Journal of AgriSearch, 6(Special Issue):80-82
An Open Access International Peer Reviewed Quarterly
ISSN : 2348-8808 (Print), 2348-8867 (Online)

Comparative study of Technology Options against Mung Bean Yellow Mosaic Virus and Mung bean Yield parameters

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ARTICLE INFO

Received on	:	08-04-2019
Accepted on	:	22-06-2019
Published online	:	09-07-2019

ABSTRACT

To study the efficacy of different technology options (T1: Farmers practice, T2: Azadirachtin 0.03% @ 2.5 l/ha (2 sprays), T3: Two sprays of Imidacloprid 17.8 SL @ 250 ml/ ha and T4: Two sprays of Dimethoate 30 EC @ 1.5 l/ ha for management of MYMV and yield parameters of mung bean an On Farm Trial (OFT) was conducted at farmer's field of Kishanganj district by Krishi Vigyan Kendra, Kishanganj, Bihar during *rabi*-summer 2017. Maximum (33.13 %) reduction of disease over control was observed in T3 (Imidacloprid 17.8 SL @ 250 ml/ ha) followed by T4 (Dimethoate 30 EC @ 1.5 l/ ha) and T2 (Azadirachtin 0.03% @ 2.5 l/ha) with 26.95 and 25.07 per cent reduction in disease over control. Grain yields of 12.37, 11.23 and 10.32 q/ ha were obtained with T3 (Imidacloprid 17.8 SL @ 250 ml/ ha), T4 (Dimethoate 30 EC @ 1.5 l/ ha) and T2 (Azadirachtin 0.03% @ 2.5 l/ha), respectively. The B:C ratios of technology options were in the range of 1:1.69 to 1: 1.82. The B: C ratio was found maximum (1: 8.2) for T3 (Imidacloprid 17.8 SL @ 250 ml/ ha) followed by T4 (Dimethoate 30 EC @ 1.5 l/ ha) and T2 (Azadirachtin 0.03% @ 2.5 l/ha) with B: C ratio of 1.69 and 1.48, respectively. The application of imadicloprid (systemic insecticide) contributed more seed yield compared to control by reducing mung bean yellow mosaic disease incidence.

KEYWORD

Mung bean yellow mosaic, MYMV, Technology options, B:C ratio, Disease management.

INTRODUCTION

Mung bean, *Vigna radiate* (L.) Wilczek, Synonym of *Phaseolus aurius* Roxb., *Phaseolus radiatus* L. is one of the major food legumes and third most important pulse crop of India after chickpea and pigeon pea. Pulses are vital source of protein and provide 11% of the total protein intake of majority of the population (Reddy, 2010). Frequency of pulse consumption in India is much higher than any other source of protein that indicates the importance of pulses in the Indian daily diet. In view of being the cheapest source of protein, there is much scope for increasing pulse production to ensure balanced diet among the economically backward classes (Sanjeev and Mauriya, 2014). Mung bean Being a short duration crop, fits well in mixed cropping and crop rotation. It is also grown as a cash crop and green manure crop as it helps to enrich the soil by a symbiotic relationship with specific soil rhizobia of the genus *Bradyrhizobium*.

Mung bean suffers with diseases, especially cercospora leaf spot (*C. canescens, C. cruenta*), powdery mildew (*Erysiphe polygoni*), root disease complex (*Pythium* spp., *Rhizoctonia solani*, *Fusarium* spp.) and the reniform (*Rotylenchulus reniformis*) nematode. It also gets affected with different viruses like mung bean yellow mosaic virus, alfalfa mosaic virus, bean common mosaic virus, cucumber mosaic virus, leaf crinkle virus, leaf curl virus and mosaic mottle virus. Among various *viral* diseases inflicting legumes, mung bean yellow mosaic virus (MYMV) is the most destructive one.

Mung bean yellow mosaic virus on green gram was first reported from IARI, New Delhi in 1960, which is transmitted by whitefly, *Bemisia tabaci* (Genn.) (Nariani, 1960). MYMV initially causes small yellow patches or spots on young leaves and lead to complete yellowing. Affected plants produce fewer flowers and pods, pods often develop mottling, remain small and contain fewer and smaller seeds thus affecting yield (qualitatively and quantitatively). Reduction in number of pods/plants, seeds/pod and seed weight are the main contributing factors for yield reduction (Nene, 1973; Dhingra and Chenulu, 1985).

MATERIALS AND METHODS

To test the effect of different technology options (T1: Farmers practice, T2: Azadirachtin 0.03% @ 2.5 l/ha (2 sprays), T3: Two sprays of Imidacloprid 17.8 SL @ 250 ml/ ha and T4: Two sprays of Dimethoate 30 EC @ 1.5 l/ ha for management of MYMV, and yield parameters of moongbean a On Farm Trial (OFT) was conducted at farmer's field of Kishanganj district by Krishi Vigyan Kendra, Kishanganj, Bihar during *rabi*-summer 2017. The trials carried out in a randomized block design (RBD) with three replications at 30 x 10 cm spacing. Mung bean variety SML 668 was taken as a test variety with plot size 5x3 m. The Azadirachtin, Imidacloprid, and Dimethoate sprays were taken up at 45 and 60 days after sowing. The data on disease incidence was recorded at 60 days after planting and analyzed statistically. Per cent disease incidence was calculated by using following formulae:

$$\text{Per cent disease incidence} = \frac{\text{Number of plants infected in a row}}{\text{Total number of plants in a row}} \times 100$$

The per cent disease inhibition over control was calculated by using the formula given by Vincent (1927).

$$\text{Per cent disease inhibition} = \frac{C - T}{C} \times 100$$

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Where,

C = Per cent disease in control
T = Per cent disease in treatment

The grain yield obtained and cost of treatment application including man power charges and net profit per hectare was also calculated. Cost benefit ratio was calculated to compare the feasibility of various treatments economically.

RESULTS AND DISCUSSION

All the technology option showed different level of reaction to MYMV compared to farmers practice. The lowest (31.58 %) mung bean yellow mosaic disease incidence was recorded in the plots treated with Imidacloprid 17.8 SL @ 250 ml/ ha (T3) followed by Dimethoate 30 EC @ 1.5 l/ ha (T4) and Azadirachtin 0.03% @ 2.5 l/ha (T2) with 34.5 and 35.39 per cent disease incidence, respectively. Maximum (47.23 %) disease incidence was recorded in control (T1, Farmers practice). Maximum (33.13 %) reduction of disease over control was observed in T3 (Imidacloprid 17.8 SL @ 250 ml/ ha) followed by T4 (Dimethoate 30 EC @ 1.5 l/ ha) and T2 (Azadirachtin 0.03% @ 2.5 l/ha) with 26.95 and 25.07 per cent reduction in disease over control (Table 1 and Fig. 1).

A same trend was also found in grain yield. Grain yield of 12.37, 11.23 and 10.32 q/ ha were obtained with T3 (Imidacloprid 17.8 SL @ 250 ml/ ha), T4 (Dimethoate 30 EC @ 1.5 l/ ha) and T2 (Azadirachtin 0.03% @ 2.5 l/ha), respectively. Minimum grain yield was obtained from control (T1, Farmers practice). Hence, increase in grain yield over control was maximum (4.52q/ ha) in T3 (Imidacloprid 17.8 SL @ 250 ml/ ha) followed by T4 (Dimethoate 30 EC @ 1.5 l/ ha) and T2 (Azadirachtin 0.03% @ 2.5 l/ha) with increase in grain yield of 3.38 and 2.47 q/ ha, respectively (Table 1 and Fig. 1).

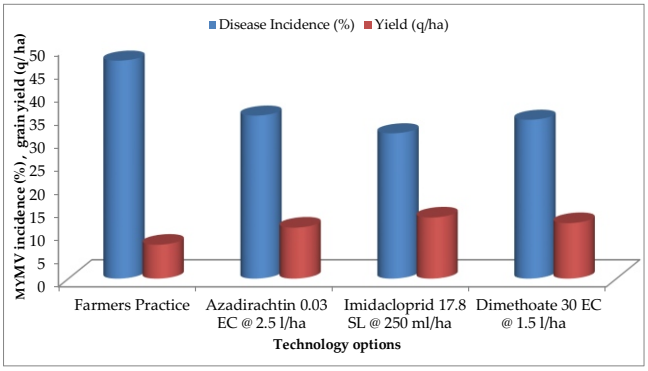

Fig. 1: Efficacy of technology options on MYMV incidence and grain yield

The net increase in return over control was calculated by subtracting the additional cost of treatment with value of additional grain yield. Increase in net return over control was maximum (15514 Rs. / ha) in T3 (Imidacloprid 17.8 SL @ 250 ml/ ha) followed by T4 (Dimethoate 30 EC @ 1.5 l/ ha) and T2 (Azadirachtin 0.03% @ 2.5 l/ha) with 11365.0 and 7859.0 Rs. / ha.

The benefit: cost (B:C) ratio was also calculated for these technology options. The B:C ratios of technology options were in the range of 1:1.69 to 1: 1.82. The B: C ratio was found maximum (1: 8.2) for T3 (Imidacloprid 17.8 SL @ 250 ml/ ha) followed by T4 (Dimethoate 30 EC @ 1.5 l/ ha) and T2 (Azadirachtin 0.03% @ 2.5 l/ha) with B: C ratio of 1.69 and 1.48, respectively (Table 1 and Fig. 2).

Efficacy of imidacloprid to manage whiteflies (vector of MYMV disease) was earlier reported by Mote *et al.* (1993); Walunj and Mote (1995) and Dandale *et al.* (2001). Similar results were obtained by Malathi and John (2008) and Sethuraman et al. (2001). They reported that seed treatment

Table 1: Effect of different technology options on Mung bean Yellow Mosaic Virus disease incidence, yield parameters and B: C ratio

Tr. No.	Technology option	Disease Incidence (%)	% reduction over control	Yield (q/ha)	Increase yield over control (q/ha)	Value of the additional grain yield (Rs. /ha)	Additional cost of treatment (Rs. /ha)	Increase in Net Return (Rs. /ha)	B:C ratio
T1	Farmers Practice (Control)	47.23	-	6.85	-	-	-	-	
T2	Azadirachtin 0.03 EC @ 2.5 l/h (2 sprays)	35.39	25.07	10.32	2.47	9509.00	1650.00	7859.00	1:4.8
T3	Imidacloprid 17.8 SL @ 250 ml/h (2 sprays)	31.58	33.13	12.37	4.52	17402.00	1888.00	15514	1:8.2
T4	Dimethoate 30 EC @ 1.5 l/h (2 sprays)	34.50	26.95	11.23	3.38	13013.00	1648.00	11365	1:6.9
	SEM	0.74		0.31					
	CD at 5%	2.60		1.10					

* Sprays were given at 45 and 60 days after planting.

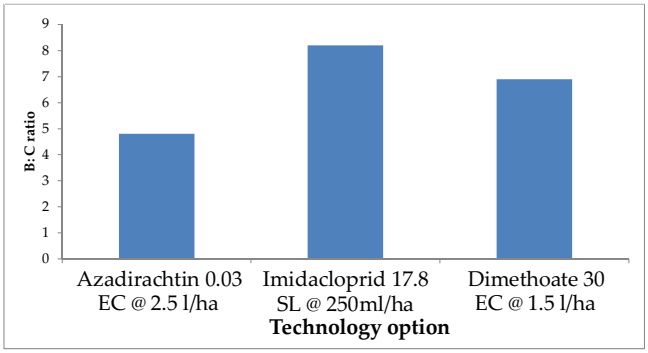

Fig. 2 B: C ratio of different technology options

and spay of imidacloprid contributed to relatively low YMV disease incidence on mungbean. Similarly, Jayappa (2017) was also observed that Seed treatment of imidacloprid (5 ml/kg of seeds) and two spray (0.5 ml/l) recorded minimum YMV disease incidence. Application of imidacloprid significantly influenced pod and seed yield compared to untreated plants (Ghosh, 2008).

Recommendation for Farmers:

Two sprays of Imidacloprid 17.8 SL @ 250 ml/ha significantly control the Moong bean Yellow Mosaic diseases and gives more grain yield.

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