Effect of Different Pesticides on Incidence of Mungbean Yellow Mosaic Virus Incidence

D. GHOSH, S.K. LAHA AND N.K. BISWAS

International Journal of Plant Protection, Vol. 2 No. 1 : 67-70 (April to September, 2009)

SUMMARY

Six different insecticides namely Dimethoate (Rogor @ 2ml/l), Imidacloprid (Confidor @ 0.25ml/l) Thiomethoxam (Ektara @ 0.25ml/l), Azadarachtin (Econeem @1.5 ml/l) Monocrotophos (1.5ml/l) and Chlorpyriphos (@ 2 ml/l tried against white fly that acts as vector of the virus causing MYMV in both *Pre kharif* and *Post kharif* season of 2006. Among the insecticides Imidacloroprid reduced the disease to a maximum extent having treatment efficiency of 81% and per cent reduction in disease of 44.85% at 60 DAS. Similar result was also evident during *post kharif* season with 72.32% treatment efficiency and per cent reduction in disease of 41.97% at 60 DAS. Imidacloprid insecticide from alheomicotinamyle group was found to be most effective, thus replacing the ever used Monocrotophos facing restrictions for use in agriculture. Imidacloprid @1ml/4l of water may be used by virtue of its lower dose and ecologically safe characters. No significant difference exists between Monocrotophos and Thiomethoxam in terms of disease reaction at any stage of development and thus Thiomethoxam also has the potentiality to replace Monocrotophos. During *pre* and *post-kharif* seasons a strong correlation was found between AUDPC and yield of the crop, giving co-relation coefficient of 0.8 and 0.9, respectively during *pre* and *post kharif* seasons.

See end of the article for authors' affiliations

Correspondence to :
N.K. BISWAS
Department of Plant Pathology, Uttar Banga Krishi Viswavidyalaya, P.O. Pundibari, COOCH BEHAR (W.B.) INDIA

Key words : Mung bean, Insecticides, MYMV, White fly

Pluses play an equally important role in rainfed and irrigated agriculture by improving physical, chemical and biological properties of soil and are considered excellent crops for natural resource management, environmental security, crop diversification and consequently for viable agriculture. Despite being the largest producer in the world, India is in short supply of pulse. During 2004-05, the pulse production in the country was 13.38 million tonnes from 22.47 million hectares (Ali and Kumar, 2006). This is below the domestic requirement leading to import of pulses to the tune of 1.47 millions tonnes. Among the pulse crops, mungbean [*Vigna radiata* (L.) Wilczek], commonly known as green gram, has been cultivated in India since time immemorial in almost all the states and occupies about 3.08 mha with an annual production of 1.31 mt and productivity of 4.25 q/ha (Asthana and Chaturvedi, 1999). Among several fungal, bacterial and viral diseases that attack different parts of mungbean plant, major ones are: Cercospora leaf spot, Anthracnose, Powdery mildew, Web blight, Bacterial leaf spot and yellow mosaic virus (YMV). Cercospora leaf spot disease has a devastating potential in mungbean and urdbean. About 12 viral diseases have been reported from mungbean and urdbean. Yellow mosaic disease of mungbean is the most serious disease and the main constraint in increasing the production of this crop. The disease was reported from India in 1955 on mungbean (Nariani, 1960). It has potential to inflict 100% damage to this crop (Nene, 1972). It is incited by mungbean yellow mosaic virus (MYMV), which is a whitefly transmitted geminivirus. Management of MYMV through chemical means is not possible directly. As such reduction in the white fly population would in turn, reduce MYMV infection. Ambithion, Phoxin, Malathion, non-systemic insecticides and monocrotophos, a systemic insecticide were the most effective (Singh and Bhan, 1998). There might be several spraying schedules to manage the vector with the objective to minimize the virus transmission and yield loss. Three sprays of Anthio 0.2% (Chenulu *et al.*, 1979), three sprays of monocrotophos (0.25 kg a.i./ha) at 10 days interval from 15 DAS; aldicarb alone or in combination with endosulfan or captan were effective (Yein *et al.*, 1982); a combination of aureofungin (0.003%) and phosphomidon 0.25 kg a.i./ha (Ahmed and Gane, 1982) were also reported to be effective.

Neem products were assessed for efficacy against MYMV in urdbean [*Vigna*

Accepted : February, 2009

mungo] cv. CO 5, transmitted by *Bemisia tabaci*, in an experiment conducted in Tamil Nadu, India, during the *kharif* seasons of 1997-98 and 1998-99. Treatments included: neem oil (NO) at 3%; NO 60EC (A) at 3%; NO 60EC (C) at 3%; NOPO 60EC at 3%; neem seed kernel extract at 5%; pungam leaf extract at 5%; nochi leaf extract at 5% and Bougainvillea leaf extract at 5%. Monocrotophos at 0.1% was used as insecticide control. Two sprays of the plant products were given at 35 and 50 days after sowing. Neem oil, neem seed kernel extract, NO 60EC (A), NO 60EC (C) and NOPO 60EC were as effective as monocrotophos in reducing the YMV disease. Leaf extracts of pungam, nochi and bougainvillea were not effective in controlling the disease. The neem derivatives were also effective in increasing urdbean yield (Sethuraman *et al*., 2001). As the viral disease is transmitted through vector whitefly, so controlling of the vector through insecticides of both chemical and botanical origin to mange the disease indirectly is the main aim of the experiment.

MATERIALS AND METHODS

The field experiments were conducted at Pundibari Research Farm and lab. experiments were done in Research laboratory, Dept. of Plant Pathology, Uttar Banga Krishi Viswavidyalaya (UBKV), Pundibari, Cooch Behar. Mungbean seeds of variety Pusa Visal were sown in the field on 28th April, 2006 (Pre *kharif*) and 10th November, 2006 (Post *kharif*).The variety, Pusa Visal was chosen for this experiment as this variety, was most susceptible for MYMV disease in this zone. All the normal package of practices were followed for conducting the experiment. Six different pesticides were applied twice at 38 and 53 DAS to evaluate the efficacy of different pesticides for management of MYMV disease of mungbean. The experiments were conducted in the same field in two different seasons.

Land situation	:	Medium to high
Soil type	:	Loam
Plot size	:	2.5m x 1m
Spacing	:	Row to row – 30 cm
		Plant to plant – 20 cm
		Plot to plot – 50 cm
Replications	:	Three
Fertilizer dose	:	N:P:K @ 20:40:20 kg/ha
Varity	:	Pusa Vishal

The following insecticides were used for conducting the experiments as : T_1: Dimethoate (Rogor @ 2ml/l), T_2: Imidacloprid (Confidor @ 0.25ml/l), T_3: Thiomethoxam (Ektara @ 0.25ml/l), T_4: Azadarachtin (Econeem @1.5 ml/l), T_5: Monocrotophos (1.5ml/l), T_6: Chlorpyriphos (@ 2 ml/l), T_7: Check (control without any application of insecticide)

In case of pre-*kharif* season, for controlling of white fly (transmission of MYMV) two sprays were done on 38 DAS and 53 DAS and the observations of the disease recorded after 7 days of each spray. The disease scoring was done on the mentioned dates to get the gradual development of the disease and to calculate the area under disease progress curve (AUDPC). Same sprays schedule were followed as post-*kharif* season.

AUDPC:

$$AUDPC = \sum (Yi + Yi+1)/2 \ (t_2 - t_1)$$

Y = % of severity

t = Time

Data collected during the period of study were processed using INDOSTAT software for statistical analysis according to Gomez and Gomez (1984).

RESULTS AND DISCUSSION

Six different insecticides were evaluated for management of MYMV disease in both pre and post-*kharif* seasons and the results are presented in Table 1 and 2. Two sprays of Dimethoate, Imidacloroprid, Thimethoxam, Econeem, Monocrotophos and Chlorpyriphos were done at 38 and 53 DAS with an aim to reduce white fly population responsible for initiation

Table 1 : Effect of different insecticides on MYMV disease of mungbean during pre- *kharif* season

Treatments	PDI at 45 DAS	PDI at 60 DAS	AUDPC (45 and 60 DAS)	Yield (q /ha)
	Mean	Mean		
Dimethoate (Rogor @ 2ml/L)	29.70 (33.02)	31.70 (34.26)	460.57	7.27
Imidacloprid (Confidor @ 0.25ml/L)	22.60 (28.38)	24.16 (29.45)	350.78	9.11
Thimethoxam (Ektara @ 0.25ml/L)	27.97 (31.92)	28.78 (32.45)	425.56	7.64
Azadarachtin (Econeem @ 1.5ml/L)	30.54 (33.54)	31.49 (34.13)	465.27	7.23
Monocrotophos (1.5ml/L)	26.98 (31.29)	28.31 (32.14)	414.70	8.01
Chlorpyriphos (2.5ml/L)	27.56 (27.56)	28.92 (32.53)	423.58	7.59
Untreated check	39.12 (38.71)	45.69 (42.52)	636.06	6.41
C.D. (P=0.05)	2.42	3.63		0.73
S.E. ±	0.78	1.78		0.23
CV (%)	4.67	6.52		5.41

and spread of the disease. Control plants were sprayed with plain water. Among the insecticides, Imidacloroprid reduced the disease to a maximum extent having treatment efficiency of 81% and per cent reduction in disease of 44.85% at 60 DAS. Similar results were also evident during post *kharif* season with 72.32% treatment efficiency and per cent reduction in disease of 41.97% at 60 DAS. Disease incidence (PDI) of the plants under Imidacloropid treatment were having significantly lower value than the other treatments. According to AUDPC calculated between 45 and 60 DAS the next effective chemical was Monocrotophos. Two sprays of Imidacloropid at 15 days intervals may be effective in reducing the incidence of MYMV. The use of systemic insecticides for reduction in viral disease was also reported by Singh and Bhan (1998) and Debnath and Nath (2002). The neem product namely, Econeem reduces the incidence of disease in both the seasons as compared with check. But in comparison with the insecticides used in this experiment its efficiency was low. Though in post *kharif* season at 60 DAS it showed 38.17 % disease incidence as compared to Chlorpyriphos (38.49 %) but the effect of these two treatments were at par. The data from the trials were put to linear regression to find out the relation between AUDPC and seed yield, if any exists. During pre and post-*kharif* seasons, a strong correlation was found between AUDPC and yield of the crop, giving co-relation coefficient of 0.8 and 0.9, respectively during pre and post-*kharif* seasons (Fig.1 and Fig.2). However, the relationship was predictably negative, but with very little slope during both the seasons.

Table 2: Effect of different insecticides on MYMV disease of mungbean during post-*kharif* season

Treatments	PDI at 45 DAS Mean	PDI at 60 DAS Mean	AUDPC (45 to 60 DAS)	Yield (q /ha)
Dimethoate (Rogor @ 2ml/L)	33.35 (35.27)	36.24 (37.01)	521.92	6.89
Imidacloprid (Confidor @ 0.25ml/L)	26.86 (31.21)	27.94 (31.90)	411.07	8.08
Thimethoxam (Ektara @ 0.25ml/L)	31.92 (34.40)	35.48 (36.56)	505.55	7.08
Azadarachtin (Econeem @1.5ml/L)	35.67 (36.67)	38.17 (38.15)	553.89	6.85
Monocrotophos (1.5ml/L)	30.96 (33.80)	34.13 (35.74)	488.21	7.07
Chlorpyriphos (2.5ml/L)	35.64 (36.65)	38.49 (38.34)	556.05	6.67
Untreated check	43.57 (41.30)	50.86 (45.49)	708.35	5.92
C.D. (P=0.05)	1.99	2.02		0.53
S.E. ±	0.64	0.65		0.17
CV (%)	3.30	3.04		4.34

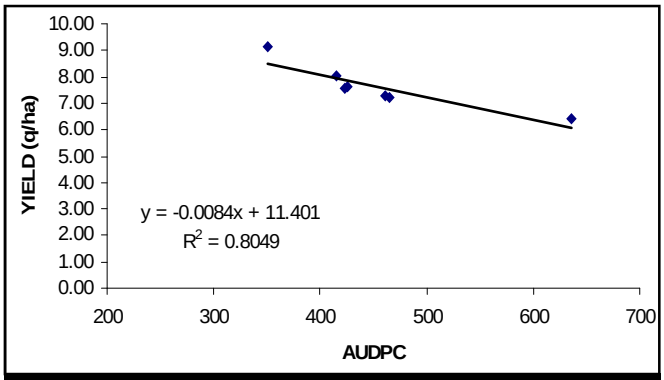

Fig.1 : Relationship between yield and AUDPC of the cropo under different insecticides treatment during pre-*kharif* season

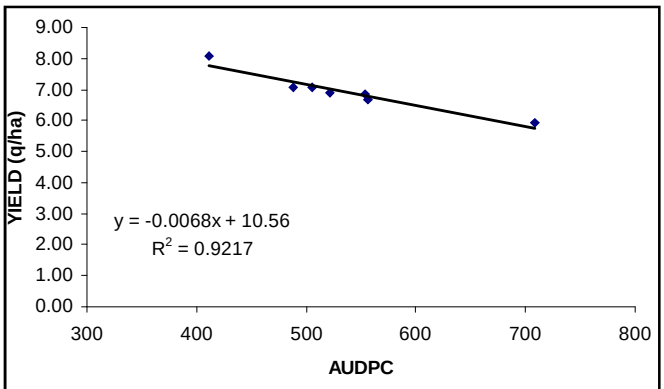

Fig. 2 : Effect of different insecticides on MYMV disease of mungbean during post-*kharif* season

Authors' affiliations:
D. GHOSH AND S.K. LAHA, Department of Plant Pathology, Uttar Banga Krishi Viswavidyala, P.O. Pundibari, COOCH BIHAR (W.B.) INDIA

REFERENCES

Ahmed, S.R. and Gane, R. B. (1982). Chemotherapeutic approach to check yellow mosaic virus of mung (*Phaseolus aureus* L.) *Hindusthan Antib. Bull.*, **24** (3) : 197 – 199.

Ali, M., and Kumar, S. (2006). Pulses: Paradigm shift in planning need. *The Hindu Survey of Indian Agriculture*, pp. 63-65.

Asthana, A.N. and Chaturvedi, S.K. (1999). A little impetus need. *The Hindu Survey of Indian Agriculture*, pp. 61-65.

Chenulu, V.V., Venkteswarulu, V. and Rangaraju, R. (1979). Studies on yellow mosaic disease on mungbean. *Indian Phytopathol.*, **32** : 230 – 235.

Debnath, S. and Nath, P.S. (2002). Management of yellow vein mosaic okra though insecticides, plant products and suitable varities. *Ann. Pl. Protec. Sci*., **10** (2) : 340 – 342.

Gomez, K.A. and Gomez, A.A. (1984). *Statistical Procedures for Agricultural Research*. Second Ed. John Wiley & Sons., New York.

Nariani, T.K. (1960). Yellow mosaic of mung (*Phaseolus aureus* L.). *Indian Phytopathol.*, **13** : 24-29.

Nene, Y. L., Srivastava, S. K. and Naresh, J. S. (1972). Evaluation of urdbean and mungbean germplasms and cultivars against yellow mosaic virus. *Indian J. Agric. Sci.*, **42** : 251-254.

Sethuraman, K., Manivanan, N. and Natarajan, S. (2001). Management of yellow mosaic disease of urdbean using neem products. *Legume Res.*, **24** (3) : 197 -199.

Singh, G. and Bhan, L.K. (1998). Diseases of mungbean and urdbean and their management. In : *IPM System in Agriculture*. Vol. **4**. *Pulses*. pp. 311-371.

Yein, B.R. and Singh, H. (1982). Effect of pesticides and fertilizers on the population of white fly and incidence of yellow mosaic virus in green gram. *Indian J. Agric. Sci*., **52** : 852 – 855.

****