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# Field Studies and the Efficiency of Different Insecticides against *Thrips tabaci* Lindeman on Onion Crops in Egypt


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**Abstract**: Onion thrips (*Thrips tabaci* Lindeman) ((Thysanoptera: Thripidae) is the major pest attacking onion crops on the Egyptian fields during seasons 2023 and 2024. The total average populations were 652.70 in the first season and 677.33 in the second season, the highest peak were recorded on the 4$^{th}$ week of April with average 110.48 and 99.53. Different insecticides were used to study its effectiveness on thrips as Dinotefuran, acetamiprid, abamectin + thiamethoxam, spirotetramat, spinosad, spintorame, chlorophanpyar, fenopethrin + etoxal and acetamiprid + bifenthrin. After 24 hours all compound recorded the highest reduction than after 3,7 and 10 days, the highest reduction was recorded with spintorame by 97.32±1.36and 96.93±0.96%. On the third day, Spirotetramat recorded the highest reduction by 95.21±1.22and 92.60±2.40%. On the seventh day, chlorophanpyar recorded the highest reduction by 83.52±1.74 and 81.62±2.60%. On the tenth day also chlorophanpyar recorded the highest reduction by 72.40±0.87 and 69.30±1.85%. Chlorophanpyar was recorded the highest overall average by 85.42±5.35and 82.79$^{a}$±4.60 %.



**Key words**: Onion, Thrips, *Thrips tabaci*, Insecticides, reductions rate.


## 1. Introduction

The onion thrips, *Thrips tabaci* Lindeman (Thripidae) is the major pest attacking onion crops (*Allium cepa* L) in Egypt **(Diaz-Montano *et al.*, 2011; Azazy *et al.*, 2018 and Allam *et al.*, 2020).** Chemical insecticides were tested to study the efficiency of reducing thrips infestation (**Hendawy *et al.*, 2011**, **Nadeem *et al.*, 2022, Geremias *et al.*, 2022 and Allam *et al.*, 2023**). Abamectin + Thiamethoxam compound recorded high reduction ranged 94-98 % after 1, 3, 7, 14 days (**Mohamed and Ahmed, 2022 and Hassan *et al.*, 2024**). On other side *T. tabaci* recorded a resistance to both compound (**Adesanya *et al.*, 2020 and Geremias *et al.*, 2022).** Bifenthrin and acetamiprid showed a significant effect on thrips population (**Ashghar *et al.*, 2018 and Mohammad Falahzadah *et al.*, 2021**). Dinotefuran affected on thrips population with total reduction ranged 69 to 74% (**Khozimy *et al.*,**

**2021**), also other investigations showed that thrips show a resistance to the compound( **Kliot *et al.*, 2016**). Spirotetramat is one of the compound which showed a high reduction after 1 to 3-day treatment (**Nault *et al.*, 2013 and Khaliq *et al*., 2014)**. Spintorame is the most effective on thrips and used to suppress it (**Moretti *et al*. 2019 and Wakil *et al.* 2023**). Chlorfenpyar is one of compound with success effective in controlling thrips **(Ali *et al.*, 2015 and Korai *et al*., 2024)**. Spinosad finally consider as one of the biotic compound with a high reduction to thrips especially after treatment directly and in total reduction **(Wakil, *et al*., 2023)**. This study was conducted to evaluate the extent of the effect of the previous compounds in reducing the thrips population during the 2023 and 2024 seasons.

## 2. Materials and methods

### 2.1. Thrips population

This study was conducted on the research farm at the Sakha Agricultural Research Station, Kafr Al sheikh governorate during the 2023 and 2024 seasons. The numerical density of *Thrips tabaci* Lindeman was counted weekly for 16 weeks in both seasons. The seedlings were transferred in the second week of December to The agricultural field for the experiment field (4000 square meters). The red onion varaity Tantawi was used in this study. All agricultural operations were carried out, including irrigation and fertilization. With the beginning of the appearance of thrips individuals, thrips individuals were counted on 25 plants for four replicates. The plants were shaken on a piece of plastic and the individuals that had fallen were counted, then these plants were transferred to the laboratory to count the individuals present among the leaves that did not fall. Both methods were combined to calculate the average number of individuals per week.

### 2.2. Insecticides treatments

Under high population of *T. tabaci* during the 3$^{rd}$ week of April, the experiment was divided into nine equal areas (450 square meters/ treatment). The plants were examined and the thrips individuals were counted before treatment, then, eight pesticides were used to determine their ability to reduce thrips populations, after 24 hours, 3 days, 7 days and 10 days after treatment. Data in table (1) is containing the pesticides information.

**Table (1). Ingredients, trade name, manufacture and Application rate of the insecticides treatments**

| NO | Ingredients | Trade name | Manufacture | Application rate /100 L |
|---|---|---|---|---|
| **1** | Abamectin + Thiamethoxam | Agri Flex 18.56 % | Syngenta, Egypt | 40cm |
| **2** | Acetamiprid + bifenthrin | Rubek 50%wp | Shoura, Egypt | 25gm |
| **3** | Acetamiprid | Mospilan20%Sp | Shoura, Egypt | 25gm |
| **4** | Dinotefuran | Oshin20%sc | Shoura, Egypt | 125gm |
| **5** | Spirotetramat | Movento10%sc | Bayar, Germany | 75cm |
| **6** | Spintorame | Radiant 120sc | Dow Agro Sciences, UK | 60cm |
| **7** | Chlorfenpyar | Challenger Super 24% SC | BASF ,Egypt | 60cm |
| **8** | Spinosad | Tracer 240SC | Dow Agro Sciences, USA | 30cm |

Data were analyzed by using Statically Analysis (SPSS 2016) and (ANOVA) analysis also constructed to test the significant differences between the compounds. Efficacy rate were calculated by using the formulas as following

$$\text{Efficacy (\%)} = \frac{\text{Pre spray count} - \text{Post spray count}}{\text{Pre spray count}} \times 100$$

## 3. Results and Discussion

Data in Table (2) indicated the population *of Thrips tabaci* during 2023 season and 2024. The populations start to appear in the 3rd week of January, the highest peak was recorded in the 4th week of April by 99.53 and 110.48 individual. The total average recorded 652.70 and 677.33 individual.

**Table (2). Population of *Thrips tabaci* Lindeman on onion plants during season 2023 and 2024**

| Month | week | Season 2023 | Season 2024 |
|---|---|---|---|
| | | Means ±SE /plant | Means ±SE /plant |
| January | 3 | 10.05 | 8.92 |
| | 4 | 16.31 | 12.90 |
| February | 1 | 12.97 | 24.03 |
| | 2 | 22.73 | 31.30 |
| | 3 | 22.5 | 34.25 |
| | 4 | 25.72 | 41.27 |
| March | 1 | 39.09 | 43.30 |
| | 2 | 43.2 | 45.30 |
| | 3 | 51.32 | 49.30 |
| | 4 | 57.49 | 61.55 |
| April | 1 | 72.32 | 65.73 |
| | 2 | 71.36 | 73.72 |
| | 3 | 97.16 | 86.23 |
| | 4 | 110.48 | 99.53 |
| May | 1 | 97.45 | 91.30 |
| | 2 | 100.61 | 80.23 |
| Total | 16 | 652.70 | 677.33 |

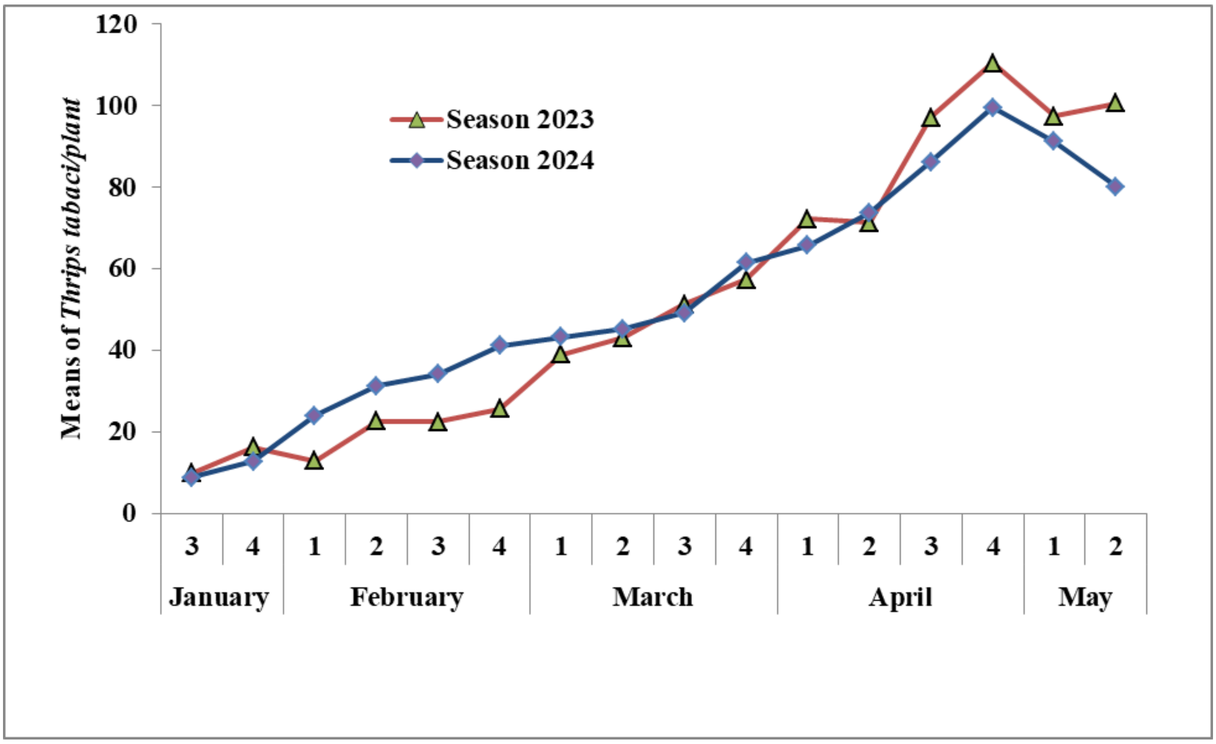


**Fig.(1). Population of *Thrips tabaci lindeman* on onion plants during season 2023 and 2024**

Data in figure (1) resulted that the population of *T.tabaci* during 2023 season and 2024 started in the 3rd week of January and incresed to reach to highest numbers in the 2nd week of Aprile to the 2nd week of May(harvesting time) . The highest peak recorded during season 2023 in the 4th week of April.

As conclusion the population of *T. tabaci* starts to increase by the 1st week of January and reach to the highest peak by the end of April during season 2023 and 2024 which were agree with **(Ullah *et al.*, 2010; Darwish, 2015 and Allam *et al*., 2023)**. Also the density number affected by thrips attacking from wheat in April.

The results shown in Table (3) indicated the means reduction of thrips population resulting from the use of compounds in the 2023 season. After 24 hours the highest reduction were recorded by Spintorame followed by Dinotefuran, Spirotetramat, Spinosad and Chlorophanpyar with significant between them by 97.32±1.36, 96.78±0.78, 95.84±1.30, and 93.91±0.92and 92.64±1.37%, respectively. Meanwhile, Abamectin +bifenthrin recorded the lowest reduction by 76.93. After the 3rd day the highest reduction was recorded by Spinosad followed by Spirotetramat and Chlorophanpyar recorded the highest reductions by 95.71±1.00, 95.21±1.22 and 93.12±1.02, respectively. After the 7th day the reduction rate decreased, the highest reduction recorded with chlorophanpyar followed by Spirotetramat, Spintorame and Spinosad by 83.52±1.74, 80.59±1.29, 80.52±2.82and 80.40±2.32respectively. After the 10th day, all compounds reduction was decreased, the highest reduction recorded by Chlorophanpyar by72.40±0.87. The overall average reduction recorded the highest reduction with using Chlorophanpyar followed by Spinosad, Spirotetramat and Spintorame by85.42±5.35, 84.54±4.46, 83.43±8.19 and 80.87±10.18respectively.

**Table (4). Means reductions rate of different compounds against *Thrips tabaci* Lindeman on onion in Kafr El-Sheikh region during season 2023**

| Compound | Pretreatment/25plant | Means Reduction ±SE %after | | | | Overall average |
|---|---|---|---|---|---|---|
| | | 24 hours | 3Day | 7day | 10 day | |
| Abamectin +bifenthrin | 1675 | 76.93$^{g}$ ±0.32 | 80.85$^{f}$ ±0.89 | 67.90$^{f}$ ±0.98 | 47.13$^{f}$ ±2.31 | 68.20$^{h}$ ±7.69 |
| Abamectin +Thiamethoxam | 1975 | 83.54$^{f}$ ±0.88 | 88.32$^{c}$ ±2.65 | 69.85$^{e}$ ±2.12 | 54.07$^{e}$ ±1.15 | 73.94$^{f}$ ±10.06 |
| Acetamiprid | 1875 | 87.12$^{e}$ ±0.59 | 84.28$^{e}$ ±0.6 | 77.03$^{c}$ ±3.27 | 45.88$^{g}$ ±0.58 | 73.58$^{g}$ ±11.65 |
| Chlorophanpyar | 1500 | 92.64$^{d}$ ±1.37 | 93.12$^{b}$ ±1.02 | 83.52$^{a}$ ±1.74 | 72.40$^{a}$ ±0.87 | 85.42$^{a}$ ±5.35 |
| Dinotefuran | 2200 | 96.78$^{ab}$ ±0.78 | 84.33$^{e}$ ±0.86 | 72.35$^{d}$ ±1.44 | 44.10$^{h}$ ±2.58 | 74.39$^{e}$ ±5.75 |
| Spinosad | 1450 | 93.91$^{c}$ ±0.92 | 95.71$^{a}$ ±1.00 | 80.40$^{b}$ ±2.32 | 68.12$^{b}$ ±0.82 | 84.54$^{b}$ ±4.46 |
| Spintorame | 1825 | 97.32$^{a}$ ±1.36 | 86.34$^{d}$ ±2.04 | 80.52$^{b}$ ±2.82 | 59.31$^{d}$ ±2.03 | 80.87$^{d}$ ±10.18 |
| Spirotetramat | 1575 | 95.84$^{b}$ ±1.30 | 95.21$^{a}$ ±1.22 | 80.59$^{b}$ ±1.29 | 62.07$^{c}$ ±0.58 | 83.43$^{c}$ ±8.19 |
| Control | 1925 | | | | | |

In a Colum, means followed by the same letter are not significantly at 5%

The results shown in Table (4) indicated the means reduction of thrips population resulting from the use of compounds in the 202٤ season. After 24 hours the highest reductions were recorded by dinotefuran spintorame followed by spintorame, spirotetramat, spinosad and chlorophanpyar with a significant between them by 97.03±1.12, 96.93±0.96, 95.84±0.82, and 93.91±1.62 and 92.64±1.00%, respectively. Meanwhile, abamectin +bifenthrin recorded the lowest reduction by 74.93±0.92, respectively. After the 3$^{rd}$ day spirotetramat followed by spintorame and spinosad recorded the highest reductions by 92.60±2.40, 89.45±1.28 and 89.15±1.00, respectively. After the 7$^{th}$ day the reduction rates decreased with all compound, the highest reduction recorded with chlorophanpyar followed by Spintorame and dinotefuran by 81.62±2.60, 81.43±2.30 and 78.08±2.30respectively. After the 10$^{th}$ day, all compounds reduction was decreased, the highest reduction recorded by chlorophanpyar by69.30±1.85. The overall average reduction resulted that the highest reduction recorded with using chlorophanpyar followed by spintorame, dinotefuran and spirotetramat by 82.79±4.60, 82.24±7.60, 79.59±7.54and 77.15±7.20, respectively.

As conclusion data in table (3and4) indicated that all compounds affected on *T. tabaci* and recorded a high reduction after 24 hour treatment, then the reduction rate decreased after 3days and recorded the lowest reduction after 10 days treatment which agree with **(Khozimy *et al*., 2021;Allam *et al.*, 2023 and Hassan *et al.*,2024** ).Also spintorame and Chlorophanpyar recorded the highest reduction after24 hours,3,7,10 and total reduction treatment as agree with **(Moretti *et al*. 2019, Wakil *et al.* 2023and Korai *et al*., 2024)**. *T. tabaci* recorded a resistance towards abamectin, dinotefuran, acetamiprid and bifenthrin after 7 to 10 days' treatment which agree with (**Asghar *et al.*, 2018; Adesanya *et al*., 2020 and Mohammad Falahzadah *et al.*, 2021**).

**Table (3). Means reductions rate of compounds against *Thrips tabaci Lindeman* on onion in Kafr El-Sheikh region during season 2024**

| Compound | Pretreatment/25 plant | Means Reduction ±SE %after | | | | Overall average |
|---|---|---|---|---|---|---|
| | | 24 hours | 3day | 7day | 10 day | |
| Abamectin + Thiamethoxam | 2075 | 83.54[g] ±1.08 | 88.32[d] ±0.76 | 77.86[b] ±1.12 | 54.76[ab] ±3.10 | 76.12[e] ±6.30 |
| Abamectin1.3%+ bifenthrin8.8% | 2225 | 74.93[h] ±0.92 | 73.88[f] ±1.98 | 67.83[f] ±1.85 | 36.56[b] ±3.40 | 63.30[g] ±8.52 |
| Acetamiprid | 2110 | 89.01[f] ±1.25 | 83.08[e] ±1.14 | 75.27[e] ±1.40 | 41.40[b] ±2.64 | 72.19[f] ±5.34 |
| Chlorophanpyar | 2175 | 92.64[e] ±1.00 | 87.61[d] ±0.82 | 81.62[a] ±2.60 | 69.30[a]±1.85 | 82.79[a] ±4.60 |
| Dinotefuran | 2250 | 97.03[a] ±1.12 | 87.57[d] ±2.10 | 78.08[b] ±2.30 | 55.67[ab] ±2.98 | 79.59[c] ±7.54 |
| Spinosad | 2425 | 93.91[d] ±1.62 | 89.15[c] ±1.00 | 75.83[d] ±1.93 | 40.06[b] ±6.2 | 74.74[e] ±5.10 |
| Spintorame | 2325 | 96.93[b] ±0.96 | 89.45[b] ±1.28 | 81.43[a] ±2.30 | 61.13[a] ±3.21 | 82.24[b] ±7.60 |
| Spirotetramat | 1975 | 95.84[c] ±0.82 | 92.60[a] ±2.40 | 77.95[c] ±2.45 | 42.22[b] ±2.98 | 77.15[d] ±7.20 |
| Control | 1875 | | | | | |

In a Colum, means followed by the same letter are not significantly at 5%

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