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MANAGEMENT APPROACH AGAINST POD BORER, *EUCRYSOPS CNEJUS* F. ATTACKING YARD LONG BEAN

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Abstract

Several management approaches were evaluated against pod borer attacking yard long bean during April - July, 2019 at Entomology Research Field, Bangladesh Agricultural Research Institute (BARI), Gazipur. The management package namely sanitation + spraying bio-pesticide Antario (Package 1), sanitation + spraying bio-pesticide Spinosad 45 SC (Package 3) and sanitation + alternate spraying of Antario and Spinosad 45SC (Package 4) showed almost equal effectiveness in reducing flower and pod damage by pod borer and higher yield. But the management package sanitation + spraying bio-pesticide Antario (Package 1) appeared best as it provided the highest marginal benefit cost ratio (MBCR) (10.09), which was followed by sanitation + alternate spraying of Antario and Spinosad 45SC (6.97) (Package 4), and sanitation + spraying bio-pesticide Spinosad 45 SC (5.29) (Package 3). The effectiveness of sanitation +Bt kurstaki) (Package 2) was poor in respect of yield (12.06 tha^{-1}) and MBCR (3.44).

Keywords: Bio-pesticide, Yard long bean pod borer, Management approach.

Introduction

Yard long bean, *Vigna unguiculata* ssp. *sesquipedalis* is an important leguminous vegetable grown widely in summer season of Bangladesh**.** But the production of this vegetable in Bangladesh is much lower than any other Asian countries with a national average of 3.87 t ha^{-1} (Anon. 2017). There are many constraints in the production of the crop, of which pod borer, *Eucrysops cnejus* (Lepidoptera: Lycaenidae) cause both quantitative and qualitative losses. The tiny larvae bore into buds and flowers and devours upon tender parts like anthers and pollens. Full-grown larva bores the pods and feeds upon developing seeds (Patel *et al*. 1998). Farmers spray locally available chemical pesticides to get rid of this problem. Available reports reveal that synthetic insecticides dominate as the means of control against pod borers in pulses, peas and bean (Lalasangi, 1988; Rahman & Rahman, 1988; Karim, 1995).

Sometimes farmers spray insecticides 3-4 times in a week. But indiscriminate use of pesticides has not only complicated the management, but also create several adverse effects such as pest resistance, outbreak of secondary pests (Hagen and Franz, 1973), health hazards (Bhaduri *et al*. 1989) and environmental pollution (Fishwick, 1988). So, to reduce unwarranted pesticide load in the environment

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and for sustainable production an attempt was undertaken to develop management package(s) against pod borer attacking yard long bean.

Materials and Methods

The experiment was conducted in the research field of Entomology Division, Bangladesh Agricultural Research Institute (BARI), Gazipur (25°25′N, 89°5′E) during April - July, 2019. Yard long bean seeds of Kagornatoki variety were directly sown in a plot of 4m × 5.5m. The seeds were sown on 2 April, 2019 maintaining plant spacing of 30 cm and row spacing of 60 cm. The experiment was laid out in Randomized Complete Block Design (RCBD) with 3 replications. The crop was fertilized with Cowdung 15 t ha^{-1}, Urea 50 kg ha^{-1}, TSP 150 kg ha^{-1}, MP 150 kg ha^{-1}, Gypsum 100 kg ha^{-1}, Zn Sulphate 12 kg ha^{-1} and Borax 12 kg ha^{-1} as prescribed by Rashid *et al*., 2009. Weeding and other intercultural operations were done as and when necessary.

Treatment applications were started as soon as the infestation of pod borer was noticed. Non target pests especially the sucking pests were controlled with spraying Acetamipirid 50SP @ 1g $litre^{-1}$ of water. The management approaches were as follows:

Package (1): Sanitation i.e. hand picking of infested flowers and pods with larvae + 4 sprays of bio-pesticide Antario (Bt+ Abamectin) @ 1g $litre^{-1}$ of water at fortnightly interval; Package (2): Package 1 + 4 sprays of bio-pesticide Bt Kurstaki @ 0.5 g $litre^{-1}$ of water at fortnightly interval; Package (3): Sanitation as above P_1 + P_2 or P_2 + 4 sprays of bio-pesticide Spinosad 45SC @ 0.4 ml $litre^{-1}$ of water at fortnightly interval; Package (4): Sanitation + Alternate spraying of Antario and Spinosad 45SC @ 0.4 ml $litre^{-1}$; altogether 4 sprays were done at fortnightly interval; Package (5): Farmers practice- spraying of Emamectin benzoate 5SG @ 1 g $litre^{-1}$ of water; altogether 8 sprays were applied starting from the initiation of the pest attack at weekly interval; and Untreated control.

Numbers of healthy and infested flowers were counted and recorded from 20 randomly selected rachis per plot. At each harvest number and weight of healthy and infested pods were recorded and percent fruit infestation and yield (t ha^{-1}) was calculated.

Moreover, marginal benefit cost ratio (MBCR) of different treatments were also calculated following Dutta *et al.* (2018). Data were analyzed by using MSTAT-C software for analysis of variance and treatment means were separated by applying DMRT at 1 % level of significance.

Results and Discussion

The package namely Sanitation + alternate spraying of Antario and Spinosad 45SC (Package 4) showed significantly the lowest flower infestation (5.08%) which is statistically similar to the package 1 consisting of Sanitation + Antario

(5.84%) and package 3 consisting of Sanitation + Spinosad 45 SC (5.67%). The untreated control showed significantly the highest flower infestation (19.57%) by pod borer. It was also observed that, the package 4 having Sanitation + alternate spraying of Antario and Spinosad 45SC showed significantly the lowest pod infestation (6.02%) which is statistically similar to package 1 consisting of Sanitation + Antario (6.47%) and package 3 having Sanitation + Spinosad 45 SC (6.98%). The untreated control showed significantly the highest pod infestation (20.21%) by pod borer.

Package 3 having Sanitation + Spinosad 45 SC treated plots produced significantly the highest yield (14.75 t ha^{-1}) followed by package 4 with Sanitation + alternate spraying of Antario and Spinosad 45SC treated plots (14.58 t ha^{-1}) and package 1 provided with Sanitation + spraying of Antario treated plots (14.42 t ha^{-1}). However, the control plots produced significantly the lowest yield (7.50 t ha^{-1}) (Table 1).

Table. 1 Effect of different management packages on flower and pod infestation and yield of yard long bean by pod borer

Management approaches	Flower infestation (%)	Flower infestation reduction over control (%)	Pod infestation (%)	Pod infestation reduction over control (%)	Yield (t ha^{-1})
Package 1	5.84d	70.16	6.47c	67.99	14.42a
Package 2	8.82c	54.93	8.32bc	58.83	12.05b
Package 3	5.67d	71.03	6.98c	65.46	14.75a
Package 4	5.08d	74.04	6.02c	70.21	14.58a
Package 5	10.02b	48.79	10.25b	49.28	11.85b
Untreated control	19.57a	-	20.21a	-	7.50c
CV%	5.02		7.62		9.02

Means having similar letter(s) in a column not significantly different at P> 0.01 followed by DMRT.

The marginal benefit-cost ratio (MBCR) as worked out based on the expenses incurred and value of crops obtained from the treated plots for the control of pod borer of yard long bean is given in Table 2. It was noted here that expenses incurred referred to those only on pest control. It was revealed that the highest (10.09) marginal benefit-cost ratio (MBCR) was calculated from Sanitation + Antario treated plots (package 1) followed by package Sanitation + alternate spraying of Antario and Spinosad 45SC (6.97) (package 4). So, considering MBCR, sanitation along with spraying Antario (package 1) may be recommended for effective management of pod borer attacking yard long bean.

In recent times, different new bio-pesticides are being developed worldwide. In our country, a limited efforts have been given towards developing bio-rational based management approach against pod borer. However, Uddin *et. al.* (2015), observed that spinosad (Tracer 45 SC) and Emamectin benzoate (Proclaim 5 SG) were the most effective chemical insecticides to manage pod borer infesting yard long bean. Recently, Malacrino *et al*. (2019) in their studies on IPM of yard long bean in Cambodia observed that the costs of IPM were higher than conventional management, which contributed to lower profits in the IPM treatments in both seasons despite yields being as high as in conventional management.

Table 2. Benefit cost analysis of different management packages for the management of yard long bean pod borer

Management approaches	Marketable yield (t ha^{-1})	[1]Gross return (Tk ha^{-1})	[2]Cost of treatment (Tk ha^{-1})	Net return (Tk ha^{-1})	Adjusted net return (Tk ha^{-1})	Marginal benefit cost ratio (MBCR)
Sanitation + Antario = Package 1	14.42	360500	15600	344900	157400	10.09
Sanitation + Bt Kurstaki = Package 2	12.05	301250	25600	275650	88150	3.44
Sanitation + Spinosad 45 SC = Package 3	14.75	368750	28800	339950	152450	5.29
Sanitation + alternate spraying of Antario and Spinosad 45SC = Package 4	14.58	364500	22200	342300	154800	6.97
Farmers' practice (Emamectin benzoate 5 SG spray only) = Package 5	11.85	296250	24400	271850	84350	3.47
Untreated control	7.50	187500	0.00	187500	-	-

[1]Farmgate price of yard long bean @ Tk. 25.00 kg^{-1}

[2][Cost of Spinosad 45SC: @ Tk. 2400 100^{-1} ml; Cost of Antario: @ Tk. 3000 Kg^{-1}; Cost of Emamectin benzoate 5 SG: @ Tk. 450 100^{-1} g**;** Cost of spray: Two laborers $spray^{-1}$ ha^{-1} @ Tk 400.00 $labour^{-1}$ day^{-1}; Cost of hand picking: Two laborers ha^{-1} @ Tk 400.00 $labour^{-1}$ day^{-1}; Spray volume required: 500L ha^{-1}].

Conclusion

Presently, pod borer problem is of growing concern for yard long bean cultivation in Bangladesh. Previous attempts to control this pest were mostly toxic chemical insecticides based, thus providing no sustainable solution to the

problem. So, it is anticipated that the outcome of this study would open up new scope for the farmers providing them an environment friendly and cost effective bio-rational management package to combat this pest.

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