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Competitive studies of insecticides for the control of sucking pests in urdbean (*Vigna mungo*) in relation to yield

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ABSTRACT

A study was conducted during the *Kharif* season of 2012 and 2013 for knowing the competitive study of insecticides as foliar application for the control of sucking pests such as jassid, thrips and whitefly in urdbean in relation to yield gap. Population of thrips, jassid and white fly were recorded with crop age and found that the population of all the three pest increased with increase the crop age up to reproductive stage 4.06 jassid/6 leaves, 6.32/6 leaves thrips and 9.54 whitefly/6 plants, respectively at 48 days after sowing. Reproductive stage was more vulnerable than vegetative and maturity stage. Among the treatments against jassid, imidacloprid was found more effective (1.14 jassid/6 leaves) Followed by thiamethoxam (1.15) and acitamiprid (2.24)in the year 2012. However same result was noted in the year 2013 in case of above used insecticides. Imidacloprid significantly showed better effect to control the thrips (1.34 and 0.95/6 leaves in 2012 and 2013, respectively). In case of whiteflies, thiamethoxam gave significantly good control (2.11 in 2012 and 2.69 in 2013/6 plants) followed by imidacloprid and acetamiprid during both the seasons. Highest population of all the three sucking pests was noted in control plot. Significantly maximum yield in 2012 was found in imidacloprid treated plot (11.33q/ha) followed by thiamethaxam (10.88q/ha) and acetamiprid (10.77q/ha) in comparison to trizophos (9.55q/ha) and monocrotophos (8.55q/ha). However, malathian and chloropyriphos had least effect on increase the yield. Only 5.22q/ha yield was found in control plot. In the year 2013, thiamehaxam gave better results in increasing the yield (11.93q/ha) than other tested insecticides.

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INTRODUCTION

Urdbean (*Vigna mungo*) is an important pulse crop used as a whole grain, germinated grain, dal and flour in human diet suffering from and low and erratic rain fall, improper nutrient management number of pests and diseases which ultimately affect the production and

productivity. 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 quality and quantity of the crop. These pests are not only directly damaged the crop but also disseminate the mungbean yellow masaic virus (MYMV) that is very much responsible for significant yield losses (Verma *et al.*, 1992). Imidachloprid an insecticide widely used as a seed dressing, soil and foliar spray applications for controlling sucking pests (Elbert *et al.*, 1990).Imidachloprid reported to reduced the eggs and adult population of whitefly (Woolfenbarae and Cook, 1996). Thiamethaxam is a new neonicotinoid insecticide provides effective control against adult sucking pests at low concentration (Liguori and Cestari, 2003). In the present study, attempt are made to know the efficacy of against jassid, thrips and whitefly management and also study the effect of different insecticides on urdbean yield.

MATERIAL AND METHODS

An extensive survey at different crop stage was done to know the direct and indirect harmful effect of jassid, thrips and whitefly on reducing the yield and quality of urdbean. 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 with 11 different systemic and contact insecticides including control plot with three replications in Randomized Block design. Urdbean var. LBG20 was taken for the experiment with 8x5m plot size during both the crop season 2012 and 2013. Seed treatment was done with bavistin (2.5g/kg of seed) and Sown in the second week of July with recommended spacing and doses of fertilizers. Weeding was also done as per need. Stock solution of each insecticide was prepared before half an hour of application, separately. Treatment and replication wise observation was noted for calculation of the reduced pest population according to the performance of insecticide, separately. For observation of yield, treatment wise twenty five plants per plot were randomly harvested and dried. The seeds were cleaned and dried to less than 10 per cent moisture by weight. The yield was converted as per treatment in kg/ha.

Table A : Name of insecticides and their recommended dose

Treatments	Detail of treatment	Dose ml/g/ha
T_1	Imidacloprid17.8SL	125
T_2	Thiamethaxam25WG	125
T_3	Monocrotophos36SL	500
T_4	Malathian50EC	500
T_5	Acephate75SP	500
T_6	Acetamiprid 20 SP	125
T_7	Trizophos40SL	750
T_8	Methyldematon25EC	500
T_9	Dimethioate30EC	750
T_{10}	Chloropyrphos20EC	1000
T_{11}	Control	Simple water

RESULTS AND DISCUSSION

Extensive survey was done and results were summarized in Table 1 revealed that maximum population of jassid , thrips and whitefly noted at reproductive stage (4.36, 6.32 and 9.54, respectively at 48 days of sowing) followed by vegetative stage and maturity. population of pest decreased with increased the crop stage. The efficacy of different insecticides as listed in Table A were tested on the sucking pest of black gram *viz.*, jassid,thrips and whitefly in the present investigation. All the

Table 1 : Natural Population of sucking pests of urdbean (polled data of two years)

Age of crop (days)	Crop stage	Average population/6 leaves		Average population of whitefly/6 plants
		Jassid	Thrips	
8	Vegetative stage	2.28	1.95	3.84
16	Vegetative stage	3.12	2.46	3.77
24	Vegetative stage	3.17	3.65	5.15
32	Reproductive stage	3.46	5.76	5.95
40	Reproductive stage	4.29	6.18	7.23
48	Reproductive stage	4.36	6.32	9.54
56	Reproductive stage	4.12	4.31	5.24
64	Maturity stage	1.78	3.41	3.16
72	Maturity stage	1.63	2.26	3.98

insecticides were found significantly effective in reducing the jassid population over untreated control during the two year study (Table 2). The treatment of imidacloprid recorded significantly lower jassid population (1.14 in 2012 and 1.00 in 2013, respectively). However it was at par with thiamethaxam (1.15/6 leaves in 2012 and 1.13/ 6 leaves in 2013) and acetamiprid (1.17/6 leaves in 2012 and 1.1/6 leaves in 2013). Significant effect of Methyldematan and trizophos were also observed in both successive years as they recorded1.26 to 1.48 and 1.49 to 1.52 jassid/6 leaves over untreated control (2.97 to 2.87/6 leaves). Nandini *et al.*, 2012 reported the effect of imidacloprid against capsicum pest than thiamethoxam. Effect of imidacloprid against cotton jassid was reported by Kshirsagar *et al.*, 2012. Rana *et al.*, 2006 were also reported the similar results on okra.

Average number of thrips/6 leaves after insecticidal treatment varied from 1.34 to 4.84 in the year 2012 and 0.95 to 4.13 in 2013 (Table 2). Lowest population was recorded in plot treated with imidacloprid (1.34/6 leaves in 2012 and 0.95/6 leavesin 2013) followed by thiamethaxam (1.65 to 1.17 in 2012 and 2013, respectively) acetamiprid (2.24 and 1.12). All the insecticide treatments recorded significantly lower thrips population than untreated control during both the years 2012 and 2013. Least effect of chloropyriphos and melathion were recorded. Gopalaswamy *et al.*, 2012 reported the effect of various neonicotinoids in the control

Table 2 : Efficacy of insecticides against sucking pests of urdbean (Av. of two sprays)

Treatments	Average pest population					
	Jassid/6leaves		Thrips/6leaves		Whitefly/6plants	
	2012	2013	2012	2013	2012	2013
Imidacloprid17.8SL	1.14(1.28)	1.00(1.22)	1.34(1.31)	0.95(1.05)	2.94(1.84)	.73(1.78)
Thiamethaxam25WG	1.15(1.26)	1.13(1.25)	1.65(1.61)	1.17(1.25)	2.11(1.72)	.69(1.77)
Monocrotophos36SL	1.55(1.33)	1.57(1.28)	2.69(1.78)	1.28(1.32)	3.50(1.98)	.24(1.92)
Malathian50EC	1.87(1.51)	1.68(1.50)	2.97(1.87)	1.69(1.50)	3.76(2.04)	.53(2.01)
Acephate75SP	1.66(1.42)	1.55(1.43)	2.75(1.81)	1.65(1.49)	3.72(2.01)	.36(2.04)
Acetamiprid 20 SP	1.17(1.28)	1.15(1.55)	2.24(1.76)	1.12(1.19)	2.97(1.85)	.87(1.74)
Trizophos40SL	1.49(1.31)	1.52(1.42)	2.91(1.85)	1.28(1.29)	3.51(1.76)	.99(1.85)
Methyldematon25EC	1.26(1.32)	1.48(1.33)	2.32(1.58)	1.62(1.41)	3.15(1.92)	.19(1.84)
Dimethioate30EC	1.58(1.42)	1.57(1.42)	2.87(1.83)	1.47(1.31)	3.65(2.01)	.24(1.91)
Chloropyrphos20EC	2.31(1.62)	2.26(1.72)	3.18(1.88)	2.48(1.71)	3.99(2.08)	.87(2.07)
Control	2.97(1.38)	.87(1.79)	4.84(2.51)	4.13(2.21)	5.49(2.41)	.53(2.31)
S.E.+_	0.06	0.09	0.05	0.17	0.21	0.05
C.D. (P=0.05)	0.12	0.21	0.27	0.24	0.38	0.17

Table 3 : Effect of insecticides on yield of urdbean

Treatments	Yield q/ha	
	2012	2013
T_1- Imidacloprid	11.13	11.67
T_2- Thaimethaxam	10.88	11.93
T_3- Monocrotophos	8.55	9.86
T_4- Malathion	6.55	7.27
T_5- Acephate	7.31	8.87
T_6- Acitamiprid	10.77	10.57
T_7- Trizophos	9.55	10.16
T_8- Methyldemeton	8.22	9.05
T_9- Dimethioate	8.39	8.97
T_{10}- Chlorpyriphos	6.88	7.15
T_{11}- Control	5.22	5.13
S.E. $\pm$	1.25	1.17
C.D. (P=0.05)	2.67	2.43

of insect pest of okra and black gram, respectively. Kandakoor *et al.*, 2013 observed maximum reduction of thrips population by imidacloprid spray on groundnut.

Perusal of the results revealed that all the treatment was found significantly superior over control in reducing the whitefly population. Average number of whitefly/6 plant were observed 2.11 to 5.49 after insecticidal treatments. Among the different sets of treatment, significantly minimum population of whitefly (2.11/6 plants) was recorded in thiamethaxam treated plot, which was at par with imidacloprid (2.94) and acetamiprid (2.97) in the year 2012. In the year 2013, the average number of whitefly were also varied from 2.69 to 5.53. The whitefly population was minimum in thiamethaxam treated plot (2.69). The next other most effective treatment in respect of fly population were imidacloprid and acetamiprid, respectively (Table 2). Nath and Sinha (2011) reported various neonicotinoids were used effectively to control insect pest of okra and black gram. Woolfenbarae and Cook (1996) reported that imidacloprid strongly reduced the eggs and adults population of whitefly. thiamathaxam is a neonicotinoids insecticide provide effective control against sucking pest including whitefly even at low concentration of application it also reduced adult emergence of *Bemisia tabaci* (Liguori and Cestari, 2003).

Significantly maximum yield in 2012 was found in imidacloprid treated plot (11.33q/ha) followed by thiamethaxam (10.88q/ha) and acetamiprid (10.77q/ha) m in comparison to trizophos(9.55q/ha) and monochrotophos (8.55q/ha). However, malathian and chloropyriphos had least effect on increase the yield. Only 5.22q/ha yield was found in control plot. In the year 2013, thiamehaxam gave better results in increasing the yield (11.93q/ha) than other tested insecticides. Lavekar *et al.* (2004) and Singh *et al.* (2014) obtained highest yield from imidacloprid treated plots. Significant increase in yield through the application of neonicotinoids in urdbean were reported by Singh and Kumar (2011).

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