Zagazig J. Agric. Res., Vol. 46 No. (6A) 2019

Plant Protection and Pathology Research

http:/www.journals.zu.edu.eg/journalDisplay.aspx?Journalld=1&queryType=Master

EFFICACY OF SOME INSECTICIDES, ADJUVANTS AND THEIR MIXTURES FOR CONTROLLING THE WHEAT APHID, *Schizaphis graminum* Rondani (Hemiptera: Aphididae) AND ONION THRIPS, *Thrips tabaci* ON WHEAT PLANTS

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Received: 23/06/2019 ; Accepted: 02/09/2019

ABSTRACT: Field experiments were conducted to evaluate the effect of three insecticides individually and in combination with two adjuvants (Tween 80 and Sylgard 309) for control of the wheat aphid, *Schizaphis graminum* and onion thrips, *Thrips tabaci* on wheat plants during two successive growing seasons 2016 and 2017. The three tested insecticides were lambda- cyhalothrin 5% EC at the rate of 100 ml/100 l , thiamethoxam 25% WG at the rate of 20 g/100 l and malathion 57% EC at the rate of 150 ml/100 l. Twelve treatments (11 insecticides and their mixtures with adjuvants + control) were replicated four times in a completely randomized design. Chemicals were sprayed using a knapsack sprayer motor in separated plots (1/100 faddan). Mean numbers of wheat aphids and onion thrips were recorded before spraying and post treatment periods of 1, 3, 7 and 10 days. Results showed that application of the tested insecticide lambda-cyhalothrin either individually or in combination with sylgard 309 or tween 80 resulted in a significant reduction in the number of the wheat aphid recording 100% mortality in all treatments as initial effect in both seasons 2016 and 2017. Based on general average, a clear effects of lambda-cyhalothrin with sylgard 309, lambda- cyhalothrin with tween 80 and lambda- cyhalothrin were the highly toxic and rapidly kill the tested aphid recording 96.73, 95.83 and 95.43% mortality, respectively, in season 2016 and 98.33, 98.12 and 97.35% mortality, respectively, in season 2017 followed by thiamethoxam and its mixtures then malathion with sylgard 309, malathion with tween 80 and malathion alone recording 86.30, 85.87 and 83.56% mortality, respectively, in season 2016 and 90.77, 90.63 and 88.60% mortality, respectively, in season 2017. After 1 day of spray, lambda-cyhalothrin recorded the most effective treatment resulting in 100% thrips reduction, the same result was recorded for lambda-cyhalothrin + sylgard 309 (100%) and lambda-cyhalothrin + tween 80 (100%). Thiamethoxam, malathion and their mixtures with the two adjuvants caused also 100% thrips reduction. Mortality percentage induced by sylgard 309 and tween 80 were only 56.67 and 49.58%, respectively during season 2016. Similar results were recorded after 24 hr. of application in the second season 2017. After 3, 7 and 10 days of treatments, lambda-cyhalothrin plus sylgard 309, lambda-cyhalothrin + tween 80 and lambda-cyhalothrin alone induced the highest percentages of mortality during seasons 2016 and 2017, respectively, which differed significantly than control. Moreover thiamethoxam with sylgard 309 was recorded 100, 92.77 and 87.40% thrips reduction after 3, 7 and 10 days from spray, respectively, during seasons 2017. However, the results showed also that malathion and its mixtures caused lower percent mortality than the other two tested insecticides and its mixtures during season 2016 and 2017. All the insecticides and their mixtures were significantly better than untreated check in reducing the tested pests population. Lambda- cyhalothrin proved the best effect followed by thiamethoxam and malathion.

Key words: Insecticides, adjuvants, lambda-cyhalothrin, thiamethoxam, malathion, aphid, thrips.

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INTRODUCTION

Wheat (*Triticum aestivum* L.)plays an important role in the diet of Egyptians, while the annual production of wheat is insufficient to cover Egyptian demand **(El-Hariry, 1979; El-Heneidy, 1994)**. Wheat crop is attacked by several insect pests such as army worm, cut worm (Noctuidae: Lepidoptera), termites (termitidae: isoptera), wheat beetles and weevils (Chrysomelidae, Carabidae, Curculionidae: Coleoptera) thrips (Thripidae: Thysanoptera) and Aphids (Aphididae: Homoptera) (**Naeem *et al.*, 2016**). Wheat aphids are considered one of the most destructive insects of wheat plants **(Dewar and Carter, 1984; Steffey, 2012)**. Direct damage that aphids cause to crops include: sap ingestion, desiccation of leaves, reduced germination potential and productivity, and finally plant death. Indirect damage is caused through stunting and premature plant death, reduction in photosynthesis, as well as sterilization of inflorescences, plentiful honeydew production, which may result in deformed leaves, and growth of sooty mold **(Blackman and Eastop, 2000)**. Aphids may reduce wheat production by causing 35-40% yield losses directly through sucking injury and 20-80% yield losses indirectly by transmitting viral and fungal diseases **(Kieckhefer and Gellner, 1992; Girma *et al.*, 1993; Trdan and Milevoj, 1999)**. Thrips cause evident damage to winter wheat, whose development most closely overlaps with the life cycle of thrips. **(Parrella and Lewis, 1997; Mound, 2005; Moritz, 2006)**. Both adults and larvae impact winter wheat development, the latter being more destructive by affecting partial or complete white ear effect, drying of flag leaf, partial ear fertilization, and incomplete grain filling **(Volkmar *et al.*, 2009; Gaafar, 2010)**. Thrips are tiny insects that reproduce rapidly, congregate in tight places that make pesticide coverage difficult, and feed with rasping-piercing-sucking mouth parts, resulting in deformation of leaves **(Duraimurugan and Jagadish, 2011)**.

Various environment friendly control measures are available to keep the aphids below economic injury level (EIL). These control measures included cultural, biological, chemical and host plant resistance **(Hatchett *et al.*, 1987)**. Host plant resistance is more important, which can keep aphid populations below the economic threshold level and reduce the chance of biotypes development. Combination of non-chemical *i.e*. host plant resistance and natural enemies can keep aphids population below economic injury level. But in case of aphid's population build up selective insecticide should be applied to control aphids outbreak on wheat and decrease the chance of economic losses (**Newsom, 1980; Lowe, 1987**). The aim of this study was to evaluate the efficacy of insecticides lambda-cyhalothrin, thiamethoxam and malathion against aphids and thrips attacking wheat plants

MATERIALS AND METHODS

Insecticides and Adjuvants Used

Tested pesticides trade names, formulation types, percentage of active ingredients, Chemical formula and application rate are presented in Table 1. The pesticide concentrations used in this study were based on the labeled recommendation rate. Tested adjuvants were sylgard 309 used at the rate of 1% and tween 40 used at the rate of 0.25% .

Experiment Design

This experiment was conducted in wheat field (Egyptian cultivar Misr-1) at Zagazig District, Sharkia Governorate, Egypt, during 2016 and 2017 seasons. The experimental area was divided into plots of 10×10 meters each. Tested insecticides were distributed in a complete randomized block design (CRBD) in four replicates for each treatment and untreated control. A knapsack sprayer with one nozzle beam was used in application of insecticide solution at the rate of 200 liters per faddan. Insecticides were applied on March 16th, 2016 and on April 7th, 2017 growing seasons. Samples of twenty five wheat plants (after 14 weeks from planting) were randomly selected from each replicate immediately before insecticides application and after treatment at the intervals of 1, 3, 7 and 15 days post-treatment for evaluating the initial and the residual activity of these insecticides on aphid and thrips populations. In field, aphid and thrips population were recorded in the early morning hours from terminal branches, leaves, stems and spikes in 25 plants for each replicate before and after treatment periods.

Table 1 . Descriptions of the tested insecticides used

Common name	Trade name	(a.i.)% and formulation	Chemical formula	Recommended rate
Lambda-cyhalothrin	Lambada	5% EC	$C_{23}H_{19}ClF_3NO_3$	100 ml/100 l
Thiamethoxam	Actara	25% WG	$C_8H_{10}ClN_5O_3S$	20 g/100 l
Malathion	Malason/cheminova	57%EC	$C_{10}H_{19}O_6PS_2$	150 ml/100 l

The percentages of aphid and thrips reduction were calculated according to **Henderson and Tilton's equation (1955)** as follow:

Reduction (%) = 100 × 1 - (Ta × Cb) / Tb × Ca)

Where:
C = Insect number in the untreated control plot.

T = Insect number in the treated plot.

a = After insecticide application.

b = Before insecticide application.

Statistical Analysis

All data were statistically analyzed using the general linear models procedure of the statistical analysis system SPSS (22). Significances of differences were defined at $p < 0.05$. All experiments as well as related analysis results were repeated three times and all obtained data are expressed as averages.

RESULTS AND DISCUSSIONS

Efficiency of the Tested Chemicals and Their Binary Mixtures Against the Wheat Aphid, *Schizaphis graminum*

Efficacy of the tested insecticides, two adjuvants and their combinations against the wheat aphid on wheat plant under field conditions were presented in Tables 2 and 3. Application of the tested insecticide lambda-cyhalothrin either alone or in combination with sylgard 309 and tween 80 resulted in a significant reduction in the number of the wheat aphid recording 100% mortality for all treatments as initial effect in both seasons (2016 and 2017). Thiamethoxan and its mixtures with both adjuvants came in the second position followed by malathion and their mixtures which recorded the least efficacy. Sylgard 309 and tween 80 significantly decreased the number of *S. graminum* as an initial effect in both seasons recording 39.68 and 38% mortality in season 2016 (Table 2) and 39.30 and 38.75% mortality in season 2017 (Table 3), respectively. Based on general average, a clear deleterious effects of lambda- cyhalothrin with sylgard 309, lambda-cyhalothrin with tween 80 and followed by lambda- cyhalothrin were the highly toxic and rapidly kill the tested aphid recording 96.73, 95.83 as well as 95.43% mortality, respectively, in season 2016 and 98.33, 98.12 and 97.35% mortality, respectively, in season 2017 followed by thiamethoxam and its mixtures then malathion with sylgard 309, malathion with tween 80 followed by malathion alone recording 86.3 , 85.87 and 83.56% mortality, respectively, in season 2016 as well as 90.77, 90.63 and 88.60% mortality, respectively in season 2017. All treatments were significantly differed compared with the control (untreated). Contrarily, adjuvants had a less toxic effect as initial and general average. Indeed, during a 2016–2017 the insecticides and their combinations with adjuvants versus the control had a significant effect on the number of aphid. The results clearly indicated that adjuvants increased the efficiency of the tested insecticides against wheat aphid in wheat field in both seasons. These results are in harmony with those obtained by **Abd-Ella (2015)** who indicated that neonicotinoids (acetamiprid, imidacloprid, thiamethoxam and dinotefuran), organophosphate (malathion) and carbamate (pirimicarb) insecticides significantly reduced the pomegranate aphid, *Aphis punicae* population by an average of 70.6 - 90.7%. The greatest control of *A. punicae* was achieved by thiamethoxam > acetamiprid > imidacloprid > pirimicarb > dinotefuran > malathion. Thiamethoxam, dinotefuran, acetamiprid

Table 2. Efficiency of the insecticides, adjuvants and their mixtures against the wheat aphid, *Shizaphis graminum* (2016 season)

Treatment	Count before spraying	Initial effect	Number of individuals and reduction percentage after different days post - treatment			Mean of residual effect	General average
		1	3	7	10		
Lambda-cyhalothrin	**38.25^{ijkl}**	0.00^{b}	2^{yzab}	5^{tuvwxy}	8.5^{s}	5.17	3.88
	Red. %	100	96.31	94.4	91	93.90	95.43
Malathion	**35.25^{lm}**	2.5^{xyzab}	6.25^{stuvw}	15.75^{q}	24.25^{op}	15.42	12.19
	Red. %	93.5	87.47	80.89	72.4	80.25	83.57
Thiamethoxam	**34.75^{m}**	1.5^{ab}	3.5^{wxyza}	8^{st}	13.25^{qr}	8.25	6.56
	Red. %	96	92.88	90.15	84.70	89.24	90.93
Sylgard 309	**40.25^{hi}**	26.5^{o}	35.5^{lm}	62^{e}	68.25^{d}	55.25	48
	Red.%	39.68	37.69	34.12	31.98	34.59	35.87
Tween 80	**44^{g}**	29.75^{n}	39.25^{ij}	69^{d}	76.25^{c}	61.5	53.56
	Red.%	38	36.98	32.93	30.49	33.47	34.6
Lambda-cyhalothrin+sylgard 309	**43^{gh}**	0.00^{b}	1^{ab}	4.25^{vwxyza}	7.75^{stu}	4.33	3.25
	Red.%	100	98.36	95.77	92.77	95.63	96.73
Lambda-cyhalothrin+tween 80	**36.75^{jklm}**	0.00^{b}	1.25^{ab}	4.75^{uvwxyz}	8^{stu}	4.67	3.5
	Red.%	100	97.59	94.47	91.27	94.44	95.83
Malathion+sylgard 309	**38.75^{ijk}**	1.75^{zab}	5.5^{stuvwx}	15^{qr}	23.25^{p}	14.58	11.38
	Red.%	95.86	89.97	83.44	75.93	83.11	86.3
Malathion+tween 80	**39.5^{ij}**	2^{yzab}	6^{stuvw}	15.5^{qr}	24^{op}	15.17	11.8
	Red.%	95.36	89.27	83.22	75.63	82.71	85.87
Thiamethoxam +sylgard 309	**39.5^{ij}**	0.00^{b}	2.5^{xyzab}	6.75^{stuv}	12.5^{r}	7.25	5.44
	Red.%	100	95.53	92.69	87.31	91.84	93.88
Thiamethoxam +tween 80	**37.75^{ijklm}**	0.00^{b}	2.75^{xyzab}	7.5^{stu}	13^{qr}	7.75	5.81
	Red.%	100	94.85	91.5	86.19	90.85	93.14
Control	**35.5^{klm}**	38.75^{ijk}	50.25^{f}	83^{b}	88.5^{a}	73.92	65.13

LSD $\leq$ 0.05 level for treatments = 1.1704 LSD $\leq$ 0.05 level for periods= 0.9474
LSD $\leq$ 0.05 level for interactions between (TxP) = 3.1600

Table 3. Efficiency of the insecticides, adjuvants and their mixtures against the wheat aphid, *Shizaphis graminum* (2017 season)

Treatment	Count before spraying	Initial effect	Number of individuals and reduction percentage after different days post-treatment			Mean of residual effect	General average
		1	3	7	10		
Lambda-cyhalothrin	**28^{m}**	0.00^{w}	0.00^{w}	2.5^{stuvw}	4.5^{rstu}	2.33	1.75
	Red.%	100	100	96	93.38	96.46	97.35
Malathion	**30.75^{jklm}**	1.5^{uvw}	4^{rstuv}	9.25^{p}	13.75^{o}	9	7.13
	Red.%	95.69	90.5	86.65	81.57	86.24	88.60
Thiamethoxam	**31.25^{ijkl}**	0.00^{w}	2^{tuvw}	6^{qr}	10.75^{op}	6.25	4.69
	Red.%	100	95.32	91.48	85.82	90.87	93.16
Sylgard 309	**33.5^{ghij}**	23^{n}	29.5^{lm}	51.25^{e}	56.75^{d}	45.83	40.13
	Red.%	39.30	35.67	32.13	30.18	32.66	34.32
Tween 80	**35^{gh}**	24.25^{n}	32.25^{hijkl}	54.5^{d}	60.25^{c}	49	42.81
	Red.%	38.75	32.69	30.92	29	30.87	32.84
Lambda-cyhalothrin+sylgard 309	**30^{klm}**	0.00^{w}	0.00^{w}	1.5^{uvw}	3.25^{rstuv}	1.58	1.19
	Red.%	100	100	97.78	95.53	97.77	98.33
Lambda-cyhalothrin+tween 80	**32.25^{hijkl}**	0.00^{w}	0.00^{w}	2^{tuvw}	3.75^{rstuv}	1.92	1.44
	Red.%	100	100	97.25	95.21	97.49	98.12
Malathion+sylgard 309	**33^{ghijk}**	1^{vw}	3.25^{rstuv}	8.5^{pq}	12.5^{o}	8.08	6.31
	Red.%	97.32	92.80	88.57	84.39	88.59	90.77
Malathion+tween 80	**35.5^{g}**	1.25^{vw}	3.75^{rstuv}	9^{pq}	13.25^{o}	8.67	6.81
	Red.%	96.89	92.28	88.75	84.62	88.55	90.64
Thiamethoxam +sylgard 309	**34.25^{ghi}**	0.00^{w}	1.25^{vw}	4.75^{rst}	8.5^{pq}	4.83	3.63
	Red.%	100	97.33	93.85	89.77	93.65	95.24
Thiamethoxam +tween 80	**32.5^{ghijkl}**	0.00^{w}	1.5^{uvw}	5.25^{rs}	9^{pq}	5.25	3.94
	Red.%	100	96.63	92.83	88.59	92.68	94.51
Control	**30.5^{jklm}**	34.5^{gh}	41.75^{f}	68.75^{b}	74^{a}	61.5	54.75

LSD $\leq$ 0.05 level for treatments = 1.6978   LSD $\leq$ 0.05 level for periods= 0.8892

LSD $\leq$ 0.05 level for interactions between (TxP) = 3.2359

and imidacloprid proved to be the most effective insecticides in reducing cotton aphid, *A. gossypii* population up to 21 days after treatment throughout both seasons of study and caused an average reduction percentage ranged from 73.58 to 96.42%, whereas pirimicarb and malathion showed the lowest reduction **(Gaber *et al.*, 2015)**. Lambda cyhalothrin and imidacloprid, were effective in lowering aphid density in strawberry; however lambda cyhalothrin yielded better results as compared to imidacloprid. Aphid population significantly reduced after the spray of cyhalothrin and imidacloprid **(Ul Ane *et al.*, 2016)**.

Efficiency of the Tested Chemicals and Their Binary Mixtures Against the Onion Thrips, *Thrips tabaci*

Results concerning the efficacy of the three insecticides (lambda-cyhalothrin, malathion and thiamethoxam), the two adjuvants and their binary mixtures against the onion thrips are presented in Tables 4 and 5. The wheat plants were carefully inspected at weekly interval to monitor the thrips infestation. The tested chemicals were used when the insect counting were reached to a suitable numbers. The results showed that all the tested insecticides, two adjuvants and their binary mixtures were significantly better than the control. After 1 day of spray, lambda-cyhalothrin recorded the most effective treatment with a minimum mean thrips population per plant (0.00 individuals) resulting 100% thrips reduction, the same result was recorded for lambda-cyhalothrin + sylgard 309 (100%) and lambda-cyhalothrin + tween 80 (100%). Thiamethoxam, malathion and their mixtures with the two adjuvants caused also 100% thrips reduction. Mortality percentage induced by sylgard 309 and tween 80 were only 56.67 and 49.58%, respectively, during season 2016. Similar results were recorded after 24 hr. of treatments in the second season 2017. After 3, 7 and 10 days of treatments, lambda-cyhalothrin plus sylgard 309, lambda-cyhalothrin + tween 80 and lambda-cyhalothrin alone induced the highest percentages of mortality during seasons 2016 and 2017, respectively, which differed significantly than control. Moreover thiamethoxam with sylgard 309 was recorded 100, 92.77 and 87.40% thrips reduction after 3, 7 and 10 days from spray, respectively, during seasons 2017. However, the results showed also that malathion and its mixtures caused lower percent mortality than the other two tested insecticides and its mixtures during seasons 2016 and 2017. Lambda-cyhalothrin and its mixtures appeared to be the most persistent treatment, followed by thiamethoxam and its mixtures meanwhile, malathion and its mixtures with adjuvants recorded the lowest efficiency against the wheat thrips. These results are in harmony with **Sadozai *et al.* (2009)** who studied the efficacy of different insecticides against onion thrips in Taharan- Peshawar. All the tested insecticides were significantly more effective than the untreated check in reducing pest population after both applications. Thiodan proved the best followed by curacron and karate. **El-Naggar and Zidan (2013)** evaluated the effectiveness of imidacloprid and thiamethoxam, used separately as seed treatments and foliar applications at the recommended rate against the sucking insects: thrips, *T. tabaci* (lind), jassid, *Empoasca* spp., whitefly, *Bemicia tabaci*, and cotton aphid, *A. gossypii* (Glover.). Results showed the following trends: Seed treatment with imidacloprid and thiamethoxam protected cotton seedlings from thrips for at least 6 weeks from the onset of seed planting. Imidacloprid had a better efficiency against this sap. The results also revealed that imidacloprid had more adverse effects on soil fauna than thiamethoxam.sucking pest than thiamethoxam. Treatments with imidacloprid and thiamethoxam as foliar applications were highly effective against aphids. **Bereś *et al.* (2016)** tested two insecticides: Karate Zeon 050 CS, containing lambda-cyhalothrin, and Proteus 110 OD, containing thiacloprid with deltamethrin on thrips abundance on maize. The tested active substances showed high effectiveness against thrips, but a better effect reflected in a decrease in thrips abundance was found for the mixture of thiacloprid with deltamethrin. The tested insecticides significantly reduced the population of thrips for up to 14 days after treatment. **Ding *et al.* (2018)** determined the control efficacy of seven neonicotinoid insecticides of seed treatments against corn thrips. The results showed that, among the tested neonicotinoid seed treatments each of thiamethoxam (1.0 and 2.0 g active ingredient (AI)/kg of seeds), clothianidin (1.0 and 2.0 g AI/kg of seeds), and imidacloprid (2.0 g AI/kg of seeds) was the highest in control efficacy against corn thrips throughout the corn growing season. Treating corn seeds with thiamethoxam, clothianidin, and imidacloprid can provide effective protection against early-season thrips and reduce yield losses under field conditions.

Table 4. Efficiency of the tested insecticides,two adjuvants and their mixtures against the onion thrips, *Thrips tabaci* attacking wheat plants in the field during 2016 season

Treatment	Count before spraying	Initial effect	Number of individuals and reduction percentage after different days from application			Mean of residual effect	General average
		1	3	7	10		
Lambda-cyhalothrin	**14.25^{abcd}**	0.00^{m}	0.00^{m}	1.75^{klm}	2.75^{jklm}	1.5	1.13
	Red.%	100	100	91.57	86.95	92.84	94.63
Malathion	**14.5^{abcd}**	0.00^{m}	1.5^{lm}	5.25^{hijkl}	6.5^{ghij}	4.42	3.31
	Red.%	100	91.19	75.14	69.68	78.67	84
Thiamethoxam	**12^{bcde}**	0.00^{m}	0.00^{m}	3.75^{ijklm}	4.75^{ijkl}	2.83	2.13
	Red.%	100	100	78.54	73.22	83.92	87.94
Sylgard 309	**13^{abcde}**	6^{hijk}	9.5^{efgh}	12.25^{bcde}	15.75^{abc}	12.5	10.88
	Red.%	56.67	37.75	35.30	18	30.35	36.93
Tween 80	**13.5^{abcde}**	7.25^{fghi}	10.75^{defg}	14.5^{abcd}	16.25^{ab}	13.83	12.19
	Red.%	49.58	32.17	26.26	18.57	25.67	31.65
Lambda-cyhalothrin+sylgard 309	**12.75^{abcde}**	0.00^{m}	0.00^{m}	1^{lm}	2^{klm}	1	0.75
	Red.%	100	100	94.62	89.39	94.67	96
Lambda-cyhalothrin+tween 80	**13.75^{abcde}**	0.00^{m}	0.00^{m}	1.5^{lm}	2.25^{jklm}	1.25	0.94
	Red.%	100	100	92.51	88.93	93.81	95.36
Malathion+sylgard 309	**15.75^{abc}**	0.00^{m}	1^{lm}	4^{ijklm}	4.75^{ijkl}	3.25	2.44
	Red.%	100	94.59	82.56	79.59	85.58	89.19
Malathion+tween 80	**13^{abcde}**	0.00^{m}	1.25^{lm}	4.5^{ijklm}	5^{ijkl}	3.58	2.69
	Red.%	100	91.81	76.23	73.98	80.67	85.51
Thiamethoxam +sylgard 309	**14.5^{abcd}**	0.00^{m}	0.00^{m}	3.25^{ijklm}	4^{ijklm}	2.42	1.81
	Red.%	100	100	84.61	81.34	88.65	91.49
Thiamethoxam +tween 80	**13.75^{abcde}**	0.00^{m}	0.00^{m}	3.5^{ijklm}	4.25^{ijklm}	2.58	1.94
	Red.%	100	100	82.52	79	87.17	90.38
Control	**11.5^{cdef}**	12.25^{bcde}	13.5^{abcde}	16.75^{a}	17^{a}	15.75	14.88

LSD $\leq$ 0.05 level for treatments = 4.964 LSD $\leq$ 0.05 level for periods=3.857

LSD $\leq$ 0.05 level for interactions between (TxP) = 5.863

Table 5. Efficiency of the tested insecticides, two adjuvants and their mixtures against the onion thrips, *Thrips tabaci* attacking wheat plants in the field 2017 season

Treatment	**Count before spraying**	**Initial effect**	**Number of individuals and reduction percentage after different days from application**			**Mean of residual effect**	**General average**
		1	**3**	**7**	**10**		
Lambda-cyhalothrin	**13.5^{bcd}**	0.00^{q}	0.00^{q}	1^{opq}	2^{mnop}	1	0.75
	Red.%	100	100	94.37	90.20	94.86	96.14
Malathion	**11.5^{ef}**	0.00^{q}	1.75^{nopq}	4.25^{ijkl}	5.5^{ij}	3.83	2.88
	Red.%	100	87.27	71.94	68.37	75.86	81.89
Thiamethoxam	**10^{f}**	0.00^{q}	1^{opq}	1.5^{opq}	2. 5^{lmno}	1.67	1.25
	Red.%	100	91.63	88.61	83.47	87.90	90.93
Sylgard 309	**10.75^{ef}**	5.25^{ijk}	7.5^{gh}	10.25^{f}	13.75^{ab}	10.5	9.19
	Red.%	53.43	41.62	27.60	15.42	28.21	34.52
Tween 80	**10^{f}**	5.75^{hi}	8^{g}	10.75^{ef}	14.25^{ab}	11	9.69
	Red.%	45.17	33	18.38	5.77	19.05	25.58
Lambda-cyhalothrin+sylgard 309	**11.75^{def}**	0.00^{q}	0.00^{q}	0.5^{pq}	1.25^{opq}	0.58	0.44
	Red.%	100	100	96.77	92.96	96.58	97.43
Lambda-cyhalothrin+tween 80	**14^{abc}**	0.00^{q}	0.00^{q}	0.75^{opq}	1.75^{nopq}	0.83	0.63
	Red.%	100	100	95.93	91.73	95.89	96.92
Malathion+sylgard 309	**10.75^{ef}**	0.00^{q}	1.25^{opq}	3.5^{klmn}	4.75^{ijk}	3.17	2.38
	Red.%	100	90.27	75.28	70.78	78.78	84
Malathion+tween 80	**11.25^{ef}**	0.00^{q}	1.5^{opq}	3.75^{jklm}	5.25^{ijk}	3.5	2.63
	Red.%	100	88.84	74.69	69.14	77.56	83.17
Thiamethoxam +sylgard 309	**10.5^{ef}**	0.00^{q}	0.00^{q}	1^{opq}	2^{mnop}	1	0.75
	Red.%	100	100	92.77	87.40	93.39	95
Thiamethoxam +tween 80	**11^{ef}**	0.00^{q}	0.00^{q}	1.25^{opq}	2.25^{mnop}	1.17	0.88
	Red.%	100	100	91.37	86.47	92.61	94.46
Control	**10.25^{f}**	10.75^{ef}	12.25^{cde}	13.5^{bcd}	15.5^{oa}	13.75	13

LSD $\leq$ 0.05 level for treatments = 0.7560 LSD $\leq$ 0.05 level for periods= 0.5318

LSD $\leq$ 0.05 level for interactions between (TxP) = 1.8129

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فعالية بعض المبيدات الحشرية والمواد المساعدة ومخاليطها لمكافحة حشرة مَنْ القمح وحشرة التربس على نباتات القمح

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أجريت تجارب حقلية لتقييم تأثير ثلاثة مبيدات حشرية منفردة أو فى مخاليط مع مادتين مساعدتين (توين ٤٠ وسيلجارد ٣٠٩) لمكافحة حشرة مَنْ القمح وحشرة تربس البصل على نباتات القمح خلال موسمي النمو ٢٠١٦و٢٠١٧، اثنتا عشر معاملة (إحدى عشر معاملة للمبيدات الحشرية ومخاليطها مع المادتين الإضافيتين المختبرتين + تجربة المقارنة) تكررت أربع مرات فى تقييم كامل العشوائية، أوضحت النتائج أن استخدام مبيد اللمباداسيهالوثرين سواء منفردا أو مخلوطا مع كل من ماده السيلجارد ٣٠٩ وماده التوين ٨٠ أعطى انخفاضاً معنوياً في تعداد حشره مَنْ القمح حيث سجل ١٠٠% موت فى كل المعاملات كتأثير فورى فى كلا الموسمين ٢٠١٦ و٢٠١٧ وأنهم الأعلى بناءًا على المتوسط العام يتضح من تأثير معاملات مبيد اللمباداسيهالوثرين مع ماده السيلجارد ٣٠٩ وماده التوين ٨٠ ويلى ذلك تأثير مبيد اللمباداسيهالوثرين منفردا سمية وإبادة سريعة لحشره المَنْ المختبرة حيث سجلت ٩٦.٧٣، ٩٥.٨٣ و ٩٥.٤٣% كنسبه مئوية للموت على التوالى خلال الموسم ٢٠١٦ وسجلت القيم ٩٨.٣٣ ، ٩٨.١٢ و ٩٧.٣٥% على التوالى خلال الموسم ٢٠١٧، يلى ذلك مبيد ثياميثوكسام ومخاليطه ثم مبيد الملاثيون مع ماده السيلجارد ٣٠٩ وماده التوين ٨٠ يلى ذلك مبيد الملاثيون منفردا حيث سجلوا ٨٦.٣، ٨٥.٨٧ و ٨٣.٥٦% كنسبه مئوية للموت على التوالى خلال الموسم ٢٠١٦ وسجلت القيم ٩٠.٧٧ ، ٩٠.٦٣ و٨٨.٦% على التوالى خلال الموسم ٢٠١٧، أكدت النتائج أيضاً أن مبيد اللمباداسيهالوثرين سجل بعد يوماً واحداً من الرش أقل متوسط على تعداد الحشرة لكل نبات بنسبه انخفاض ١٠٠%، سجلت نفس النتيجه مع مبيد اللمباداسيهالوثرين مخلوطاً مع ماده السيلجارد ٣٠٩ وماده التوين ٨٠، مبيد الثياميثوكسام ومبيد الملاثيون ومخاليطهم مع المادتين المساعدتين أعطت أيضاً ١٠٠% كنسبة انخفاض لحشره التربس، النسبة المئوية للانخفاض لماده السيلجارد ٣٠٩ ومادة التوين ٨٠ منفردتين كانت ٥٦.٦ و٤٩.٥٨% على التوالى خلال الموسم ٢٠١٦ نفس النتائج سجلت بعد ٢٤ ساعه من المعاملة خلال الموسم الثانى ٢٠١٧، بعد ٣، ٧ و١٠ أيام من المعاملة أعطى مخلوط اللمباداسيهالوثرين مع ماده سيلجارد ٣٠٩ ومخلوط اللمباداسيهالوثرين مع ماده التوين ٨٠ ومبيد اللمباداسيهالوثرين منفرداً أعلى نسبه موت خلال الموسم ٢٠١٦ و٢٠١٧ على التوالى حيث اعطت علاقة عالية المعنوية مقارنة بتجربة المقارنة، مبيد الثياميثوكسام مع ماده السيلجارد ٣٠٩ سجل ١٠٠، ٩٢.٧٧ و٨٧.٤٠% كنسبه مئوية للانخفاض فى تعداد التربس بعد ٣ ،٧ و ١٠ أيام من الرش على التوالى خلال الموسم ٢٠١٧، أظهرت النتائج أيضاً أن مبيد الملاثيون ومخاليطه سجل أقل نسبه موت من المبيدين الآخرين ومخاليطهم خلال موسمى ٢٠١٦ و٢٠١٧، المبيدات الحشرية ومخاليطها أحدثت إنخفاضا معنويا فى تعداد الآفتين المختبرتين مقارنه بتجربة المقارنة، مبيد اللمباداسيهالوثرين أعطي أفضل تأثير تلى ذلك مبيدى ثياميثوكسام والملاثيون.

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