COMPARATIVE EFFICACY OF SOME INSECTICIDES AGAINST SUCKING INSECT PESTS ON MUNGBEAN, *VIGNA RADIATA* (L.) WILCZEK

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ABSTRACT

A field study was conducted to evaluate one combination of seed treatment with imidacloprid (Confidor 70 WS) and spray with detergent and for insecticide sprays: imidacloprid (Confidor 20% SL), acetamiprid (Acelan 20% SL), thiomethoxam (Actara 25 WG) and acephate (Commando 75 SP), against sucking insect pests on mungbean, *Vigna radiata* (L.) at Arid Zone Research Institute (AZRI), Bhakkar during 2012. All the treatments showed a significant difference with one another, regarding their effectiveness. The application of insecticide sprays immediately enhanced the mortality of the pests, whereas, the effect of seed-treatment and detergent did not show distinctive effect on the pests' population. Imidacloprid and thiomethoxam resulted in a maximum mortality of the jassid, followed by acetamiprid. While in case of whitefly, imidacloprid was the most effective and resulted in a minimum population followed by acetamiprid. Acephate resulted in the maximum control of thrips and was found the most effective insecticide, followed by acetamiprid.

Key Words: Mung bean, seed treatment, insecticides, sucking insect pests, Insect control.

INTRODUCTION

Mungbean, *Vigna radiata* (L.) Wilczek, is an important legume crop grown widely in Bangladesh, Bhutan, China, India, Myanmar, Nepal, Sri Lanka, Thailand and Pakistan. In Pakistan, it is grown twice a year and its production is exclusively handled by the small-scale farmers. In Punjab, the crop was cultivated on an area of 1,20,000 hectares, total production of 81,000 metric tons of grain with yield of 678.214 kg/ha during 2011 (Anonymous, 2012). It contains 22-24% protein (Nazir, 1994), easily digestible and also contains amino acid (Metha, 1970). It constitutes a balanced diet in combination with cereals. Like other pulses this crop also fixes atmospheric nitrogen (Malik, 1994). The stem of mungbean is also a good source of fodder for live stock as well as a green manure. Because of its short duration, it fits well in our crop rotation programme.

Because of more vegetative canopy, large number of insect pests attack mungbean from its seedling to harvest which causes a serious loss to this crop. Since mungbean is grown mainly in the tropical climates, insect pests play important role in the profitable production of the crop. Most of these insects are polyphagous and feed on wide variety of legumes and non-legumes. Lal (1985) reported 64 species of insects that attack mungbean in the field. Among these sucking insect pests whitefly, jassids, and thrips are of the major importance (Khattak *et al*., 2004). In flowers, both larvae and adults of thrips nourish on pollen and scratch other flower parts and suck the plant sap oozing out from the injured plant parts. As a result of this type of damage, flowers drop off and none pods formation. Sometimes these pests cause total yield loss. Mungbean Yellow Mosaic Begomovirus (MYMV) is very important and serious disease which is transmitted

by the white fly (Honda and Ikegami, 1986, Sachan *et al*., 1994). Heavily infected crop by white fly exhibits a sickly black appearance. Jassids is a serious pest of mungbean in almost all part of country. In case of heavy infestation, leaves turn brown, curl from the edges and dry. The present studies were conducted on mungbean to find out the relative toxicity of different insecticides against sucking insect pests in order to find an effective control of these pests under the agro-ecological condition of district Bhakkar.

MATERIALS AND METHODS

The experiment was conducted at Arid Zone Research Institute (AZRI), Bhakkar during June to September 2012 following Randomized Complete Block Design, replicated thrice. The mungbean variety (AZRI-2006) was sown on 12-06-2012. For the control of weeds, Pendimethaline, a pre-emergence herbicide was applied @ 1.0 kg/acre. All the fertilizers were incorporated in the soil during final land preparation. The crop was irrigated when needed; all agronomic practices were maintained constant. For the count of jassid and whitefly population, 15 plants, in each replication, were selected at random. The leaves were observed, in such a sequence that one leaf from the upper part of the first plant, one from the middle part of the second plant and one from the bottom part of the third plant, plants of similar age, were taken. The total of 15 leaves, were taken, per treatment. In case of thrips, 15 flowers were carefully examined from each plot. Then the numbers of thrips were recorded. The insecticides used in the experiment were obtained from the local market. The data from each plot was recorded early in the morning, 24 hours before spray and then 24, 48, 72 hours and one week after application of insecticides. The insecticides were applied with hand operated knapsack sprayer having hollow cone nozzle. The plot size, for each treatment, was maintained as 10m × 10m, with a spacing of 75 cm from row to row and a distance of 30 cm from plant to plant. The data was analyzed for analysis of variance to determine the significance of treatments with MSTAT package (Steel *et al.*, 1997). Means were separated by Duncan's New Multiple Range Test (DMRT) (Duncan, 1955). The comparative efficacy of the control methods was considered to be an indirect reflection of the sucking insect pests population, per leaf/flower. The treatments were

T_1= Seed treatment with imidaclorpid (5g/kg seeds) + detergent @ 2g/l of water.
T_2 = Spray with imidacloprid (Confidor 20% SL) @ 240 ml/acre.
T_3 = Spray with acetamiprid (Acelan 20% SL) @ 125 ml/acre.
T_4 = Spray with thiomethoxam (Actara 25 WG) @ 24 gm/acre.
T_5= Spray with acephate (Commando 75 SP) @ 330 gm/acre.
T_6= Untreated control.

Procedure of seed treatment

Procedure of Jagadish and Gowda (1994) was followed for the seed treatment. Finer fractions of sticky soil with high clay content were obtained. For treatment, 200g of mungbean seeds was taken in a plastic container with 20g of the fine soil. Then 10 ml of water, 3-4 drops of gum (sticker) and required quantity of imidaclorpid (Confidor 70 WS) was added to this and stirred carefully. If necessary more water was added drop by drop and stirred well to get slurry. Lid of the container was tightened properly and vigorously shaken for 30 seconds to get uniform coating of the slurry on the seeds. The seeds were

then air dried in shade overnight and sown on next day.

Procedure for Insecticide Spray

To apply pesticide in a cost effective manner, the required amount of pesticide per acre was applied with knapsack sprayer fitted with hollow cone nozzle. The formulation of pesticide was diluted in calculated amount of water and applied in the field.

RESULTS AND DISCUSSION

The results (Table 1) are mean comparison of the data, regarding the treatment effect on jassid-population and percent reduction, at different post-treatment intervals. The minimum Jassid population was recorded 0.271, per leaf, in T_2 with imidacloprid application which was statically at par with that of T_4 (spray with actara). Imidacloprid reduced 0.904% jassid-population which was better than 0.863%, 0.493%, 0.322%, 0.083% reduction of test insect with actara, acetamiprid, acephate and combination of seed treatment and detergent respectively, at 48 hour after spray. This maximum reduction of 0.904% in jassids population with imidacloprid 48 hour after spray decreased to 0.676% at 168 hours after spray. The effectiveness of T_1 (combination of seed-treatment + detergent) was found lowest and was, at par, statistically with T_6 (spray with acephate) 0.524 and 0.527 jassids per leaf respectively and differ significantly as against 0.653 jassids per leaf in control treatment. The treatment T_3 (spray with acetamiprid) were intermediate in their response to the jassids-mortality with significant difference from all the other treatments. In the present study combination of seed-treatment with imidacloprid and detergent, did not show a significant effect on the population of jassids. The application of insecticides immediately enhanced the mortality of the pest. It is evident from the results that spray with imidacloprid and actara resulted in a maximum mortality of the pest, followed by acetamiprid. The present findings support the result of Yazdani *et al*. (2000) who investigated that Confidor 200 SL was much effective insecticide against jassid. The present findings are in conformity with Misra (2002), and Solangi and Lohar (2007) who also reported that Confidor was most effective in controlling the jassid population. The present findings can partially be compared; with those of Shah *et al*. (2007) who reported that imidacloprid treated plots had significantly the highest yield followed by acetamiprid.

The results (Table 2) are mean comparison of the data, regarding the treatment effect on whitefly-population and percent reduction, at different post-treatment intervals. The result shows that T_2 (spray with imidacloprid) was found to be the most effective and it resulted in a minimum whitefly population, per leaf i.e., 1.45 and followed by T_3 (spray with acetamiprid) with whitefly population 1.54 per leaf. Both T_2 and T_3 did not differ significantly and resulted in a maximum mortality of the pest, followed by T_4 (spray with actara). The maximum population reduction 0.923% was noticed in the plots treated with imidacloprid 24 hours after spray, which was more than the 0.876%, 0.56%, 0.551% and 0.371% population reduction of whitefly in plots treated with acetamiprid, actara, acephate and combination of seed treatment and detergent, respectively. It is evident from the results that the effect of T_1 (combination of seed treatment + detergent) was low as compared with the other treatments and thus was the least effective. The results of the present studies disfavored the results of Latif *et al*. (2001)

who determined that Confidor was not much effective insecticides against whitefly. The present findings can be compared with those of Afzal *et al*. (2002) who reported that Imicon 25 WP @ 200 gm/acre (imidacloprid) was found to be most effective for whitefly.

The results (Table 3) regarding thrips-population, per flower, in different treatments, revealed a highly significant difference among the treatments. From these results, it was concluded that T_5 (spray with acephate) was the most effective and resulted in the maximum control of thrips-population followed by T_3 (spray with acetamiprid) with thrips population 1.64 and 2.337 per flower respectively. The maximum reduction in thrips population (0.897%) was recorded in the plots treated with acephate which was better than 0.776%, 0.397%, 0.242%, 0.035% reduction of test insect with acetamiprid, imidacloprid, actara and combination of seed treatment and detergent, respectively, at 72 hour after spray. Efficacy of insecticides remained the same at 168 hours after application. The over all effect of T_1 (combination of seed treatment and detergent) on the population of thrips was not pronounced in the post treatment observations. The effectiveness of T_1 (combination of seed treatment + detergent) was found to be the minimum with 4.191 thrips per flower followed by T4 (spray with actara) with 3.684 thrips per flower as against 4.578 thrips per flower in control treatment. The response of T_2 (spray with imidacloprid) and T_3 (spray with acetamiprid) was intermediate with population 3.005 and 2.337 thrips per flower, respectively. The application of acephate showed the maximum mortality of the thrips and so was the most effective treatment. The present findings are not in accordance with the results of Koeing *et al*. (2001) who found that actara 25WG proved an excellent controlling insecticide against thrips. In the present study effectiveness of actara was minimum which supports the finding of Khattak *et al*. (2004) who investigated that actara 25 WG lost its efficacy against thrips 240 hour after spray.

TABLE: 1 A Mean Comparison Of The Data, Regarding The Jassid Population, Per Leaf Along With The Percentage Reduction In Its Population On Mungbean In Different Treatments, At Various Intervals Before And After Spray

Treatments	24 HOUR BEFORE SPRAY		24 HOUR AFTER SPRAY		48 HOUR AFTER SPRAY		72 HOUR AFTER SPRAY		168 HOUR AFTER SPRAY		Means for Treatments
	Jassid Popu-lation/ leaf	% redu-ction	Jassid Popul-ation /leaf	% reduc-tion	Jassid Popu-lation/ leaf	% redu-ction	Jassid Popu-lation/ leaf	% reduc-tion	Jassid Popu-lation/ leaf	% reduc -tion	
T_1=Seed Treatm. + Detergent	0.867	0.133	0.577	0.039	0.447	0.083	0.330	0.322	0.400	0.420	0.524 b
T_2=Imidacloprid	0.887	0.113	0.130	0.783	0.047	0.904	0.067	0.863	0.223	0.676	0.271 d
T_3 =Acetamiprid	1.023	-0.023	0.243	0.594	0.247	0.493	0.130	0.733	0.310	0.551	0.391 c

T_4 =Actara	0.933	0.067	0.087	0.856	0.067	0.863	0.133	0.726	0.247	0.643	0.293 d
T_5 =Acephate	0.933	0.067	0.577	0.039	0.330	0.322	0.353	0.274	0.443	0.357	0.527 b
T_6 =Control	1.000	0.000	0.600	0.000	0.487	0.001	0.487	0.001	0.690	0.000	0.653 a
LSD value											0.04003

Means sharing similar letter in columns not significantly different by LSD Test

TABLE: 2 A MEAN COMPARISON OF THE DATA, REGARDING THE WHITEFLY POPULATION, PER LEAF ALONG WITH THE PERCENTAGE REDUCTION IN ITS POPULATION ON MUNGBEAN IN DIFFERENT TREATMENTS, AT VARIOUS INTERVALS BEFORE AND AFTER SPRAY

Treatments	**24 HOUR BEFORE SPRAY**		**24 HOUR AFTER SPRAY**		**48 HOUR AFTER SPRAY**		**72 HOUR AFTER SPRAY**		**168 HOUR AFTER SPRAY**		**Means for Treatments**
	White-fly Popu-lation /leaf	**% redu-ction**	**White-fly Popu-lation /leaf**	**% reduc-tion**	**White-fly Popu-lation /leaf**	**% reduc-tion**	**White-fly Popu-lation /leaf**	**% reduc-tion**	**White-fly Popu-lation /leaf**	**% redu-ction**	
T_1=Seed Treatm. + Detergent	4.933	0.039	2.710	0.371	2.400	0.223	1.890	0.388	2.133	0.373	2.813b
T_2=Imidacloprid	5.467	-0.065	0.330	0.923	0.333	0.892	0.533	0.827	0.597	0.825	1.452 e
T_3 =Acetamiprid	5.553	-0.082	0.533	0.876	0.397	0.872	0.397	0.872	0.867	0.745	1.549 e
T_4 =Actara	4.957	0.034	1.890	0.561	1.620	0.476	1.600	0.482	1.933	0.431	2.400 d
T_5 =Acephate	5.310	-0.034	1.933	0.551	1.910	0.382	2.000	0.352	2.067	0.392	2.644 c
T_6 =Control	5.133	0.000	4.310	0.000	3.090	0.000	3.087	0.000	3.400	0.000	3.804 a
LSD value											0.1308

Means sharing similar letter in columns not significantly different by LSD Test

TABLE: 3 A Mean Comparison Of The Data, Regarding The Thrips Population, Per Flower Along With The Percentage Reduction In Its Population On Mungbean In Different Treatments, At Various Intervals Before And After Spray

Treatments	24 HOUR BEFORE SPRAY		24 HOUR AFTER SPRAY		48 HOUR AFTER SPRAY		72 HOUR AFTER SPRAY		168 HOUR AFTER SPRAY		Means for Treatments
	Thrips /flower	% reduc-tion	Thrips /leaf	% reduc-tion	Thrips /leaf	% reduc-tion	Thrips/leaf	% reduc-tion	Thrips/ leaf	% reduc-tion	
T_1=Seed Treatm. + Detergent	5.223	0.082	4.533	0.081	3.867	0.094	3.730	0.035	3.600	0.129	4.191 b
T_2=Imidaclopri d	5.333	0.063	2.733	0.446	2.223	0.479	2.333	0.397	2.400	0.419	3.005 d
T_3 =Acetamiprid	5.870	-0.032	1.800	0.635	1.283	0.699	0.867	0.776	1.867	0.548	2.337 e
T_4 =Actara	5.533	0.028	3.600	0.270	3.023	0.291	2.930	0.242	3.333	0.193	3.684 c
T_5 =Acephate	5.733	-0.008	0.600	0.878	0.467	0.891	0.397	0.897	1.043	0.748	1.648 f
T_6 =Control	5.690	0.000	4.933	0.000	4.267	0.000	3.867	0.000	4.133	0.000	4.578 a
LSD value											0.1699

Means sharing similar letter in columns not significantly different by LSD Test

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