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DEVELOPMENT OF INTEGRATED MANAGEMENT APPROACHES AGAINST INSECT PEST COMPLEX OF MUNGBEAN

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ABSTRACT

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An experiment was conducted at the field of Regional Agricultural Research Station (RARS), Bangladesh Agricultural Research Institute (BARI), Ishurdi, Pabna, during March to June 2008 to develop integrated management approaches against insect pest complex of mungbean. The management approaches tested in the study were T_1= Seed treatment with Imidachlorpid (5g/kg seeds) + Poultry manure (3t/ha) + Sequential release of bio-control agent (*Trichograma chilonis* + *Bracon habetor*) + Detergent @ 2g/l of water, T_2 =Seed treatment with Imidachlorpid (5g/kg seeds) + Poultry manure (3t/ha) + Sequential release of bio-control agent (*Trichograma chilonis* + *Bracon habetor*) +Neem seed karnel extract @ 50gm/lof water, T_3 = Seed treatment with Imidachlorpid (5g/kg seeds) + Poultry manure (3t/ha) + Spray with Quinalphos @ 1ml / l of water and T_4 = Untreated control. All the treatments significantly reduced insect's infestation (except thrips) and produced higher yield compared to control. It was found that the highest yield was obtained from the treatment T_3 (1316 kg/ha) which was statistically similar to T_2 (1316 kg/ha) and T_1 (1283 kg/ha). In case of Benefit Cost Ratio (BCR), the highest value was obtained from the treatment T_3 (1.84), which was followed by T_1 (1.55) and T_2 (1.31).

Keywords: Management approach, insect infestation, BCR

INTRODUCTION

Mungbean (*Vigna radiata* L. Wilczek) is the fifth important pulse crop of Bangladesh. It is an important source of protein and several essential micronutrients. It contains 24.5% protein and 59.9% carbohydrate. It also contains 75 mg calcium, 8.5 mg iron and 49 mg B-carotine per 100g of split daul (Bakr *et al*. 2004).The foliage and stem are also a good source of fodder for live stock as well as a green manure. Despite its importance, mungbean yields are greatly depressed by a complex of biotic and abiotic factors of which insect pests are the most important. Mungbean is attacked by a number of insect pests which cause a heavy loss to crop. Major insect pests are stemfly, thrips, whitefly, jassid and pod borer.

In Bangladesh, insecticides are frequently being used in controlling insect pests of field and horticultural crops (Kabir *et al*. 1996). These conventional chemical control measures failed to adequately control this pest that resulting in severe yield losses. Under these circumstances it becomes necessary to find out some eco-friendly alternative methods for insect pest's management in formulating the Integrated Pest Management approach. The present study was conducted to develop economically feasible integrated management approach combining bio-control agent, bio-rationale, seed treatments and foliar spray with synthetic insecticides.

MATERIALS AND METHODS

The experiment was conducted at the field of Regional Agricultural Research Station (RARS), Bangladesh Agricultural Research Institute (BARI), Ishurdi, Pabna, Bangladesh during March to June 2008. The experiment was consisted with four treatments. The treatments were –

T_1= Seed treatment with Imidachlorpid (5g/kg seeds) + Poultry manure (3t/ha) + Sequential release of bio-control agent (*Trichograma chilonis* + *Bracon habetor*) + Detergent @ 2g/l of water

T_2 =Seed treatment with Imidachlorpid (5g/kg seeds) + Poultry manure (3t/ha) + Sequential release of bio-control agent (*Trichograma chilonis* + *Bracon habetor*) +Neem seed karnel extract @ 50gm/l of water

T_3 = Seed treatment with Imidachlorpid (5g/kg seeds) + Poultry manure (3t/ha) + Spray with Quinalphos @ 1ml / 1 of water starting from the first incidence of pest (2 spray at ten days interval)

T_4 = Untreated control.

***Procedure of seed treatment*:** Seeds were treated according to the procedure of Jagadish and Gowda (1994). A sticky soil with high clay content was obtained from tank bed, dried, powdered and sieved to get finer fractions. For treating, 200g of mungbean seeds with 20g of the fine soil was taken in a plastic container. Then 10 ml of

water, 3-4 drops of gum (sticker) and required quantity of Imidachlorpid (Gaucho) were added to this and stirred thoroughly. If necessary more water was added drop by drop and stirred well to get slurry. Lid of the container tightened properly and vigorously shaken about 30 seconds to get uniform coating of the slurry on the seeds. The seeds were then air dried in shade overnight and sown on next day.

The experiments were laid out in RCB Design with three replications having plot size 10.0 × 10.0 m with an inter plot distance of 0.75 m and inter block distance of 1.0 m. Spacing of row to row and seed to seed was 30 cm and 10 cm, respectively. Seeds of mungbean (variety Barimung- 6) were sown. Soil was fertilized with Urea, Triple supper phosphate and Muriate of potash respectively, at the rate of 45, 100 and 58 kg/ha. All the fertilizers were incorporated in the soil during final land preparation.

For stemfly infestation, ten randomly selected plants were uprooted from each plot and brought in the laboratory. Roots were cleaned to remove adhering soil, stems of each plant were dissected with a scalpel and observations of length of stem, length of tunnel and the number of larvae and pupae present in the stem were recorded. The number of stemfly infested plants in each sample was also recorded. In case of thrips, twenty flowers were carefully examined from each plot. The number of thrips was recorded. Regarding pod borer infestation, at harvest, 10 randomly selected plants from each plot were carefully uprooted to record the number of infested and healthy pod. The percentage of damaged pod was also recorded. The yield per plot was recorded and converted into yield per hectare. Data were analyzed statistically and the treatment means were separated by Duncan's Multiple Range Test (DMRT) according to Gomez and Gomez (1984).

RESULTS AND DISCUSSION

All the treatments significantly reduced stemfly infestation compared to control (T_4). The lowest stemfly infestation (17.14 %) was recorded in the T_1 which was statistically similar to T_2 (17.62%) and T_3 (20.95%). The highest stemfly infestation (53.34 %) was found in the control. More or less similar trend of the treatments became evident when percentage stem tunneling by the fly was considered (Table 1). The percentage of stem tunneling per plant varied from 2.94-10.65. The treatments had no significant effect on the abundance of thrips per flower. The number of thrips per flower recorded from 2.39-3.10 (Table 1). Pod borer infestation varied significantly among the treatments. The T_3 had the lowest infestation (8.37%) which was statistically similar to all the treatments except T_4 (18.00%). The highest yield was obtained from the T_3 (1316 kg/ha) which was statistically similar to T_2 (1316 kg/ha) and T_1 (1283 kg/ha). The T_1 offered the lowest yield (781 kg/ha).

The maximum gross return (Tk 65800/-) was achieved in T_3 followed by T_2 (65650/-), T_1 (64150/-) and T_4 (49050/-) (Table 2). The pest management cost ranged from Tk. 0 (zero) to 11500/- where the minimum and the maximum were in T_4 and T_2, respectively. Considering net return, a maximum of Tk. 56370/- was gained due to the effect of T_3 followed by T_1 (54310/-), T_2 (54150/-) and T_4 (39050/-) (Table 2). The maximum benefit cost ratio (BCR) -was obtained from the T_3 (1.84) followed by T_1 (1.55) and T_2 (1.31).

The present findings indicate that all the treatments significantly reduced insect infestation (except thrips) and offered higher yield compared to control (T_4). The role of imidachlorpid and poultry manure in minimizing insects infestation have been claimed by a good number of entomologists which clearly supports the findings of present investigation. The effectiveness of imidachlorpid against thrips control as seed treatment has been reported by Ester *et al.* (2001). According to them seeds film-coated with imidachlorpid showed effective control of thrips on the seed bed of *Allium porrum* for twelve weeks and three weeks after transplanting which was closely agreement with the present investigation. The results of present study have also been corroborated with the findings of Balasubramanian and Muralibaskaran (2000). They carried out research against the sucking insects using poultry manure on cotton and observed poultry manure significantly reduced the incidence of early sucking pest of cotton.

Table 1. Incidence of major insect pests of mungbean at different treatments and its yield

Treatments	Stemfly infested plant (%)	Stem tunneling by stemfly/plant (%)	Thrips/ flower (no)	Pod borer infestation (%)	Grain yield (Kg/ha)
T_1	17.14 b	3.09 b (1.75)	2.39	14.00 ab (3.71)	1283 a
T_2	17.62 b	2.94 b (1.70)	2.62	14.16 ab (3.79)	1313 a
T_3	20.95 b	3.47 b (1.85)	2.45	8.37 b (2.85)	1316 a
T_4	53.34 a	10.65 a (3.26)	3.10	18.00 a (4.21)	781 b
CV (%)	16.82	11.13	12.78	13.23	7.47
S(x)	2.647	0.1378	ns	0.2781	50.59

Means in a column having same letter(s) did not differ significantly at 5% by DMRT, Figures in the parenthesis are the square root transformed values

Table 2. Economics of different treatments assigned for the management of major insect pests in mungbean

Treatment	Gross return (Tk)	Pest management cost (Tk)	Net return (Tk)	Adjusted return (Tk/ha)	BCR
T_1	64150	9840	54310	15260	1.55
T_2	65650	11500	54150	15100	1.31
T_3	65800	9430	56370	17320	1.84
T_4	49050	00	39050	-	-

Mungbean- 50 Tk/kg, Imidachlorpid (Gaucho)- Tk.125/5g; Quinalphos (kinalux 25 EC)- Tk 78/100 ml; Neem seed- Tk 25/Kg, Detergent- Tk 40/Kg, *Trichograma chilonis*- Tk 100/g and *Bracon habetor*- Tk 150/banker.

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