cd	25.8 %
Untreated control	10.3 a	0.0 %
CV	6.6 %	

Table 3. Effect of insecticides on jute hairy caterpillar in year-round country field grown during summer season

Treatments	Jute hairy caterpillar	
	Mean Value	Reduction over control
Cypermethrin 10 EC	4.3 ef	48.0 %
Fenitrothion 50 EC	7.0 b	15.8 %
Fenvalerate 20 EC	5.0 d	39.9 %
Emamectin benzoate 5 SG	4.7 de	43.9 %
Deltamethrin 2.5 EC	3.7 g	55.9 %
Esfenvalerate 5 EC	2.7 h	68.0 %
Curtap 50 SP	6.0 c	28.0 %
Neem oil (Fresh)	3.7 fg	56.0 %
Neem oil (Stored)	6.7 b	20.0 %
Untreated control	8.3 a	0.0 %
CV	6.3 %	

proportion (~50%) of the jute hairy caterpillar population. Meena *et al*. (2020) reported that Emamectin benzoate 5 SG was shown to be the most efficient in controlling Bihar hairy caterpillars in cluster beans. Flubendiamide 480 SC was an effective insecticide in reducing the incidence of *S. obliqua* and ensuring a maximum yield of 16.9 q/ha in soybean (Mishra *et al*. 2017).

Therefore, during the summer, Fenvalerate 20 EC or Esfenvalerate 5 EC in combination with Neem oil (Fresh) may be recommended to combat bean bug and jute hairy caterpillar infestations in country bean fields.

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