INTERNATIONAL JOURNAL OF PLANT PROTECTION
VOLUME 12 | ISSUE 1 | APRIL, 2019 | 15-20

● ISSN-0974-2670 | Visit us : *www.researchjournal.co.in*

IJPP

RESEARCH PAPER

DOI : 10.15740/HAS/IJPP/12.1/15-20

Study of the efficacy of insecticides against jassid on okra

■ S. Harinkhere*, A.S., Thakur **and** S.B. Das

Department of Entomology, Jawaharlal Nehru Krishi Vishwa Vidyalaya, **Jabalpur (M.P.) India**

ARITCLE INFO

Received : 30.10.2018
Revised : 22.02.2019
Accepted : 05.03.2019

KEY WORDS :
Jassids, Sucking pest,
Abelmoschus esculentus

***Corresponding author:**
Email : jpharinkhere@gmail.com

ABSTRACT

Field experiments were conducted during *Kharif* 2011 to evaluate the efficacy of six insecticides against sucking insect pest jassids (*Amrasca biguttula biguttula*) on okra (*Abelmoschus esculentus* L.). Spraying of difenthiuron 50 WP @ 300 g a.i./ha was found significantly more effective and the next treatment Thiamethoxam 25 WG @ 25 g a.i./ha was also significantly effective in controlling jassid population.

How to view point the article : Harinkhere, S., Thakur, A.S. and Das, S.B. (2019). Study of the efficacy of insecticides against jassid on okra. *Internat. J. Plant Protec.*, **12**(1) : 15-20, **DOI : 10.15740/HAS/IJPP/12.1/15-20,**

INTRODUCTION

Okra (*Abelmoschus esculentus* L.) is one of the most important vegetables which is locally known as Bhendi and Lady's finger worldwide. In India, okra is an important and indigenous vegetable crop often known as the cash crop for the farmers. It is grown in many tropical and subtropical parts of the world. Tender fruits are used as vegetables or in culinary preparations as sliced and dried pieces. It is also used for thickening gravies and soups, because of its high mucilage content. The roots and stems of okra are used for cleaning cane juice (Chauhan, 1972). The matured fruits and stems containing crude fibre are used in paper industry. Okra is cultivated for its immature fruits to be consumed as a fresh and canned food as well as for seed purpose. Okra crop is basically attacked by an extensive variety of sucking pests in different phases of growth due to enrich of greenish leaves, major sucking pests mostly include jassid (*Amrasca biguttula* biguttula), aphid (*Aphis gossypii*), white fly (*Bemisia tabaci*) and shoot and fruit borer (*Leucinodes orbonalis* Guenee). Among them jassid is most destructive sucking pest (Amin *et al.*, 2008). It sucks the cell sap and injects the toxic saliva inside veins during feeding. The first symptom of its attack is leaves turned yellowish due to sucking and latter on turned to reddish coloration of the margin of leaves followed by dryness. Some time due to heavy attack at early stage reduced plant growth, cause the abortion of the first fruiting branch and increase shedding o f squares and young bolls by affecting the photosynthesis (Patel and Patel, 1998; Rafique and Shah, 1998 and Sudahkar *et al.*, 1998). The conventional insecticides including OPs and carbamates have shown resistance to jassid (Ahmad *et al.*, 2010), an intensive research have been carried out for evaluating new insecticides with novel mode of action against jassid and cause minimum health hazards to mammals and safer for natural enemies (Nauen *et al.*, 1999). The present study was on study of the efficacy

of insecticides against jassid on okra.

MATERIAL AND METHODS

Experiments on comparative efficacy of new insecticides have been carried out for evaluating new insecticides against jassid on okra conducted on field grown in the experimental field of Department of Entomology, Live Stock Farm, Adhartal, J.N.K.V.V. Jabalpur (M.P.) during *Kharif* 2011-2012. For conducting studies on management of jassid, with insecticides the experimental materials grown in Randomized Block Design (RBD) with three replications. VRO-6 variety used for experimental study grown in plot size of 6m x 1.8 m with four rows per plot with spacing of 0.45 m x 0.30 m with row length of 0.60 m. Total seven treatments are used and given in Table A. Total 300 liter water used per spray for different insecticides and three spraying at 15 days interval did by using Knapsack sprayer. This insecticide is recommended for use against this jassid pest.

Table A: Treatment details of different insecticides for spraying on okra

Treatment code	Treatments	Dose/ha
T_1	Pyriproxyfen 10 EC	50 g *a.i.*/ ha
T_2	Difenthiuron 50 WP	300g *a.i.*/ ha
T_3	Imidacloprid 17.8 SL	25 g *a.i.* / ha
T_4	Thiamethoxam 25 WG	25 g *a.i.* / ha
T_5	Emamectin benzoate 5 SG	25 g *a.i.* / ha
T_6	Quinalphos 25 EC	250 g *a.i.*/ ha
T_7	Control	Untreated

Method of observation:

Pre-treatment observations on jassid (*Amrasca biguttula biguttula*) recorded 24 hours before treatment and post- treatment, observations were recorded from five randomly selected plants per plot on six leaves per plant, 2 upper, 2 middle and 2 lower. After treatment on 1st, 3rd, 5th, 7th and 10th day after application and it was maintained for 2nd and 3rd application of insecticides. The significance among different treatment means was judged by critical difference (C.D) at 5 per cent level of significance for comparison among the treatments, the marginal means of each treatment was considered.

RESULTS AND DISCUSSION

The results revealed that the data on jassid are presented in Table 1 average jassid population per 30 leaves among different treatments were not significant 24 hours before treatment, indicating more or less uniform distribution of the pest on the crop. At one day after first spray treatment T_2 (Difenthiuron 50 WP @ 300 g a.i./ha) and T_5 (Emamectin benzoate 5 SG @ 25 g a.i./ha) was found more effective while in next group

Table 1: Efficacy of different insecticides against jassid infesting okra after first spray

Treatments code	Treatments	Dose g a.i./ha.	Mean population of jassid / 30 leaves						Over all mean
			Pre-treatment	Days after first spray					
				1	3	5	7	10	
T_1	Pyriproxyfen 10 EC	50	113.00(10.66)	63.66(7.99)	65.66(8.08)	50.66(7.14)	58.33(7.65)	82.33(9.09)	64.12(7.99)
T_2	Difenthiuron 50 WP	300	112.33(10.61)	28.00(5.21)	58.33(7.65)	32.33(5.58)	50.00(7.09)	77.66(8.83)	49.26(6.89)
T_3	Imidacloprid 17.8 SL	25	106.66(10.34)	52.66(7.26)	62.66(7.91)	39.33(6.28)	40.66(6.39)	96.00(9.81)	58.26(7.53)
T_4	Thiamethoxam 25 WG	25	108.66(10.44) L	57.33(7.59) L	52.33(7.26) L	22.66(4.78) L	35.00(5.94) L	73.66(8.60) L	48.19(6.83)
T_5	Emamectin benzoate 5 SG	25	101.33(10.08)	36.33(6.02)	71.33(8.44)	46.00(6.74)	50.66(7.14)	91.00(9.56)	59.06(7.48)
T_6	Quinalphos 25 EC	250	103.00(10.15)	61.00(7.79)	67.66(8.23)	62.00(7.86)	60.66(7.81)	100.66(10.05)	70.39(8.34)
T_7	Control	---	110.66(10.53) H	94.00(9.71) H	126.00(11.18) H	104.66(10.24) H	122.33(11.07) H	128.00(11.33) H	114.99(10.70)
	S.E.±		0.25	0.35	0.50	0.34	0.22	0.12	
	C.D. (P=0.05)		NS	1.09	1.55	1.06	0.67	0.36	

Figures in parentheses are $\sqrt{x+0.5}$ square root transformed values Non-significant, L-Lowest, H-Highest NS= Non-significant

rest of the treatment T_3 (Imidacloprid 17.8 SL @ 25 g a.i./ha), T_4 (Thiamethoxam 25 WG @ 25 g a.i./ha), T_1 (Pyriproxyfen 10 EC @ 50 g a.i./ha) and T_6 (Quinalphos 25 EC @ 250 g a.i./ha) were found significantly effective (Table 1). Among the treatments all the treatment were found significantly superior over control. At 3 days after first spray all the treatments from T_1 (Pyriproxyfen 10 EC @ 50 g a.i./ha) to T_6 (Quinalphos 25 EC @ 250 g a.i./ha) were found significantly at par and effective. T_7 (Control) showed maximum population 126.00 per 30 leaves.

Data given in Table 1 revealed that treatment T_4 (Thiamethoxam 25 WG @ 25 g a.i./ha) and T_2 (Difenthiuron 50 WP @ 300 g a.i./ha) were found more effective against whitefly. In another group treatment T_3 (Imidacloprid 17.8 SL @ 25 g a.i./ha), T_5 (Emamectin benzoate 5 SG @ 25 g a.i./ha) and T_1 (Pyriproxyfen 10 EC @ 50 g a.i./ha) were significantly at par and were found effective. Among all the treatment T_6 (Quinalphos 25 EC @ 250 g a.i./ha) was significantly not found effective. In T_7 (Control) population recorded 104.66 jassid per 30 leaves. During first spray, at seven day data revealed that T_4 (Thiamethoxam 25 WG @ 25 g a.i./ha) and T_3 (Imidacloprid 17.8 SL @ 25 g a.i./ha) were observed significantly more effective against jassid. In next group of treatment T_2 (Difenthiuron 50 WP @ 300 g a.i./ha), T_5 (Emamectin benzoate 5 SG @ 25 g a.i./ha) and T_1 (Pyriproxyfen 10 EC @ 50 g a.i./ha) were found significantly next group of treatment, at par only T_6 (Quinalphos 25 EC @ 250 g a.i./ha) was found non-significant but comparatively superior over control when jassid population 122.33 per 30 leaves.

Data presented in Table 1 revealed that among all the treatments T_4 (Thiamethoxam 25 WG @ 25 g a.i./ha) and T_2 (Difenthiuron 50 WP @ 300 g a.i./ha), were found significantly highly effective during the first spray to curb the jassid population. In next group treatment T_1 (Pyriproxyfen 10 EC @ 50 g a.i./ha) which was found significantly effective. However rest of the treatment T_1 and T_3 were found significantly at par with each other. Among the treatments T_6 were found non-significant. All the treatments were found significantly superior over control were maximum population recorded 128.00 per 30 leaves.

Overall mean population after first spray:

Data presented in Table 1 revealed that overall mean population during first spray of insecticide showed effective treatment T_4 (Thiamethoxam 25 WG @ 25 g a.i./ha) lowest population (48.19) per 30 leaves and second lowest population recorded in treatment T_2 (Difenthiuron 50 WP @ 300 g a.i./ha) 49.26 per 30

Table 2: Efficacy of different insecticides against jassid infesting okra after second spray

Treatment code	Treatments	Dose g a.i./ha	Mean population of jassid /30 leaves					Over all mean
			Days after second spray					
			1	3	5	7	10	
T_1	Pyriproxyfen 10 EC	50	76.00 (8.74)	66.00(8.14)	64.66(8.06)	87.66(9.38)	91.00(9.55)	77.06(8.77)
T_2	Difenthiuron 50 WP	300	46.00(6.77) L	58.66(6.25) L	33.66(5.84) L	66.66(8.18) L	86.33(9.30) L	54.26(7.26)
T_3	Imidacloprid 17.8 SL	25	73.33(8.55)	68.33(8.29)	57.33(7.59)	84.33(9.19)	153.00(12.37)	87.26(9.19)
T_4	Thiamethaxam 25 WG	25	53.00(7.27)	47.00(6.88)	45.33(6.74)	50.00(7.07)	97.33(9.87)	58.53(7.57)
T_5	Emamectin benzoate 5 SG	25	73.00(8.54)	66.33(8.17)	61.00(7.83)	87.00(9.34)	105.00(10.25)	78.46(8.82)
T_6	Quinalphos 25 EC	250	85.33(9.23)	47.00(6.88)	73.33(8.58)	118.33(10.89)	154.00(12.42)	95.59(9.60)
T_7	Control	---	115.33(10.73) H	105.66(10.28) H	108.00(10.40) H	147.66(12.16) H	183.66(13.56) H	132.06(11.42)
	S.E.±		0.11	0.12	0.17	0.28	0.25	
	C.D. (P=0.05)		0.33	0.35	0.51	0.86	078	

Figures in parentheses are $\sqrt{x+0.5}$ square root transformed values non-significant, L-Lowest, H-Highest

leaves, whereas in T_7 (Control) mean population was 114.99 per 30 leaves.

Efficacy of different insecticides against jassid infesting okra after second spray:

Data presented in Table 2 revealed that treatment T_2 (Difenthiuron 50 WP @ 300 g a.i./ha) and T_4 (Thiamethoxam 25 WG @ 25 g a.i./ha) were found significantly effectives against okra jassid, its mean population recorded 46.00 and 53.00 jassid per 30 leaves, respectively. In other group of treatments T_5 (Emamectin benzoate 5 SG @ 25 g a.i./ha) were also found significantly effective but treatment T_6 (Quinalphos 25 EC @ 250 g a.i./ha) was significantly non-effective as compared to other treatments, while superior with T_7 (Control). During second spray, after three days data presented in Table 2 that T_2 (Difenthiuron 50 WP @ 300 g a.i./ha) was found more effective. In second group, treatment T_4 (Thiamethoxam 25 WG @ 25 g a.i./ha) and T_6 (Quinophos 25 EC @ 250g a.i./ha.) showed significant difference when in both the treatment similar trend was recorded 47.00 and 47.00 average population, respectively. In T_7 (Control) 105.00 jassid per 30 leaves was recorded. At 5 days after second spray among all the treatments T_2 (Difenthiuron 50 WP @ 300 g a.i./ha) was found more effective against jassid. Second best treatment T_4 (Thiamethoxam 25% WG @ 25 g a.i./ha.) also found significantly effective among other treatments on five day) after spray when in T_2 (33.66 jassid/30 leaves) and in T_4 (45.33 jassid/30 leaves) observed, while in other treatment comparatively more population was recorded. In T_7 (Control) 108.00 jassid were recorded in second spray at 5 days after spray. At 7 days treatment T_4 (Thiamethoxam 25% WG @ 25 g a.i./ha.) and T_2 (Difenthiuron 50 WP @ 300 g a.i./ha) were found significantly effective. In the next group T_1 (Pyriproxyfen 10 EC @ 50 g a.i./ha), T_3 (Imidacloprid 17.8 SL @ 25 g a.i./ha), T_5 (Emamectin benzoate 5 SG @ 25 g a.i./ha) and T_6 (Quinalphos 25 EC @ 250 g a.i./ha) were also found significantly effective. All the treatments were found superior over T_7 (Control). At 10 days after second spray treatment T_2 (Difenthiuron 50 WP @ 300 g a.i./ha), T_1 (Pyriproxyfen 10 EC @ 50 g a.i./ha) and T_4 (Thiamethoxam 25 WG @ 25 g a.i./ha) was found significantly at par. In the next group T_3 (Imidacloprid 17.8 SL @ 25 g a.i./ha) and T_6 (Quinalphos 25 EC @ 250 g a.i./ha) were found significantly at par.

On the basis of overall mean after second spray more effective treatment was found T_2 (Difenthiuron 50 WP @ 300 g a.i./ha) shows minimum mean population 54.26 jassid per 30 leaves. In another effective treatment was observed in T_4 (Thiamethoxam 25 WG @ 25 g a.i./

Table 3 : Efficacy of different insecticides against jassid infesting okra after third spray

Treatment code	Treatments	Dose g a.i./ha	Mean population of jassid / 30 leaves					Over all mean
			Days after third spray					
			1	3	5	7	10	
T_1	Pyriproxyfen 10 EC	50	67.66(8.24)	68.00(8.26)	76.00(8.73)	101.66(9.97)	115.66(10.77)	85.79(9.19)
T_2	Difenthiuran 50 WP	300	15.66(4.00) L	27.33(5.26) L	43.00(6.58) L	43.33(6.59) L	29.00(5.40) L	31.66(5.56)
T_3	Imidacloprid 17.8 SL	25	70.00(8.36)	60.00(7.77)	52.00(8.74)	86.66(9.27)	92.00(9.60)	72.13(8.74)
T_4	Thiamethoxam 25 WG	25	24.33(4.97)	35.00(5.95)	37.33(6.14)	37.33(6.10)	37.66(6.16)	34.33(5.86)
T_5	Emamectin benzoate 5 SG	25	44.33(6.68)	55.66(7.48)	63.00(7.96)	59.00(7.65)	61.66(7.86)	56.73(7.53)
T_6	Quinalphos 25 EC	250	96.33(9.81)	71.33(8.46)	66.00(8.14)	91.33(9.53)	136.00(11.67)	92.13(9.52)
T_7	Control	---	142.33(11.93) H	97.33(9.88) H	106.00(10.31) H	181.33(13.41) H	192.00(13.85) H	143.79(11.89)
	S.E.±		0.31	0.18	0.24	0.63	0.25	
	C.D. (P=0.05)		0.95	0.57	0.74	1.95	0.79	

`Figures in parentheses are $\sqrt{x+0.5}$ square root transformed values Non-significant, L-Lowest, H-Highest

ha) 58.53 jassid per 30 leaves, while in T_7 (Control) maximum mean population was recorded 132.06 per 30 leaves.

Efficacy of different insecticides against jassid infesting okra after third spray:

The result of one days after third spray presented in Table 3 revealed that treatment T_2 (Difenthiuron 50 WP @ 300 g a.i./ha) followed by T_4 (Thiamethoxam 25 WG @ 25 g a.i./ha) and T_5 (Emamectin benzoate 5 SG @25 g a.i./ha) were found significantly and independently more effective, while in another group of treatment T_1 (Pyriproxyfen 10 EC @ 50 g a.i./ha) and T_3 (Imidacloprid 17.8 SL @ 25 g a.i./ha) which was found significantly at par, whereas treatment T_6 (Quinalphos 25 EC @ 250 g a.i./ha) was showing non - significant difference. Maximum population (142.33) of jassid per 30 leave were recorded in treatment T_7 (Control). Three days after third spray revealed that among the treatments T_2 (Difenthiuron 50 WP @ 300 g a.i./ha) followed by T_4 (Thiamethoxam 25 WG @ 25 g a.i./ha) was found significantly and independently effective and minimize the jassid population. The latter two insecticidal treatment T_5 (Emamectin benzoate 5 SG @ 25 g a.i./ha) and T_3 (Imidacloprid 17.8 SL @ 25 g a.i./ha) was found significantly at par. Remaining all the treatment were found comparatively superior over control. At 5 days after spray treatment T_4 (Thiamethoxam 25 WG @ 25 g a.i./ha) and T_2 (Difenthiuron 50 WP @ 300 g a.i./ha) both were found significantly at par. In the next group treatment T_5 (Emamectin benzoate 5 SG @ 25 g a.i./ha) and T_6 (Quinolphos 25 EC @ 250 g a.i./ha) were found significantly superior over control. In treatment T_7 (Control) 106.00 jassid/30 was found.

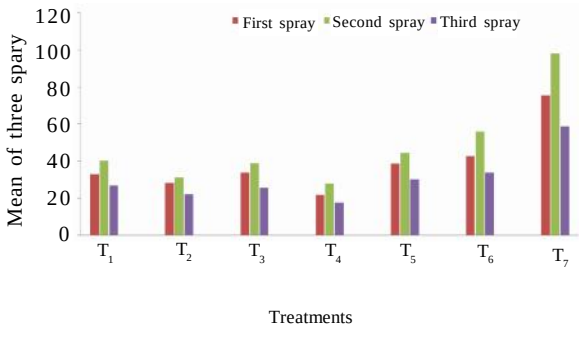

Fig. 1: Efficacy of different insecticides against jassid infesting okra

Seven days after third spray data given in Table 3 revealed that treatment T_4 (Thiamethoxam 25 WG @ 25 g a.i./ha), T_2 (Difenthiuron 50 WP @ 300 g a.i./ha) and T_5 (Emamectin benzoate 5 SG @ 25 g a.i./ha) were found significantly more effective. In next group treatment T_1 (Pyriproxyfen 10 EC @ 50 g a.i./ha) also found significantly effective. In general on 7th day as compare to five day population trend was increased. At 10 days after third spray treatment T_2 (Difenthiuron 50 WP @ 300 g a.i./ha) and T_4 (Thiamethoxam 25 WG @ 25 g a.i./ha) were found significantly superior with other treatments. In other group one treatment T_5 (Emamectin benzoate 5 SG @ 25 g a.i./ha) was found significantly effective. Rest of the treatment T_1 and T_6 also were found significantly superior over control, whereas maximum population of jassid per 30 leaves recorded 192.00 and minimum population recorded in treatment T_2 (29.00). Overall mean population of jassid after third spray found that among the treatment T_2 (Difenthiuron 50 WP @ 300 g a.i./ha) indicate lowest mean population 31.66 per 30 leaves and next lowest population was recorded in treatment T_4 (Thiamethoxam 25 WG @ 25 g a.i./ha) 34.33 per 30 leaves whereas in T_7 (Control) highest mean population was observed 143.79 per 30 leaves. These findings are in agreement with the findings of Satpathy and Rai (1999).

Overall effect of insecticidal treatments against jassid, *Amrasca biguttula biguttula* (Ishida) (Hemiptera: Cicadellidae) after three spray concluded on the basis of result, data was recorded after every spray upto 3 spray (1,3,5,7 and 10 day). Out of six treatment and one untreated control, two treatments namely T_2 (Difenthiuron 50 WP @ 300 g a.i./ha) was found significantly more effective and the next treatment T_4 (Thiamethoxam 25 WG @ 25 g a.i./ha) was also significantly effective in controlling jassid population.

REFERENCES

Ahmad, M., Arif, M. and Naveed, M. (2010). Dynamics of resistance to organophosphate and carbamate insecticides in the cotton whitefly Bemisia tabaci (Hemiptera: Aleyrodidae). *J. Pestic. Sci.*, **83**: 409-420.

Amin, M.R., Ahad, M.A., Hossain, M.H. and Tithi, D.A. (2008). Characteristics of some cotton varieties in relation to seasonal abundance of pests, predators and their impact on yield and quality. *J. Agrofor. Environ.*, **2** : 67-70.

Chauhan, D.V.S. (1972). *Vegetable production in India*. 3rd

Edition Publication Ram Prasad and Sons, Agra (U.P.) India.

Patel, Z. and Patel, J.R. (1998). Re-surveyed of jassid Ishida. *Gujrat Agric. Univ. Res. J.*, **19**: 39-43.

Nauen, R., Reckmann, U., Armborst, S., Stupp, H.P. and Elbrt, F. (1999). Whitefly activity metabolites ofimidacloprid, biological efficacy and translocation in cotton plants. *Pestic. Sci*., **55**: 265-271.

Rafique, M.A. and Shah, H.A. (1998). Cotton pest scouting of farmers fields at Multan during, 1996. *Pak. Entomol.*, **20**: 40-42.

Razaq, M., Aslam, M., Sharif, K., Salman B. and Aleem, M.F. (2003). Evaluation of insecticides against insecticides against cotton whitefly, (Homoptera: Aleyrodidae). *J. Res. Sci.*, **14**: 1012-1021.

Satpathy, S. and Rai, S. (1999). Efficacy of different pesticides and their combination against jassid and borer of okra.*Vegetable Sci.*, **26**(1): 78-81.

Sudahkar, K., Punalah, K.C. and Krishanwa, P.C. (1998). Efficacy of certain selected insecticides on the sucking pest complex on Brinjal. *Ind. Ento.*, **60**: 214-244.