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Short communication

EFFECTIVENESS OF DIFFERENT MANAGEMENT APPROACHES FOR THE CONTROL OF FLOWER THRIPS IN MUNGBEAN

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Abstract

Effectiveness of different management practices were tested against flower thrips of mungbean at BINA Headquarter farm, Mymensingh during Kharif-1 in 2021. The experiment was conducted in RCBD design with five treatments (White sticky trap, Cyp-up 10 EC, Biotrin, Bioclean and untreated control). Spraying of Cyp-up 10 EC (Cyproheptadine and tricholine citrate) @ 1ml/L of water and a biopestidcide Biotrin (Martin) @ of 1.4 ml/L of water gave the best results in reducing flower infestation and thrips population. The higher yield was also obtained from Cyp-up 10 EC (Cyproheptadine and tricholine citrate) and Biotrin (Martin) treated plots that was statistically similar. Using sticky white trap and spraying the bio-pesticide (Bioclean) were less effective in reducing flower thrips infestation in mungbean. Therefore, considering the efficacy and yield spraying of Cyp-up 10 EC (Cyproheptadine and tricholine citrate) at the concentration of 1ml/L of water and for eco-friendly management Biotrin (Martin) 1.4 ml/L of water are effective for the management of flower thrips in mungbean production in Bangladesh.

Key words: Mungbean, bio-pesticide, synthetic insecticides and thrips.

Mungbean (*Vigna radiata* L.) is one of the important pulse crops in Bangladesh. Due to its rapid growth with short duration, farmers are becoming more interested to cultivate this valuable crop after harvesting of Rabi crops in kharif-I season.

In Bangladesh about 54982 hectares of land and about 34,400 m tons of grains are produced (Banglapedia). It contains 22-24% protein (Nazir, 1994), easily digestible and also contains amino acid 800.2 mg g^{-1} (Metha, 1970). It constitutes a balanced diet in combination with cereals. It is reported that 64 species of insects that attack mungbean in India at the field (Lal 1985). Among the insects whitefly, jassid and thrips are the major sucking insects (Khattak *et al.,* 2004). More than twelve species of insect pests are found to infest mungbean in Bangladesh (Rahman *et al.,* 2000). Among the sucking insect pest thrips is one of the most important pest that cause a significant damage to crops. Flower thrips (viz. *Megalurothrips distalis* Karny, *Megalurothrips usitatus* Bagnall and *Caliothrips indicus* Bagnall) are associated mostly with the damage of tender buds and flowers of mungbean. Thrips cause damage to their host plants directly through feeding and oviposition and indirectly through the spread of tospoviruse (Arévalo-Rodriguez, 2006). Thrips feed by "punching" into the plant tissue with their single mandible and sucking out cell contents with a pair of maxillary stylets (Lewis, 1997). Thrips may also cause indirect damage by transmitting viruses or as passive carriers of fungal and bacterial spores (Childers and Achor, 1995). Severe damage of thrips resulted flower shedding causing significant yield

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loss (Chhabra and Kooner, 1985; Lal, 1985). According to Kranz *et al.* (1977), the number of thrips on a crop can increase rapidly in dry weather and decrease rapidly after rain. They found that large number of thrips attacking a crop at the seedling stage. However, once established and growing vigorously, most plants could tolerate feeding damage. Adults and nymphs were present from February to harvest (April or May) with peak abundance in early April (Edelson *et al.,* 1986).

Farmers in Bangladesh usually do not take any measure to control the insect pests in mungbean due to its low profit margin. However, recent development of high yielding varieties and increased market value of mungbean, farmers become interested towards available insect management measures. Chemical control is a general practice in insect management in Bangladesh also in other Asian countries. But it is not environment friendly in most of the cases. Therefore, it is necessary to identify the effectiveness of different management approaches to control this pest and save the crop from significant yield loss in an environment friendly way. Considering the above facts, the present study was undertaken towards development of economic and effective management approach(s) including sticky white trap, bio-pesticides along with synthetic insecticide in controlling flower thrips in mungbean.

The experiment was conducted at BINA Headquarter farm, Mymensingh during Kharif-1 in 2021 to find out the effectiveness of different management approaches for controlling flower thrips (*Megalurothrips usitatus*) of mungbean. There were five treatments namely, use of white sticky trap (WST), spraying of Synthetic pyrethroid (Cyp-up 10 EC) at the concentration of 1ml/L of water, spraying of bio-pesticide Biotrin (Matrin) at the concentration of 1.4ml/L of water, spraying of bio-pesticide (Bioclean) at the concentration of 1.4ml/L of water and untreated control. Chemical pesticide Cyp-up 10 EC and white sticky trap were collected from local market of Mymensingh and the two bio-pesticides Biotrin and Bioclean were also collected from local agent of Ispahani Agro in Mymensingh.

The soil in the experimental field was sandy loam and the land was prepared by ploughing and cross-ploughing to obtain good tilth. Laddering was done in order to break the soil clods into small pieces. All the weeds and stubbles were removed from the experimental field. The experiment was laid out in randomized complete block design with three replications. The unit plot size was 3m x 4m with a distance of 1m between the plots and 1.5m between the replications. Mungbean seeds of Binamoog-8 were sown on March 28 in rows with the spacing of 30 cm between the rows and 7 cm between the plants. NPK fertilizers @ 20-40-20 kg ha^{-1} in the form of urea, triple super phosphate and muriate of potash were applied during final land preparation. Intercultural operations like thinning out, irrigation, weeding etc. were done properly at different growing stages. Treatment wise bio-pesticide and chemical insecticides were sprayed separately firstly at 100% flowering stage and the second spray was done 7 days later of 1^{st} spray. White sticky trap was installed (one trap/plot) at the flower bud initiation stage and kept it in the field up to harvest. The population data for thrips in flowers were collected at weekly interval with total 3 times and

started from flowering. Thrips population was assessed from 20 opened flowers randomly collected from two rows from each side of the plot avoiding border and central four rows. The collected flowers were immediately opened carefully on the white paper board and counted the thrips present in the flowers. Central four rows were kept undisturbed for recording yield data. Percentage of reduction of flower thrips over control was calculated by the following formula:

$$\text{Reduction over control (\%)} = \frac{\text{Control-Treatment}}{\text{Control}} \times 100$$

The pods of central four rows of each plot comprising 4.8 m^2 (1.2m x 4m) area were harvested. The pods were then threshed, grains were cleaned and sun dried. The grain obtained from each plot was converted into kg per hectare yield. The experimental data were analyzed by MSTAT-C software. Data recorded in percent form were square root transformed prior to statistical analysis. Mean comparisons for treatment parameters were compared using Duncan's Multiple Range Test at 5% level of significance.

The effectiveness of different management approaches with white sticky trap (WST), bio-pesticides and synthetic insecticides on flower infestation and thrips population reduction are presented in Table 1. All the management practices reduced flower infestation and thrips population. The lowest number of thrips infested to flower (8.67/20 flower) was observed in Cyp-up 10 EC (Cyproheptadine and tricholine citrate) treated plots which were statistically similar to Biotrin (9.00/20 flower). Significantly lower number of thrips infested to flower was observed in white sticky trap (13.67/20 flower) and Bioclean (13.00/20 flower) compared to the untreated control. Flower infestation reduction over untreated control ranged from 12.76 to 44.67%. The highest reduction of flower infestation (44.67%) was observed in Cyp-up 10 EC (Cyproheptadine and tricholine citrate) treated plot and almost similar result was found from Biotrin (Matrin) treated plot (42.57%). The lowest reduction (12.76%) was observed in the treatment of white sticky trap. Cyp-up 10 EC is a Cypermethrin group insecticide and works by contact and/or ingestion on insect pests. Working on the nervous system of the insect it causes rapid knock down followed by death and biotrin causes skin and stomach poisoning, paralyzes the insects nervous system, making the immune system ineffective and the ability of insects to lay eggs reduced. The use of chemical insecticides can result in numerous undesirable effects, including i) killing of beneficial and no targeted organisms and sometimes resurgence; ii) rapid multiplication of secondary pests; iii) development of pesticide resistance; iv) contamination of the environment/ecosystem; v) accumulation of pesticide residues in food materials; vi) causing imbalanced ecological processes, such as pollination (pollinators affected by pesticides) and harm to living beings; vii) carcinogenic and teratogenic effects in nature; and viii) causing imbalances in hormone systems. On the other hand the use of bio pesticides is, by far, more advantageous than the use of their counterparts, traditional chemical pesticides, as they are eco-friendly and host specific. The use and application of agro-based chemicals in the agricultural sector to protect crop plants from invading and infecting pests can be greatly improved by employing bio pesticides.

Table 1. Effect of different management approaches on the incidence of flower infestation in mungbean during Kharif-1, 2021

Treatments	Mean no. of thrips infested flower/20 open flowers	Reduction of flower infestation over untreated control (%)
White sticky trap	13.67 b	12.76
Cyp-up 10 EC (Cyproheptadine + tricholine citrate)	8.67 c	44.67
Biotrin (Matrin)	9.00 c	42.57
Bioclean	13.00 b	17.04
Untreated control	15.67 a	-

In a column, treatment means having the same letter(s) are not significantly different by DMRT at 5% level.

All the treatments significantly reduced the number of thrips/20 open flowers compared to the control (Table 2). The lowest number of thrips population (10.32) was also observed in Cyp-up 10 EC (Cyproheptadine and tricholine citrate) treated plots which was statistically similar to Biotrin (12.50). Lower mean number of thrips population was observed in white sticky trap (24.35) and Bioclean (18.23) compared to the untreated control. Reduction of thrips population over untreated control ranged from 26.92 to 69.03%. The highest population reduction (69.03%) was in Cyp-up 10 EC (Cyproheptadine and tricholine citrate) which was statistically similar to Biotrin (Matrin) (62.49%).

Table 2. Effect of different management approaches on the incidence of thrips population in mungbean during Kharif-1, 2021

Treatments	Mean no. of thrips/ 20 open flowers	Reduction of population over untreated control (%)
White sticky trap	24.35 b	26.92
Cyp-up10EC (Cyproheptadine + tricholine citrate)	10.32 d	69.03
Matrin (Biotrin)	12.50 d	62.49
Bio-pesticide (Bioclean)	18.23 c	45.41
Untreated control	33.32 a	-

In a column, treatment means having the same letter(s) are not significantly different by DMRT at 5% level.

In the experiment yield of mungbean varied significantly with the level of thrips infestation depending on the efficacy of different management approaches. The highest yield (1728 kg ha^{-1}) was obtained from Cyp-up 10 EC (Cyproheptadine + tricholine citrate) sprayed plots which was statistically similar to Biotrin (Matrin), (1589 kg ha^{-1}). The lowest yield (1395 kg ha^{-1}) was recorded from untreated plots which was similar to white sticky trap (Fig. 1). Cyp-up 10 EC and Biotrin also shows better yield increase 333 kg ha^{-1} and 194 kg ha^{-1} respectively over control plot (Fig. 1).

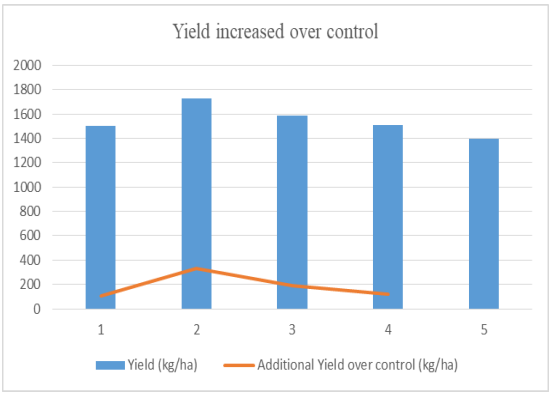

Fig. 1. Effect of different management practices on the yield of mungbean

It is concluded that spraying of chemical insecticide Cyp-up 10 EC (Cyproheptadine and tricholine citrate) at the concentration of 1ml/L of water and a bio-pesticide Biotrin (Martin) at the concentration of 1.4 ml/L of water at flowering stage were the most effective management approach against thrips of mungbean. The yield of mungbean was also increased by the application of these two treatments. Considering effectiveness and environmental issues the bio pesticide Biotrin (Matrin) could be used for controlling flower thrips of mungbean.

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