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Integrated Pest Management of Cotton Thrips, *Thrips tabaci* (Lindeman, 1889) through Selected Pesticides under Vitro Conditions

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Abstract: *The cotton crop is known as major crop of Pakistan, vigorously damaged by many insect pests, among them, the research study was conducted on most vital early-season sucking insect pest, thrips (T. tabaci) under cotton field conditions at district: Khairpur during, 2015. The six treatments and replicated four times based on five application of different pesticides of different groups such as; T_1= Pyriproxyfen, T_2= Acetamaprid, T_3= Acephate, T_4= Diafenthiuron and T_5= Nitenpyram and T_6= control plot (without use of pesticide). The results showed that, Acephate pesticide was found more effective and Pyriproxyfen with least effective. Acephate showed the overall reduction (37.39%) in overall sprays when compared with the control (un-sprayed) plot. The second pesticide Acetamaprid was observed with the overall reduction (23.68±7.68%) followed by Nitenpyram (19.45±9.57%), Diafenthiuron (19.33±4.13%) and Pyriproxyfen (1.30±16.94%) when compared with control plot (11.50±1.35), respectively. The analysis of variance showed the significant difference among all pesticides ($p<0.05$). It is concluded that only Acephate gave the better results up to 12th day among all pesticides therefore, it is suggested to be applied for controlling of T. tabaci on the cotton crop under field conditions.*

Keywords: *Thrips, Insecticides, G. hirsutum, field conditions.*

1. INTRODUCTION

Cotton, *Gossypium hirsutum* (L.) is known as "white gold" belongs to the family Malvaceae, it is the main fiber and cash crop of Pakistan (Sahito *et al.*, 2015) that grows in both tropical and sub-tropical regions throughout the world about 111 countries (Ozyigit *et al.*, 2007) with multiple products, animal nutrition and manufacturing companies (Shah *et al.*, 2016). Pakistan ranks 5th in the world and in the largest exporting countries of raw cotton on 3rd and 4th in cotton consuming countries, about 10% contribution in GDP and 55% on the country's foreign exchange is only due to cotton and cotton products. Overall 30%-40% of cotton ends up as domestic consumption of finished products. The remaining is exported as raw cotton, yarn, fabrics and garments (PAR, 2016). It maintains a million people to earn on farms and factories ginning, weaving and cooking oil industries soap factories, therefore, called for the right of the economy a lifeline in many Asian countries (Ahmad, 1999). This crop is infested by various kinds of insect pests in different stages of growth, as compared to other crops (Uthamasamy, 1994), during growth period of this crop, 148 insect pests have been recorded on this crop, out of which 17 species recorded as major insect pests (Abbas, 2001). Same wise; Thrips, *Thrips tabaci* (Lindeman); Jassids, *Amrasca biguttula biguttula* (Ishida); Whitefly, *Bemisia tabaci* (Gennadius); Aphids, *Aphis gossypii* (Glover) and mealybug, *Phenacoccus solenopsis* (Tinsley) (Sahito *et al.*, 2011) attacked on cotton crop. Among them cotton thrips have accomplished the status of a usual cotton insect pest in the Punjab region of Pakistan (Ali *et al.*, 1993). *T. tabaci* is the most vital early-season sucking insect pest on cotton (Wilson and Bauer, 1993). The maximum population of cotton thrips was recorded in the second fortnight of September (Gupta *et al.*, 1997). Thrips harmed seedlings occasionally show explosion of monopodial branches (Gaines, 1934).

The various factors such as; cultural, mechanical, physical, biological and chemical components of integrated pest management are used to control this insect pest. Among them, the chemical control is the most popular weapon because it gives faster results. For the management of thrips has been tested a number of pesticides of different groups and are considered in the framework of the general recommendation. However, the cotton crop is more vulnerable to pests herbivore subjected to highly usage of pesticides which have also negative effect on parasitic and predatory fauna but it is the only way to control the infection on a large scale and spread of a sudden pest (Afzal, 1969). In Pakistan, imported pesticides worth more than 10 billion rupees, of which about 70%-80% are sprayed against cotton pests (Anonymous, 2008). Pesticides were used for the first time in 1950 in Pakistan to combat the locust attack. In 1954, the value of imports of chemical pesticides to 254 tons in 1980 used approximately 90% of the pesticides on the cotton crop, more than 6620000 acres used to grow cotton crops any target pesticide use (Khan *et al*., 2002) that 83% of the pesticides were used to control insect pests in cotton fields. Conventional pesticides are the only option for a quick knockout blow of insects, but the wise usage remains a problem. Such as; the development of resistance and an increase in the cost of production, pollution and so different researchers test different spraying to control the cotton thrips, and get different results. Neonicotinoids are available in commercial products Imidacloprid, Acetamiprid, Thiacloprid and Thiamethoxam. These pesticides are important for agriculture because of their activity against sucking pests (Iwasa *et al*., 2004; Anikwe *et al*., 2009; Zhang *et al*., 2011; Carvalho *et al*., 2010). It's an urgent need to use the new chemical pesticides, which are not only control insect pests goal, but also safer for beneficial insects such as ladybird beetle, spider, Chrysoperlla spp., Trichogramma spp., and the human being as well. Pesticides neonicotinoid (Imidacloprid) interfere with nicotine acetylcholine receptors in the nervous system of insects (Yamamoto, 1996). Previous investigations have been conducted on the effectiveness of different pesticides to control the absorption of insect pests by different operators (Ahmed and Hussein, 1993; parasite *et al*., 1995; Attaque and Ghaffar, 1996; Wahla *et al*, 1997; Natwick, 1999; Saleem *et al*., 2001; Aslam *et al*., 2004; Khattak *et al*., 2006; Shah *et al*., 2007). The main objective of the present study is to compare the toxicity of selected pesticides against thrips, *T. tabaci* on cotton crop and to recommend the most effective pesticide against this insect pest under field conditions.

2. MATERIALS AND METHODS

The field study was conducted at Lakyari Agricultural Farm at Saidi lower near Kamaldero, Taluka: Gambat, District: Khairpur – Sindh during Kharif Season, 2015 to compare the toxicity of five selected pesticides. The pesticides with their toxicity used for cotton thrips under vitro conditions T_1= Pyriproxyfen (Admril)10.8 EC with compound Insect Growth Regulator (IGR), 400 ml dose /acre, FMC (Pvt.) Ltd at 50 ml / tank. T_2= Acetamaprid (Mospilan) 20 SP with compound Neonicotinoid 200 g, Arysta (Pvt.) Ltd. 25 g / tank. T_3= Acephate 75 SP (Safate) with compound Organophosphate 300 g, R.B Avari Enterprises (Pvt.) Ltd. 37 g / tank. T_4= Diafenthiuron (Polo) 500 SC with compound Thiourea 200 ml, Syngenta (Pvt.) Ltd. 25 ml / tank. T_5= Nitenpyram 10 SL (Amrasca) with compound Neonicotinoid 200 ml, Agri Farm Services (Pvt.) Ltd. 25 ml / tank. T_6= Control plot (without use of pesticides).

The pesticides used in the experiment were obtained from the local market. The cotton seeds (*cv. Bt.*, 114) were sown on ridges in the direction from north to south in a Randomize Complete Block Design (RCBD) having a treatment size of (29x29 m) of each. There were 5 treatments and replicated 4 times as mentioned above whereas; the control plot was kept without using any pesticide. The plots were separated from each other by keeping a space of 2 feet between treatments and replications. The distance between ridge to ridge 18 and plant to plant was 9 to 12 inches, respectively. All agronomical practices such as thinning and weeding were done manually. Before sowing the cotton crop, the weedicide was applied to control the un-wanted plants. The sprayer person was covered with mask on face, hand gloves in hands and clothes covered on whole body.

When the sucking insect pest made their initial appearance sporadically, one month after germination, the thrips population was reached at economic thresh hold level (ETL) i.e., more than ten adults or nymphs of thrips/leaf then pesticides were sprayed with shoulder mounted knapsack sprayer at that time to reduce the pest population. All the pesticides were applied at the field recommended rate / dose. The population fluctuation observed naturally occurrence under control plot with the management of beneficial insects. The data was taken atpre-treatment and post-treatment as; before

and after the spray, thus the data was collected at 24, 48, 72 hours, 7th day and 12th day post spraying. Alive sucking insect pest was counted at randomly on 3 leaves 1 from top, 1 from middle and 1 from bottom side of the plant from 20 plants.

Thus; the data collected was subjected to analysis of variance and mean values compared with LSD test using analytical statistics package 8.1 software (USA) whereas; the reduction percentage of pesticides was observed by using Henderson and Tilton, 1955 formula: Reduction % = (1-Ta x Cb / Ca x Tb) x 100.

Where:

Ta = Infestion in the treated plot after treatment.

Tb = Infestation in the treated plot before treatment.

Ca = Infestation in the control plot after treatment.

Cb = Infestation in the control plot before treatment.

3. RESULTS

The effectiveness of pesticides was assessed against thrips, *Thrip tabaci* (Lind.) (Thysanoptera: Thripidae) under cotton crop vitro conditions cultivated at district: Khairpur – Sindh. Because of extreme hot conditioning atmosphere, this locality is outstanding for the cultivation of cotton crop and the date palm all over the country. So, the research work was conducted on this significant cotton crop which was managed through the diverse pesticides as the thrips are the tiny, cylinder pests with fringed wings and exclusive asymmetrical mouthparts. During research study, it was noticed that the thrips are most affective agent to the cotton crop from beginning stage up to collecting. In this manner, it was important to deal with the pest accordingly with the assistance of various insecticidal dosages.

First spray:

The results of the first spray showed that the overall mean population of thrips was observed (15.00) in pre – treatment data collection when sprayed with Acephate pesticide, the post-treatment data showed that the (85.12%) was reduced after one day / 24 hours spray. Thus, the second day on 48 hours was observed (30.33%), on third day after 72 hours (49.08%), on seventh day (84.20%) and on twelfth day (55.82%) reduced which showed the overall reduction (60.91±10.56%) in first spray when compared with the control (un-sprayed) plot. The second pesticide Diafenthiuron was observed with the overall reduction (9.18±25.08%) followed by Acetamaprid (-4.16±26.79%), Nitenpyram (-18.00±36.53%) and Pyriproxyfen (-64.97±53.96%) when compared with control plot (21.56±5.78) with overall mean population (Table-1), respectively. The analysis of variance showed the significant difference among all pesticides (DF= 5, 24; F= 1.84; P= 0.1421) used to control the thrips at (P<0.05). Among these pesticides only Acephate pesticide provided the better results up to 12th day against thrips. After application of this pesticide it was observed the lesser population of thrips upto second spray, latter on the population went beyond the economic threshold level (ETL) after 12th day. When the higher population was observed after 15th day the second spray was applied for better management of thrips in cotton crop.

Table- 1. *Overall mean and reduction % at pre and post treatments of different pesticides against Thrips (1st spray) under cotton field conditions*

Pesticides	Pre-treatment	Post-treatment					
		24 h	48 h	72 h	7th day	12th day	Mean and Reduction % ± SE
Acephate	15.00	1.56	2.53	2.80	2.60	2.86	2.47±0.24
	Reduction %	85.12	30.33	49.08	84.20	55.82	60.91±10.56[a]
Diafenthiuron	15.90	3.70	1.33	9.26	17.30	8.80	8.08±2.75
	Reduction %	66.71	65.45	-58.87	0.85	-28.24	9.18±25.08[ab]
Pyriproxyfen	21.20	13.03	14.60	23.53	8.73	10.26	14.03±2.59
	Reduction %	12.06	-184.45	-202.77	62.47	-12.14	-64.97±53.96[b]

Acetamaprid	21.80	9.40	7.80	15.00	13.30	6.40	10.38±1.63
	Reduction %	38.31	-47.79	-87.70	44.40	31.98	-4.16±26.79[ab]
Nitenpyram	19.13	2.73	10.40	12.40	16.50	7.40	9.89±2.32
	Reduction %	79.58	-124.55	-76.82	21.40	10.37	-18.00±36.53[ab]
Control plot	38.00	26.56	9.20	13.93	41.70	16.40	21.56±5.78[ab]

Second spray:

The results of the second spray showed that the overall mean population of thrips was observed (15.06) in pre-treatment data collection when sprayed with Acetamaprid pesticide, the post-treatment data showed that the (34.97%) was reduced after one day 24 hours spray. Thus, the second day on 48 hours was observed (32.77%), on third day after 72 hours (29.45%), on seventh day (32.27%) and on twelfth day (35.65%) reduced which showed the overall reduction (33.02±1.10%) in first spray when compared with the control (un-sprayed) plot. The second pesticide Nitenpyram was observed with the overall reduction (32.41±1.52%) followed by Acephate (30.14±1.88%), Pyriproxyfen (27.66±3.25%) and Diafenthiuron (26.62±3.46%) when compared with control plot (9.44±0.14) with overall mean population (Table-2), respectively. The analysis of variance showed the highly significant difference among all pesticides (DF= 5, 24; F= 15.5; P= 0.001) used to control the thrips at (P<0.05).

Table- 2. *Overall mean and reduction % at pre and post treatments of different pesticides against Thrips population (2nd spray) under cotton field conditions*

Pesticides	Pre-treatment	Post-treatment					
		24 h	48 h	72 h	7th day	12th day	Mean and Reduction % ± SE
Acephate	15.80	6.73	5.73	5.46	6.33	6.33	6.12±0.23
	Reduction %	26.30	32.75	35.92	29.54	26.19	30.14±1.88[a]
Diafenthiuron	15.86	7.40	5.80	5.40	7.23	6.46	6.46±0.39
	Reduction %	19.27	32.19	36.86	19.82	24.96	26.62±3.46[a]
Pyriproxyfen	16.53	6.40	6.73	6.93	7.43	5.60	6.62±0.30
	Reduction %	33.01	24.50	22.26	20.95	37.59	27.66±3.25[a]
Acetamaprid	15.06	5.66	5.46	5.73	5.80	5.26	5.58±0.10
	Reduction %	34.97	32.77	29.45	32.27	35.65	33.02±1.10[a]
Nitenpyram	15.06	5.40	5.73	5.66	5.90	5.46	5.63±0.09
	Reduction %	37.96	29.45	30.31	31.10	33.21	32.41±1.52[a]
Control plot	17.06	9.86	9.20	9.20	9.70	9.26	9.44±0.14[b]

Third spray:

The results of the third spray showed that the overall mean population of thrips was observed (11.46) in pre-treatment data collection when sprayed with Acetamaprid pesticide, the post-treatment data showed (47.55%) was reduced after one day 24 hours spray. Thus, the second day on 48 hours was observed (44.77%), on third day after 72 hours (48.86%), on seventh day (7.91%) and on twelfth day (3.43%) reduced which showed the overall reduction (30.50±10.18%) in 3rd spray when compared with the control (un-sprayed) plot. The second pesticide Acephate was observed with the overall reduction (27.11±4.39%) followed by Diafenthiuron (23.14±6.95%), Nitenpyram (22.73±6.40%) and Pyriproxyfen (8.60±4.68%) when compared with control plot (9.84±1.34) with overall mean population (Table-3). The analysis of variance showed the highly significant difference among all pesticides (DF= 5, 24; F= 2.09; P= 0.1019) used to control the thrips at (P<0.05), respectively.

Table- 3. *Overall mean and reduction % at pre and post treatments of different pesticides against Thrips population (3rd spray) under cotton field conditions*

Pesticides	Pre-treatment	Post-treatment					
		24 h	48 h	72 h	7th day	12th day	Mean and Reduction % ± SE
Acephate	13.33	6.13	7.40	5.60	4.80	4.06	5.60±0.57

	Reduction %	34.19	28.73	38.45	18.45	15.73	27.11±4.39^{ab}
Diafenthiuron	14.80	10.13	9.60	5.60	4.76	4.00	6.82±1.27
	Reduction %	2.05	16.72	44.56	27.16	25.23	23.14±6.95^{abc}
Pyriproxyfen	10.66	5.60	7.46	6.95	4.36	4.00	5.67±0.68
	Reduction %	24.82	10.16	4.48	7.37	-3.81	8.60±4.68^{c}
Acetamaprid	11.46	4.20	4.93	4.00	4.66	4.00	4.36±0.19
	Reduction %	47.55	44.77	48.86	7.91	3.43	30.50±10.18^{a}
Nitenpyram	12.26	6.66	5.46	5.86	4.86	4.06	5.38±0.44
	Reduction %	22.26	42.82	29.97	10.23	8.38	22.73±6.40^{abc}
Control plot	16.60	11.60	12.93	11.33	7.33	6.00	9.84±1.34^{bc}

Fourth spray:

The results of the fourth spray showed that the overall mean population of thrips was observed (8.56) in pre-treatment data collection when sprayed with Nitenpyram pesticide, the post-treatment data showed that the (27.61%) was reduced after one day 24 hours spray. Thus, the second day on 48 hours was observed (28.99%), on third day after 72 hours (32.97%), on seventh day (30.32%) and on twelfth day (29.91%) reduced which showed the overall reduction (29.96±0.88%) in first spray when compared with the control (un-sprayed) plot. The second pesticide Pyriproxyfen was observed with the overall reduction (26.25±1.06%) followed by Diafenthiuron (26.86±0.64%), Acetamaprid (25.55±0.78%) and Acephate (21.64±3.13%) when compared with control plot (5.14±0.05) with overall mean population (Table - 4), respectively. The analysis of variance showed the highly significant difference among all pesticides (DF= 5, 24; F= 37.7; P= 0.001) used to control the thrips at (P<0.05).

Table- 4. *Overall mean and reduction % at pre and post treatments of different pesticides against Thrips population (4th spray) under cotton field conditions*

Pesticides	Pre-treatment	Post-treatment					
		24 h	48 h	72 h	7th day	12th day	Mean and Reduction % ± SE
Acephate	8.10	3.00	3.76	3.45	3.03	3.00	3.25±0.15
	Reduction %	27.37	10.71	18.54	25.63	25.93	21.64±3.13 ^{c}
Diafenthiuron	8.13	3.00	3.00	3.18	3.00	3.00	3.04±0.04
	Reduction %	27.24	29.02	25.19	26.64	26.20	26.86±0.64^{ab}
Pyriproxyfen	8.16	3.13	3.25	3.00	3.00	3.00	3.08±0.05
	Reduction %	24.78	23.39	29.69	26.91	26.47	26.25±1.06^{ab}
Acetamaprid	8.00	3.03	3.18	3.00	3.00	3.01	3.04±0.03
	Reduction %	25.73	23.54	28.28	25.44	24.75	25.55±0.78^{bc}
Nitenpyram	8.56	3.16	3.16	3.00	3.00	3.00	3.06±0.04
	Reduction %	27.61	28.99	32.97	30.32	29.91	29.96±0.88^{a}
Control plot	10.06	5.13	5.23	5.26	5.06	5.03	5.14±0.05 ^{d}

Overall mean of all sprays:

The results of the overall sprays showed that the overall mean population of thrips was observed (13.06) in pre-treatment data collection when sprayed with Acephate pesticide, the post-treatment data showed that the (48.68%) was reduced after one day 24 hours spray. Thus, the second day on 48 hours was observed (16.82%), on third day after 72 hours (31.79%), on seventh day (58.91%) and on twelfth day (30.74%) reduced which showed the overall reduction (37.39±7.38%) in overall sprays when compared with the control (un-sprayed) plot. The second pesticide Acetamaprid was observed with the overall reduction (23.68±7.68%) followed by Nitenpyram (19.45±9.57%), Diafenthiuron (19.33±4.13%) and Pyriproxyfen (1.30±16.94%) when compared with control plot (11.50±1.35) with overall mean population (Table-5). The analysis of variance showed the non-significant difference

among all pesticides (DF= 5, 24; F= 1.71; P= 0.1696) used to control the thrips at (P<0.05). Among these pesticides only Acephate pesticide provided the better results up to 7th day after application against thrips.

Table- 5. *Overall mean and reduction % at pre and post treatments of different pesticides against thrips population under cotton vitro conditions during, 2015*

Pesticides	Pre-treatment	Post-treatment					
		24 h	48 h	72 h	7th day	12th day	Mean±SE and Reduction % ± SE
Acephate	13.06	4.36	4.86	4.33	4.19	4.06	4.36±0.13
	Reduction %	48.68	16.82	31.79	58.91	30.74	37.39±7.38[a]
Diafenthiuron	13.67	6.06	4.93	5.86	8.07	5.57	6.10±0.53
	Reduction %	31.85	19.39	11.80	24.38	9.22	19.33±4.13[ab]
Pyriproxyfen	14.14	7.04	8.01	10.10	5.88	5.72	7.35±0.80
	Reduction %	23.46	-26.62	-46.96	46.74	9.87	1.30±16.94 [b]
Acetamaprid	14.08	5.57	5.34	6.93	6.69	4.67	5.84±0.42
	Reduction %	39.19	15.23	-1.26	39.14	26.11	23.68±7.68[ab]
Nitenpyram	13.75	4.49	6.19	6.73	7.57	4.98	5.99±0.56
	Reduction %	49.80	-0.63	-0.70	29.48	19.31	19.45±9.57[ab]
Control plot	20.43	13.29	9.14	9.93	15.95	9.17	11.50±1.35[ab]

Each value is a mean of 4 replications. Means in column followed by same letters are significantly different at P<0.05.

4. DISCUSSION

The research study was conducted on thrips under cotton vitro conditions at district: Khairpur during, 2015 on six treatments and replicated four times based on five applications of different pesticides. The results showed that, Acephate pesticide was found more effective and Pyriproxyfen with least effective. The results are further controversial with the results of (Aslam *et al*., 2004), who discovered Mospilan, Confidor and Tamaron profoundly compelling against thrips whereas; the agreed with the outcomes in similarity with Stefanov and Tamaron which were very successful against the thrips as well (Wahla *et al*., 1997), who also found that Tamaron and Confidor were brilliant against the thrips. Further, described that the Actara surrendered suitable control to three days after spray, while Polo Diaenfenthiuron stayed slightest compelling against cotton thrips. Khaliq *et al*., (2014) reported that acephate was observed to be the best from spirotetramat and spinetoram, respectively, and these pesticides gave preferable control over the botanicals. Stankovac *et al.,* (1970) assessed six pesticides for their proportional adequacy in controlling *T. tabaci* in cotton. The best control was given by monocrotophos (Azodrin) which gave entire kill of both the nymphs and adults five days after the treatment and the impact kept going up to 15 days. This was trailed by dicrotophas (Bidrin) and endosulfan (Thiodan) and others. Zolone D.T was the slightest effective.

Acephate pesticide showed the overall reduction (37.39%) in overall sprays when compared with the control plot. The second pesticide Acetamaprid was observed with the overall reduction (23.68%) followed by Nitenpyram (19.45%), Diafenthiuron (19.33%) and Pyriproxyfen (1.30%) when compared with control plot (11.50). Another kind of pesticides with different grouped were also evaluated by (Sidhu and Dhawan, 1979) in field tests on small scale plots sprayed with eleven pesticides and analyzed two days after treatment, monocrotophos (Nuvacron) at 0.5 kg toxcacant (dynamic fixing) per hectare turned out to be essentially predominant (95.3%) mortality to quinalphos and endosulfan at 0.5 kg, which were themselves better than the rest of the pesticides utilized. Seven days after application, monocrotophos (82.9%) mortality was still essentially better than different pesticides yet after 14 days it was slightly but not significantly inferior (70.8% mortality) and whatever is left of the pesticides viz, phethoate, quinalphus and dimenthoate, which demonstrated comparative outcomes with no huge contrasts among them. The minimum successful pesticides were malathion and carbaryl. It was led that the monocrotophos gave the best control of *T. tabaci* followed by endosulfan and quinalphos. Kernal *et al.,* (1972) tried some more current pesticides against *T. tabaci* attacking cotton in Bani-suef province of Egypt and revealed that the pesticides demonstrated

great persistant impact up to 15 to 20 days, folimate 8496 (of unstated composition) being the best and more powerful among the four pesticides sprayed. Arranged by adequacy it was trailed by Nuvacron, Phosphamidan and Zolone D.T. (Sundra and Ramakrishan (1973) calculated the viability of spray of seven organophosphorus pesticides against thrips in India. As adjudicator by the diminishment in pest population 0.025% monocrotophos (Nuvacron) was the best treatment, trailed by 0.025% dimethioate (B1 85) Phosphamidan (Dimacron) and formothion (Anthio). Rathore *et al.,* (1970) assessed a few pesticides for controlling *T. tabaci* infestation on cotton. He revealed that the pesticides giving the best outcomes upto 10 days after spraying were endrin, carbarly, monorotophos (Nuvacron) and dimethoate respectively. Every one of these pesticides has lost their power 20 days after their application.

The analysis of variance showed the significant difference among all pesticides ($p<0.05$). It is concluded that only Acephate gave the better results up to 12th day among all pesticides therefore, it is suggested to be applied for controlling of *T. tabaci* on the cotton crop under vitro conditions. Further; the management of *T. tabaci* was also evaluated through agronomic practices in onion field by (Khaliq *et al*., 2016) and (Faircloth *et al*., 2002) also accounted that cotton seedlings were more susceptible to thrips attack and observed the effect of insecticide treatment and environmental factors on thrips population, plant growth and yield of cotton. Besides, the eco-friendly management practices were necessary to keep pest population below economic damages by assuring safe mode to beneficial reported by (Khaliq *et al*., 2014). Sahito *et al*., (2017) observed the same kind of the research studied on comparative efficacy of novel pesticides against sucking complex as jassid on cotton crop under field conditions and found significant results ($p<0.05$). Whereas; the Pyriproxyfen found less effective pesticide to the Thrips of cotton crop but this pesticide found to be lesser effective to natural enemies. It is further recommended that Acephate pesticide should be used against cotton Thrips.

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