

## Management of Mungbean (*Vigna radiata* L.) Yellow Mosaic Virus Using Newer Group of Insecticidal Treatments

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### ABSTRACT

Mungbean is a one of the major pulse crops in India. The Yellow Mosaic Virus disease caused by mungbean yellow mosaic virus (MYMV) is considered as one of the most destructive disease of mungbean growing areas of north India. Efficacy of some newer insecticides were observed on mungbean (*Vigna radiata* L.) HUM-12 during Kharif season of 2013-14 and 2014-15 for the management of Mungbean Yellow Mosaic Virus on variety at Agriculture Research Farm, Banaras Hindu University Varanasi (U.P.). Among the tested insecticides, Imidacloprid (Hilmida @ 100 g a.i./ha) reduced the disease upto a maximum extent having in disease of 63.84 per cent at 60<sup>th</sup> day after sowing followed by treatments i.e. thiamethoxam (Tagxone @ 25 g a.i./ha), clothianidin (Dantop @ 20 g a.i./ha), profenophos (Celcron @ 500 g a.i./ha), buprofezine (Applaud @ 200 g a.i./ha), lambda cyhalothrin (Karate @ 40 g a.i./ha) and emamectin benzoate (Missile @ 12 g a.i./ha) per cent reduction in disease of 62.10 followed by 59.32, 56.93, 54.85, 52.30 and 47.52 per cent respectively at 60 day after sowing. On the other hand lowest reduction in (MVMY) was recorded with indoxacarb (Isocarb @ 65 g a.i./ha) and spinosad (Tracer @ 60 g a.i./ha) in treated plot with 36.10 and 43.90 per cent during both the experimental year. The identified in the present study can be used for the control of MYMV disease in mungbean.

**Keyword:** Mungbean yellow mosaic virus (MYMV), Disease, Mung bean, Insecticide.

### INTRODUCTION

The origin of the mungbean is basically from India and Mynmar region. The crop is also grown through out the asian country. Australia, West Indies, South and North America, tropical and subtropical Africa (Karthikeyan et al., 2014).

Pulses play an equally important role in rain-fed and irrigated agriculture by improving physical, chemical and biological properties of soil and considered important pulse crop for natural resource management, environmental security, crop diversification and consequently for viable agriculture (Ghosh, 2009).

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Mungbean is one of most preferred pulse crop by Indian farmers. *Vigna radiata* L. (Wilczek), and commonly known as green gram or mungbean (originated in India or the Indo Burmese region), is a vital crop grown throughout Asia. Asia alone contributes about for 90% of world's mungbean production. In which India alone contribute about 54 to 65 % of global production (Singh, 2011). The productivity of mungbean is very low (384 kg/ha) and neat to improve further.

Mungbean considered as a vital source most digestive protein (19 to 28%) among pulses along with minerals (0.18 to 0.21%) and vitamins (Vitamin A Vitamin B1 Vitamin B2 Vitamin B6 Vitamin C and folic acid) without flatulence (Karamany, 2006) and (Rishi, 2009).

The poor productivity is due to viruses namely, Alf-alfa mosaic virus, Urdbean leaf crinkle virus, Groundnut bud necrosis virus, Bean common mosaic virus, Cucumber mosaic virus, Mosaic mottle virus and mungbean yellow mosaic virus (Yadav et al., 2011). Among them Mungbean yellow mosaic virus is one of the major virus. This virus has been reported to infect cowpea (Naimuddin & Akram, 2010) and many wild accessions of *Vigna spp.* The mungbean yellow mosaic virus (MYMV) disease was first reported from India in 1955 on mungbean (Nariani, 1960). It has potential to 100% damage to this crop (Nene,

1972). The whitefly (*Bemisia tabaci*) is one of the major insect which is responsible to transmit MYMV.

It is now felt essential to study how to control / manage the whitefly (BT) population for control of this disease.

Whitefly population can only be manage with the application of systemic insecticide (Singh & Bhan, 1998). The present study was carried out to know the extent of mungbean yellow mosaic virus disease, incidence on mungbean along with population of whitefly.

### MATERIALS AND METHODS

The experiment was laid out in a Randomized Block Design with 10 treatments including untreated absolute control with three replication. The mungbean variety, HUM-12 was taken for study and sown during *Kharif* season 2013-14 and 2014-15 at 30 × 10 cm spacing between row to row and plant to plant. All the treatments were allotted randomly to each plot in each replication *i.e.* Lambda cyhalothrin 5% EC, Spinosad 45% SC, Profenophos 50% EC, Emamectin benzoate 5% SG, Imidacloprid 17.8% SL, Thiamethoxam 25% WG, Buprofezine 25% SC, Indoxacarb 14.5% SC and Clothianidin 50% WDG were evaluated against MYMV incidence. Water sprayed plots were kept as absolute control and volume of the spray liquid was taken as 500 litters per hectare.



MYMV Disease infected plant



General view of the experimental site

The observation was recorded based on the total number of plants / plot with the infected

plants at the 30 and 60 days after sowing Ganapathy and Karupiah (2004). The

population of whitefly was subjected to statistical analysis after arcsine transformation.

The insecticide spray solution was prepared by using the following formula.

$$\text{Amount of formulation} = \frac{\text{Concentration required (\%)} \times \text{Volume required (Litre)}}{\text{Concentration of toxicant in insecticidal formulation}}$$

Per cent reduction in population over control was calculated by using following modified

formula given by Henderson and Tilton (1955).

$$\text{Per cent reduction over control} = 1 - \frac{\text{Post treatment Population in Treatment}}{\text{Pre treatment Population in Control}} \times \frac{\text{Pre Treatment Population in Control}}{\text{Post Treatment Population in Control}} \times 100$$

## RESULTS AND DISCUSSION

The bio-efficacy of different insecticides was evaluated against MYMV disease incidence during *Kharif* season 2013-14. After 60 days after sowing (15<sup>th</sup> day after second spray) with few newer insecticides the disease incidence was found significantly influenced by different treatments. MYMV disease intensity was recorded ranged from 12.11 to 19.11 per cent while, intensity extent recorded highest from 33.56 per cent in control plot. Application of imidacloprid (12.11%) and thiamethoxam (12.56%) was found higher reduction with 65.35 and 63.59 per cent over control, respectively. The next effective treatment was clothianidin (13.33%) followed by profenophos (15.11%), buprofezin (14.67%), lambda cyhalothrin (16.11%) and emamectin benzoate (17.0%) which registered 87.2, 60.26, 59.47, 56.29, 51.31 and 53.23 per cent reduction, respectively, over control. The highest disease incidence 21.56 per cent was recorded in indoxacarb with 39.93 per cent and spinosad was recorded 19.21 per cent with 45.32 per reduction over control.

While, during *Kharif* season 2014-15; minimum disease incidence spread by whitefly was recorded (Table1) due to application of imidacloprid (11.89%) and thiamethoxam (11.78%) with 62.33 and 60.60 per cent reduction over control and were statistically at

par with the best treatment. Application of clothianidin (12.44%), profenophos (13.89%), buprofezin (14.44%) lambda cyhalothrin (15.0%) and emamectin benzoate (16.11%) were the most promising treatments with 58.37, 54.39, 53.41 53.29 and 41.80 per cent reduction over control MYMV disease incidence respectively. Indoxacarb (21.0%) and spinosad (19.11%) with 32.27 and 42.42 per cent reduction over control and were statistically at par with the least effective in reducing the MYMV incidence but better than control (30.44 %).

The present findings are agreement with the Salam (2005) who reported that the imidacloprid alone found highly effective and recorded the lowest per cent disease incidence and least number of whitefly. The present findings are also in agreement with the reports of Panduranga et al. (2011) found the nearly similar result, among the treatments, thiomethoxam (T<sub>3</sub>) (1086 kg/ha) followed by spirotetramat (T<sub>9</sub>) (1014 kg/ha) and acetamprid (T<sub>7</sub>) (987 kg/ha) which recorded less whitefly population and low incidence of MYMV recorded. Gopalswamy et al. (2012) reported that the whitefly population as well as yellow mosaic virus incidence were less in imidacloprid 70 WG @ 75 g/ha and thiamethoxam 25 WG @ 100 g/ha treatments.

**Table: Efficacy of different insecticides against MYMV incidence (in %) at 30 and 60 days after sowing on mungbean during Kharif season 2013-14 and 2014-15**

Treatment	Dosage	Kharif season 2013-14			Kharif season 2014-15		
		30 DAS	60 DAS	PROC	30 DAS	60 DAS	PROC
T1: Spinosad 45% SC	12 g a.i./ha	8.33(16.78)	19.11(25.92)	45.32	6.67(14.96)	19.11(25.92)	42.47
T2: Emamectin benzoate 5% SG	200 g a.i./ha	8.67(17.12)	17.00(24.35)	53.23	5.56(13.63)	16.11(23.66)	41.80
T3: Profenophos 50% EC	25 g a.i./ha	8.89(17.35)	15.11(22.88)	59.47	6.11(14.31)	13.89(21.88)	54.39
T4: Lambda cyhalothrin. 5% EC	20 g a.i./ha	7.89(16.31)	16.11(23.66)	51.31	6.44(14.71)	15.00(22.79)	53.29
T5: Thiamethoxam 25% WG	60 g a.i./ha	8.22(16.66)	12.56(20.75)	63.59	6.00(14.18)	11.78(20.07)	60.60
T6: Indoxacarb 14.5% SC	40 g a.i./ha	8.56(17.01)	21.56(27.66)	39.93	6.22(14.44)	21.00(27.27)	32.27
T7: Imidacloprid 17.8% SL	65 g a.i./ha	8.33(16.78)	12.11(20.37)	65.35	6.33(14.58)	11.89(20.17)	62.33
T8: Buprofezin 25% SC	500 g a.i./ha	8.00(16.43)	14.67(22.52)	56.29	6.22(14.44)	14.44(22.34)	53.41
T9: Clothianidin 50% WDG	100 g a.i./ha	8.00(16.43)	13.33(21.42)	60.26	6.00(14.80)	12.44(20.66)	58.37
T10: Control (Water Spray)	-	8.00(16.43)	33.56(35.40)	-	6.11(14.31)	30.44(33.49)	-
SEM±	-	NS	(0.56)	-	NS	(0.64)	-
CD at 5%	-	NS	(1.66)	-	NS	(1.93)	-

Value in parenthesis is arc sine transformed values, PROC: Per cent reduction over control, DAS: Day after sowing.

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