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EFFICACY OF NEW MOLECULES OF INSECTICIDES FOR THE CONTROL OF SUCKING PESTS IN MOONGBEAN (*VIGNA RADIATE*)

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Abstract- A study was conducted during the *kharif* season of 2013 and 2014 for knowing the effect of new insecticides for the control of sucking pests in moong bean (PDM11). Population of thrips, jassid and white fly were recorded in natural field condition with crop age and found that the population of entire three pests such as jassid (6.19/6 leaves), thrips (7.39/6 leaves) & whitefly (10.54/6 plants) increased with increase the crop age up to 48 days after sowing. Reproductive stage was more vulnerable than vegetative and maturity stage. Among the insecticides, thiamethoxam was found more effective (0.83 jassid/6 leaves) Followed by imidacloprid (0.95/6 leaves) and acitamiprid (1.07/6 leaves) in the year 2013 against jassid. However, same trend of result was obtained in the year 2014. Imidacloprid significantly showed better effect to control the thrips population, which was 1.00 thrips /6 leaves in 2013 and 1.46 /6 leaves in 2014, respectively. White fly population significantly decreased by the application of thiamethoxam (2.83 and 1.69 /6 plants) followed by imidacloprid (2.94 & 1.88/6 plants) and acetamiprid (2.97 & 2.00 /6 plants) during the seasons 2013 and 2014. Highest population of all the three sucking pests was noted in Control plot. Significantly maximum yield in 2013 was found in imidacloprid treated plot (15.81 q/ha) followed by thiamethoxam(15.69 q/ha) in comparison to monocrotophos (12.73 q/ha) and fipronil (11.51 q/ha). However, in 2014, thiamethoxam showed better performance in increasing the yield which was 15.47 q/ha followed by imidacloprid (14.15 q/ha). Neem oil and chloropyriphos had least effect on increase the yield in both the crop seasons. Effect of trizophos (12.63 q/ha), fipronil (12.58 q/ha) and monochrotophos (12.12 q/ha) in enhanced the productivity were at par in 2014. In control plot there was only 5.78 and 6.32 q/ha yield, respectively during 2013 & 2014 crop seasons.

Keywords- Insecticides, Neem oil, Moong bean seed (var.PDM 11), Sprayer

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Introduction

Moong bean (Vigna radiate (L)) is an important pulse crop used as a whole grain, germinated grain, dal and flour in human diet. Production and productivity of the crop affected with low and erratic rainfall, improper nutrient management and insect pests and diseases. Amongst the pests, sap feeder like jassid (*Empoaska kerri*), thrips (*Caliothrips indicus*) white flies(*Bemesia tabaci*) and aphid (*Appis crassivora*) are play major role in reducing the yield of the crop. Whitefly are not only directly damaged the crop but also disseminate the moong bean yellow mosaic virus [1]. Imidacloprid and thiamethoxam reported to widely used for seed dressing and foliar applications against sucking pests including whitefly at low concentration [3, 5]. In the present study, attempt are made to know the efficacy of new molecules for the management of jassid, thrips and whitefly and also find out the effect of insecticides on moong bean yield.

MaterialsandMethods

An extensive survey at different crop age was done to know the direct and indirect harmful effect of jassid, thrips and whitefly on reducing the yield and quality of moong bean. Jassid and thrips population were counted on trifoliate two leaves each from upper, middle and lower canopy and adult whitefly observation was taken on 6 plants/replication. On the basis of survey, Experiment was conducted in the Krishi Vigyan Kendra, Katni with three replications. Randomized block design was used for handling the experiment. Moong bean *var.* PDM11 was taken for the experiment with 8x5m plot size during both the crop season 2013 and 2014. Seed treatment was done with bavistin (2.5 g/kg of seed) and Sowing completed in the second week of July with recommended spacing and doses of fertilizers. Stock solution of each insecticide was prepared before half an hour of application, separately. Treatment wise observation was noted for calculation of the reduced pest population according to the performance of insecticide, separately. For observation of yield, randomly twenty-five plants from each plot were harvested. The seeds were cleaned and dried to less than 10% moisture by weight. The yield was converted as per treatment in q/ha.

Table-1 *Name and recommended dose of insecticides*

Treatment	Detail of treatment	Dose ml/g/ha
T1	Imidacloprid 17.8SL	125
T2	Thiamethoxam25WG	125
T3	Monocrotophos36SL	500
T4	Malathian50EC	500
T5	Acephate75SP	500
T6	Acetamiprid 20 SP	125
T7	Trizophos40SL	750
T8	Neem Oil	1000
T9	Fipronil 80WG	1000
T10	Chloropyrphos20EC	1200
T11	Control	Simple water

Results and Discussions

Results summarized in [Table-2] revealed that the maximum population of jassid, thrips and whitefly were found at reproductive stage which were 6.19 ,7.39 and 10.54 ,respectively at 48 days of sowing followed by vegetative stage and maturity. Population of pest decreased with increased the crop stage [Table-2]. The efficacy of different insecticides as listed in [Table-1] were tested against

sucking pest *viz*., jassid, thrips and whitefly on moong bean in the present investigation. All the insecticides were found significantly effective in reducing the jassid population over control [Table-3].

Table-2 *Population study of sucking pests of moong bean*

Age of crop(days)	Crop stage	Average population /6 leaves		Average population of whitefly/6 plants
		Jassid	Thrips	
8	Vegetative stage	2.61	3.95	4.83
16	Vegetative stage	4.51	3.48	4.97
24	Vegetative stage	4.97	4.37	6.58
32	Reproductive stage	5.13	6.03	8.15
40	Reproductive stage	5.25	6.81	8.93
48	Reproductive stage	6.19	7.39	10.54
56	Reproductive stage	4.87	4.35	7.17
64	Maturity stage	2.63	3.32	4.61
72	Maturity stage	2.24	2.27	3.98

Significantly lower jassid population was recorded in thiamethoxam treated plot (0.83/6 leaves in 2013 and 1.19/6 leaves in 2014, respectively). However it was at par with imidacloprid (0.95/6 leaves in 2013 and 1.23/6 leaves in 2014) and acetamiprid (1.07/6 leaves in 2013 and 1.25/6 leaves in 2014). Significant effect of monochrotophos and trizophos were also observed in both successive years as they recorded 1.79 to 2.23 jassid /6 leaves over untreated control (4.96 to 4.85 jassid/6 leaves). Nandini et al. 2012 [7] and Kumar et al. 2015 [3] reported the best effect of imidacloprid against jassid in chilli than thiamethoxam. Rana et al. 2006 [6] was also reported the similar results on okra.

Average number of thrips population /6 leaves after insecticidal application varied from 1.00 to 4.33 in the year 2013 and 1.46 to 3.62 in 2014 [Table-3]. Lowest population was recorded in plot treated with imidacloprid (1.00 to 1.46/6 leaves) followed by thiamethoxam (1.14 to 1.5/6 leaves, respectively) and acetamiprid (1.24&1.62). All the insecticide treatments recorded significantly lower thrips population than control during both the years 2013 and 2014. Least effect of neem oil and chloropyriphos were recorded. Results given in [Table-3] revealed that all the treatment was found significantly superior over control in reducing the whitefly population. Average number of whitefly/6 plant were observed 2.83 to 6.15 in 2013 and 1.69 and 6.19 in 2014 after insecticidal treatments. Among the different sets of treatment, significantly minimum population of whitefly (2.83/6 plants) was recorded in thiamethoxam treated plot, which was at par with imidacloprid (2.91) and acetamiprid (2.97) in the year 2013. Same trend of effectiveness of insecticides were also recorded in 2014. Imidacloprid strongly reduced the eggs and adults population of whitefly. The next other most effective treatment in respect of reducing the white fly population were imidacloprid (2.91 & 1.88 whitefly/6 plants) and acetamiprid (2.97 &2.00 whitefly/6 plants), respectively [Table-3]. Imidacloprid and thiomethoxam have been reported to reducing the pest population and yellow mosaic disease [1, 2, 4].

Table-3 *Efficacy of insecticides against sucking pests of moong bean (Av. of two spray)*

Treatments	Average pest population					
	Jassid/6leaves		Thrips/6leaves		Whitefly/6plants	
	2013	2014	2013	2014	2013	2014
Imidacloprid17.8SL	0.85(1.24)	1.19(1.12)	1.14(1.21)	1.46(1.35)	2.94(1.84)	1.88(1.51)
Thiamethaxam25WG	0.93(1.16)	1.23(1.25)	1.00(1.21)	1.53(1.45)	2.83(1.82)	1.69(1.57)
Monocrotophos36SL	1.79(1.63)	2.17(1.58)	2.33(1.68)	2.28(1.62)	3.50(1.98)	2.56(1.67)
Malathian50EC	2.01(1.71)	2.68(1.95)	2.97(1.57)	2.30(1.65)	3.26(1.94)	2.73(1.71)
Acephate75SP	1.96(1.68)	2.35(1.83)	2.35(1.61)	2.35(1.69)	3.72(2.01)	2.96(1.71)
Acetamiprid 20 SP	1.07(1.12)	1.25(1.35)	1.24(1.26)	1.62(1.39)	2.97(1.85)	2.00(1.61)
Trizophos40SL	1.85(1.41)	2.23(1.72)	2.41(1.65)	2.28(2.29)	3.01(1.96)	2.99(1.85)
Neem oil	3.81(1.92)	4.46(2.11)	4.33(2.57)	3.62(2.41)	6.15(2.92)	6.19(2.84)
Fipronil 80WG	2.63(2.42)	2.61(1.72)	2.87(1.83)	2.47(2.31)	3.15(2.01)	2.24(1.91)
Chloropyrphos20EC	3.15(1.72)	4.26(2.15)	3.19(2.88)	3.18(1.75)	3.99(2.08)	3.17(1.97)
Control	5.96(2.58)	5.85(2.49)	7.84(2.57)	6.53(2.21)	8.49(2.93)	8.56(2.91)
SEm+_	0.13	0.13	0.35	0.27	0.31	0.35
CD at 5%	0.42	0.51	1.47	1.54	1.27	1.17

Significantly maximum yield in 2013 was found in imidacloprid treated plot (15.81 q/ha) followed by thiamethoxam (15.69 q/ha)and acetamiprid (14.87 q/ha) in comparison to trizophos (13.29 q/ha) and monochrotophos (12.73 q/ha). However, neemoil and chloropyriphos had least effect on increase the yield .Only 5.78 q/ha yield was found in control plot in the year 2013. In the year 2014, thiamehoxam gave better results in increasing the yield (15.47 q/ha) than other tested insecticides [Table-4]. Kumar et al. in 2006 [3] also reported the positive effect of imidacloprid and neem oil against whitefly. Highest production of grain yield by the application of imidacloprid was reported by Singh et al. in 2014 [8].

Table-4 *Effect of insecticides on yield of moong bean*

Treatment	Yield q/ha	
	2013	2014
T1. Imidacloprid	15.81	14.15
T2. Thaimethaxam	15.69	15.47
T3. Monocrotophos	12.77	12.12
T4. Malathion	11.32	9.73
T5. Acephate	10.97	9.65
T6. Acitamiprid	14.87	13.43
T7. Trizophos	13.29	12.63
T8. NeemOil	9.28	8.86
T9. Fipronil	11.51	12.58
T10. Chlorpyriphos	9.63	9.34
T11. Control	5.78	6.32
SEm +-	1.17	1.21
CD at 5 %	3.16	2.97

Conflict of Interest: None declared

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