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Field evaluation of newer insecticides against white fly (*Bemisia tabaci*) in *Kharif* mungbean (*Vigna radiata* L.)

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Abstract
Mungbean (*Vigna radiata* L.) is third most important pulse crop of India after chickpea and pigeonpea (Singh and Singh, 2014). Sucking insect-pests (whitefly, jassid, thrips, pod sucking bug and aphid) are the major insect- pests not only reduce the vigor of the Mungbean plant by sucking the sap but also transmit viral diseases and affect adversely photosynthesis which ultimately causes yield losses (Kabir *et al*., 2014; Singh and Singh, 2014). Keeping in view of aforesaid facts and knowing the seriousness of problems, six newer insecticides *viz*., Imidacloprid 17.8 SL @ 210 g a.i./ ha, Spinosad 45 SC @ 73 g a.i./ ha, Emamectin benzoate 5 SG @10 g a.i. / h, Indoxacarb 14.5 SC @ 60 g a.i./ ha, Novluran 10 EC @ 30g a.i./, and Profenophos 50 EC @ 500 g a.i./ ha were evaluated against white fly *(Bemisia tabaci)* in Mungbean (*Vigna radiata* L.) during, *Kharif*- 2014. Among tested insecticides Emamectin benzoate 5 SG @10 g a.i. / ha showed maximum reduction in whitefly population which was at par with Indoxacarb 14.5 SC @ 60 g a.i./ ha followed by Profenophos 50 EC @ 500 g a.i./ ha and Spinosad 45 SC @ 73 g a.i./ ha at 7 and 14 days after spraying (DAS).

Keywords: mungbean (*Vigna radiata* L.), white fly (*Bemisia tabaci*), newer Insecticides

Introduction
Mungbean (*Vigna radiata* L.) is third most important pulse crop of India after chickpea and pigeonpea (Singh and Singh, 2014) [4]. Mungbean crop is raised in the three season's viz. *Kharif, Rabi*, and *Zaid* in eastern UP. The nutritive value of mungbean is high and easily digestible protein with approximately protein 25-28%, oil 1.0-1.5%, fibre 3.5-4.5%, ash 4.5-5.5%, carbohydrate 62-65%, water 9.1%, and vitamins on dry weight basis (Singh *et al*. 2014) [4]. Sucking insect-pests (whitefly, jassid, thrips, pod sucking bug and aphid) in mungbean are the major insect- pests not only reduce the vigor of the plant by sucking the sap but also transmit viral diseases and affect adversely photosynthesis which ultimately causes yield losses (Kabir *et al*., 2014; Singh and Singh, 2014) [2, 4]. Among the sucking pests, whitefly seriously affects the yield of mungbean crop in *kharif* as well as *zaid* season. Whitefly appears during the September in *Kharif* season. Both nymphs and adults suck the cell sap from under surface of leaves which resulted in chlorotic spots and also dropped pre-maturely. Whiteflies not only suck the sap of plant but also transmit Yellow Mosaic Virus which causes 30-70% yield loss (Khattak *et al*., 2004) [3]. Keeping in view of aforesaid facts and knowing the seriousness of problems, six newer insecticides were evaluated against white fly *(Bemisia tabaci)* in Mungbean (*Vigna radiata* L.) during, *Kharif*- 2014.

Material and Methods
An experiment was carried to evaluate the field efficacy of six newer insecticides (Imidacloprid 17.8 SL @ 210 g a.i./ ha, Spinosad 45 SC @ 73 g a.i./ ha, Emamectin benzoate 5 SG @10 g a.i. / h, Indoxacarb 14.5 SC @ 60 g a.i./ ha, Novluran 10 EC @ 30g a.i./, and Profenophos 50 EC @ 500 g a.i./ ha) against whitefly in mungbean at Students' Instructional Farm, Narendra Deva University of Agriculture & Technology, Kumarganj, Faizabad, during *Kharif*, 2014. The experiment was conducted under Randomized Block Design (RBD) in 3 replication of each treatment. The mungbean crop variety- NDM 1 was shown in to into 4 x 3 m^2 plot size with 30 x 10 cm^2 spacing in July, 2014. All the recommended agronomical practices were used to grow a good crop. The insecticides were applied at ETL .
Whitefly populations were recorded with the help of rectangular cage 45 cm long, 30 cm wide and 90 cm height according to the growth stage of plant. Observations were taken at 7 days interval starting from 20 days after sowing up to the crop maturity on randomly selected 10 plants in each plot.

The percent reduction in whitefly population at 7 and 14 days after spraying of insecticides was calculated with following formula

$$\text{Percent reduction} = \frac{\text{Initial population} - \text{Reduction population}}{\text{Initial population}} \times 100$$

Result and Discussion

All the insecticides tested against whitefly (*Bemisia tabaci*) were found significantly superior over control. Emamectin benzoate 5 SG @ 10 g *a.i./*ha registered maximum reduction of whitefly population and found significantly superior from rest of the treatments. Highest reduction was observed in Emamectin benzoate 5 SG @ 10 g *a.i./*ha (98.50%) followed by indoxacarb 14.5 SC @ 60 g a.i./ha (97.56%), Profenophos 50 EC @ 500 g a.i./ ha(97.56%), Spinosad 45 SC @ 73 g a.i./ ha (96.75%) and Novaluron 10 EC @ 30g a.i. (95.88%). Imidacloprid 17.8 SL @ 210 g a.i./ ha (93.99%) was least effective for reduction the whitefly population. Joshi and Patel (2010) [1] also reported that Indoxacarb and Emamectin benzoate were most effective in reduction of whitefly population (*Bemisia tabaci*).

Table 1: Effect of different newer insecticides against whitefly (*Bemisia tabaci*) population in mungbean crop

Treatment	Insecticide			Average population per cage in number			Reduction Percent	
	Chemical	Trade name	Dose g/ha	Before spray	7 DAS	14 DAS	7 DAS	14 DAS
T_1	Imidacloprid	Confidor17.8 SL	210	3.83 (1.95)	0.23 (0.47)	0.20 (0.44)	93.99	94.77
T_2	Spinosad	Tracer 45SC	73	4.00 (2.00)	0.13 (0.36)	0.10 (0.31)	96.75	97.50
T_3	Emamectin benzoate	Proclaim 5 SG	10	4.00 (2.00)	0.06 (0.24)	0.03 (0.17)	98.50	99.25
T_4	Indoxacarb	Avaunt 14.5 SC	60	4.10 (2.02)	0.10 (0.31)	0.06 (0.24)	97.56	98.53
T_5	Novaluron	Rimon 10 EC	30	4.86 (2.20)	0.20 (0.44)	0.16 (0.40)	95.88	96.70
T_6	Profenophos	Profenophos 50 EC	500	5.80 (2.40)	0.16 (0.40)	0.16 (0.40)	97.24	97.24
T_7	Untreated	Control	-	4.00 b(2.00)	2.66 (1.63)	2.00 (1.41)	33.50	50.00
SEm±				0.52	0.10	0.05		
C.D. at 5%				NS	0.32	0.17		

DAS= Days after spray

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