

Relative Efficacy of Different Insecticides Against Jassid, *Amrasca devastans* (Dist.) on Cotton, Bt-121

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Abstract: Present research was carried out to evaluate the comparative efficacy of five new insecticides viz., diafenthiuron (polo 50%SC), thiamethoxam (actara 25%WG), acetamiprid (diamond 20%SP), imidacloprid (confidor 20%SL) and thiacloprid (calypso 24% OD) at field recommended doses against jassid, *Amrasca devastans* on cotton variety Bt- 121 grown at farmer field Chak No. 253/R.B, Faisalabad. Insecticides sprayed when population of jassid reached to economic threshold level (ETL) i.e., 1- 1.5/leaf. The data regarding mean number of jassid per leaf was taken and converted in to mean percentage mortality to find out differences among the treatments. The results of present study showed that Imidacloprid, diafenthiuron, acetamiprid and thiamethoxam were most effective insecticides against jassid up to seven days after application. While, Imidacloprid and diafenthiuron gave maximum mortality during first spray (92.42 and 88.56%) and second spray (90.87 and 85.67%) after 72 h of application.

Key words: Jassid, insecticides, efficacy, cotton (Bt-121)

INTRODUCTION

Cotton (*Gossypium hirsutum* L.) is the most important cash crop and backbone of Pakistan economy, which is cultivated on 2.879 million hectares and is the source of large amount of foreign exchange, contributing about 7.0% of value added in agriculture and about 1.5% of GDP and contributes about 66.50% share in national oil production (Anonymous, 2013). Last few decades bollworm attack on cotton was a serious problem but, with the introduction of Bt varieties of cotton in Pakistan, this problem has been solved to some extent and a significant change in cropping scheme in the cotton growing areas has been observed (Ahsan and Altaf, 2009; Abdullah, 2010). But the problem of sucking insect pests attack is remained unsolved still now. 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 of squares and young bolls by affecting the photosynthesis (Patel and Patel, 1998; Rafique and Shah, 1998; 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).

Novel insecticides including growth regulators and neonicotinoids proved most effective as compared with conventional insecticides on Bt cotton against cotton white fly, so far these insecticides are considered less toxic to the predators of sucking insects pests (Aheer *et al.*, 2000; Aslam *et al.*, 2004; Solangi and Lohar, 2007; Asi *et al.*, 2008; Frank, 2012). The neonicotinoids are a new class of insecticides, which includes the commercial products imidacloprid, acetamiprid, thiacloprid and thiamethoxam. These insecticides are important to agriculture because of their activity against sucking insects (Iwasa *et al.*, 2004; Anikwe *et al.*, 2009; Zhang *et al.*, 2011; Carvalho *et al.*, 2010).

In Pakistan, pesticides worth more than 10 billion rupees are imported, out of which about 70-80% are sprayed against cotton pests (Anonymous, 2008). It is the dire need to use the new-chemistry insecticides which are not only control the target insect pest but also safer for the beneficial insects like ladybird beetle, spider, *Chrsoperlla* spp, *Trichogramma* spp and for human being also. Present study was therefore conducted to compare the efficacy of new-insecticides at different time intervals, against jassid, under the field conditions on cotton variety Bt-121.

MATERIALS AND METHODS

Experiments on comparative efficacy of new insecticides against jassid on cotton (Bt-121) were conducted on field grown cotton (Bt-121) at Chak No. 253/R.B,

Table 1: Following five selected insecticides were applied against jassid at the recommended doses

Common name	Trade name	Dose/acre
Diafenthiuron	Polo 50%SC	200 mL
Thiamethoxam	Actara 25%WG	24 gm
Acetamiprid	Diamond 20%SP	125 gm
Imidacloprid	Confidor 20%SL	250 mL
Thiacloprid	Calypso 24%OD	250 mL
Check (control)	-	-

Table 2: Comparison of mean percentage mortality of jassid after different time intervals in 1st spray

Treatments		Mean percentage mortality of jassid			
Trade names	Common names	After 24 h	After 72 h	After 7 days	Means
Diafenthiuron	Polo 50%SC	80.42±1.08 ^{ab}	88.56±0.62 ^b	77.12±0.81 ^{ab}	82.03±3.39 ^{ab}
Thiamethoxam	Actara 25%WG	73.67±1.16 ^{cd}	83.64±1.14 ^c	68.89±1.47 ^{cd}	75.40±4.34 ^{bc}
Acetamiprid	Diamond 20%SP	78.19±1.19 ^{bc}	86.92±0.90 ^{bc}	72.21±1.33 ^{bc}	79.10±4.27 ^{ab}
Imidacloprid	Confidor 20%SL	84.92±0.86 ^a	92.42±0.84 ^a	79.42±1.54 ^a	85.58±3.76 ^a
Thiacloprid	Calypso 24%OD	68.24±1.06 ^d	74.67±1.96 ^d	65.63±1.12 ^d	69.51±2.68 ^c
Check (Control)	-	0.00 ^e	0.00 ^e	0.00 ^e	0.00 ^d
LSD		3.5578	3.7955	3.6059	6.1113

Means sharing similar letters in each column are not different significantly (Tukey's HSD, $p > 0.05$)

Faisalabad. To conduct the study 6 rows of cotton crop (75 cm apart) were selected keeping the net plot size 10 x 5 m for each treatment including untreated check. Two rows were left as non-experimental area between the treatments. There was also distance of 2 m between the replications. The population of jassid was recorded by leaving one row on each side of the treatment early in the morning. For this purpose 15 plants were selected randomly. Insects were counted from the upper leaf of 1st plant, middle leaf of 2nd plant and lower leaf of 3rd plant and so on (Razaq *et al.*, 2003). Insecticides (Table 1) were sprayed in recommended doses when the population of whiteflies reached at economic threshold level (ETL) i.e., jassid 1-1.5/ leaf, respectively (Ahmad, 1999). Insecticides were dissolved in water to prepare insecticide solutions on v/v and w/v basis. The crop was sprayed in the morning before 9 a.m. The data regarding the population of jassid were recorded from each plot before spray and 24, 72 h and 1 week after application of insecticides and mean percentage mortality was calculated. The data were analyzed by using analysis of variance techniques (Steel *et al.*, 1997). The treatment means were compared by applying Tukey's HSD test at 5% significance level.

RESULTS AND DISCUSSION

After 1st spray, mean percentage mortality of jassid was recorded at different time interval after the application of five insecticides viz. diafenthiuron (polo 50%SC), thiamethoxam (actara 25%WG), acetamiprid (diamond 20%SP), imidacloprid (confidor 20%SL) and thiacloprid (calypso 24% OD). The results in Table 2 reveal that all the treatments caused significant mortality of jassid even at 7 days after spray. After 24 h of spray, the mean value data reveal that confidor and Polo were proved highly effective insecticides with maximum mortality 84.92 and 80.42%, which were statistically at par with

other, followed by diamond (78.19%), Actara (73.67%) and calypso (68.24%), respectively. After 72 h of application the efficacy increased, where Confidor, gave maximum mortality (92.42%) while Polo and diamond gave 88.56 and 86.92% mortality which were statistically at par with other, while minimum mortality was recorded in calypso i.e., 74.67%, respectively. While after 7 days of application efficacy decreased and Confidor gave 79.42% mortality, followed by Polo diamond, actara and calypso with mortality of 77.12, 72.21, 68.89 and 65.63%, respectively. Over all if we compare the means of all the time intervals of the treatments, Confidor, Polo and Diamond were statistically at par with other with 85.58, 82.03 and 79.10% mortality of jassid followed by actara (75.40%) and calypso (69.51%), respectively.

The results of mean percentage mortality of jassid after 2nd spray are presented in Table 3. The results reveal that all the treatments caused significant mortality of jassid even at 7 days after spray. After 24 h of spray, the mean value data reveal that confidor and Polo were proved highly effective insecticides with maximum mortality 85.24 and 81.12% which were statistically at par with other, followed by diamond (76.67%), Actara (72.56%) and calypso (69.12%), respectively. After 72 h of application the efficacy increased, where Confidor, gave maximum mortality (90.87%) while Polo, diamond and actara were statistically at par with each other with 85.67, 84.12 and 83.34% mortality of jassid and minimum mortality was observed in calypso (73.19%) respectively. While after 7 days of application efficacy decreased and Confidor gave 78.67% mortality, followed by Polo diamond, actara and calypso with mortality of 76.19, 73.42, 70.21 and 69.57%, respectively. Over all comparison of means of all the time intervals of the treatments showed that Confidor, Polo and Diamond were statistically at par with other with 84.92, 80.99 and 78.07% mortality of jassid followed by actara (75.37%) and calypso (69.57%), respectively.

Table 3: Comparison of mean percentage mortality of jassid after different time intervals in 2nd spray

Treatments		Mean percentage mortality of jassid			
Trade names	Common names	After 24 h	After 72 h	After 7 days	Means
Diafenthiuron	Polo 50%SC	81.12±1.33 ^{ab}	85.67±0.76 ^b	76.19±0.94 ^{ab}	80.99±2.73 ^{ab}
Thiamethoxam	Actara 25%WG	72.56±1.24 ^{cd}	83.34±0.72 ^b	70.21±1.02 ^{cd}	75.37±4.04 ^{bc}
Acetamiprid	Diamond 20%SP	76.67±1.21 ^{bc}	84.12±1.22 ^b	73.42±1.09 ^{bc}	78.07±3.16 ^{ab}
Imidacloprid	Confidor 20%SL	85.24±1.17 ^a	90.87±0.80 ^a	78.67±0.82 ^a	84.92±3.52 ^a
Thiacloprid	Calypso 24%OD	69.12±0.97 ^d	73.19±1.37 ^c	66.42±1.03 ^d	69.57±1.96 ^c
Check (Control)	-	0.00 ^e	0.00 ^d	0.00 ^e	0.00 ^d
	LSD	4.0811	1.9496	3.0118	5.5284

Means sharing similar letters in each column are not different significantly (Tukey's HSD, p>0.05)

The results of present study showed that confidor remained effective up to 7 days and gave the maximum mortality after 72 h of application during 1st (90.42%) and 2nd (90.87%) spray among all the insecticides used in current study which are in accordance with the previous studies (Mohan and Katiyar, 2000; Tayyib *et al.*, 2005; Mohammad *et al.*, 2008; Shivanna *et al.*, 2011; Shaikh and Patel, 2012; Iqbal *et al.*, 2013) they found that Confidor significantly suppressed jassid population in cotton. Khattak *et al.* (2004) also supported our study they found that Confidor and polo caused significant reduction in the jassid population at 24 h, 72 h and even 120 h after spray. In current study Polo proved effective insecticide after confidor against jassid which is matched with the previous studies conducted by Mustafa (2000) and Asi *et al.* (2008), they reported that Polo was highly effective against sucking insect pests of cotton. Abbas *et al.* (2012) also confirmed that Confidor, Actara and diamond proved to be highly effective against jassid. But our results were contadit with Parrish (2001) and Aslam *et al.* (2003) they reported that maximum mortality of jassid was recorded with the application of acetamiprid.

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