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**ABSTRACT:** Voracity and predation preference of the predatory beetle, *Stethorus gilvifrons* Mulsant, predatory bug, *Orius albidipenis* Reuter, predatory thrips, *Scolothrips longicornis* Priesner and predacious mites, *Phytoseiulus macropilis* Banks, *Phytoseiulus persimilis* Athias-Henriot, were reared on both egg and motile stages of the two-spotted spider mite, *Tetranychus urticae* Koch under laboratory conditions. The daily consumption of certain predators on the stages of the prey was observed. It prevailed that all studied predators consumed eggs more than motile stages of *T. urticae*. The daily grand mean of consumed eggs were: 41.83, 33.20, 35.87, 28.07 and 26.30 eggs, whereas the daily grand mean of consumed motile stages were: 35.37, 27.17, 31.03, 23.33 and 21.73 individuals for *S. gilvifrons*, *O. albidipenis*, *S. longicornis*, *P. macropilis* and *P. persimilis*, respectively. The predatory beetle, *S. gilvifrons* was the most voracious one compared to other predators. The predation preference was not significantly for *S. gilvifrons*, whereas, *O. albidipenis* and *S. longicornis* were preferred egg than motile stage, while predaceous mites, *P. macropilis* and *P. persimilis* were preferred motile stages than egg stage of spider mites. Results indicated that all studied predators are effective on *T. urticae* stages and insectal predators preferred egg stage, while predacious mites preferred motile stages of the two-spotted spider mite.

**Key words:** comparative voracity, predation preference, predators and spider mite

**INTRODUCTION**

The two-spotted spider mite, *Tetranychus urticae* Koch (Acari: Tetranychidae), is considered one of the most phytophagous species. It is a widespread agricultural pest, causing severe damage on most of vegetable and field crops. Spider mites are difficult to control with acaricides due to inaccessibility of lower leaf surfaces, short life cycle, high reproductive capacity, and ability to develop resistance to miticides (Naher *et al.*, 2005 and Ibrahim *et al.*, 2016). This species is adapted to various environmental conditions and is distributed worldwide, causing loss of quality and yield or the death of the plants by sucking out the contents from the leaf cells (Granham, 1985). The problem of spider mite increased when natural enemies are destroyed by applications of broad spectrum insecticide, applied against other pests. However, *T. urticae* has several important natural enemies that play important role in their ecology, including lady beetles (Coleoptera: Coccinellidae) (Mori *et al.*, 2005), predatory anthocorids (Heteroptera: Anthocoridae) (Cocuzza *et al.*, 1997), and predaceous mites (Acari: Phytoseiidae) (Gotoh *et al.*, 2004, Abdel-Aziz, 2016). In addition, acarophagous thrips (Thysanoptera: Aeolothripidae, Thripidae) are important natural enemies, and have various degrees of specialization on various mites (Pakyari *et al.*, 2011).

Acarophagous insects, including species of the *Stethorus* are obligate predators of spider mites (Rott and Ponsonby, 2000) and several species have been reported to be effective as biological control agents (Gotoh *et al.*, 2004; Mori *et al.* 2005). They are known to be voracious predators with all motile stages feeding on all prey stages, having high host-finding and high dispersal
potential, and long-living adults (Roy et al., 2005). Both larvae and adult beetles feed on all stages of spider mites. Adults can eat 50 mite eggs per day or 10 adults and can consume 240 spider mites during their developmental period. Among the predators used mainly in controlling spider mites is the specialist predatory thrips Scolothrips longicornis (Priesner), which consumes on all stages of spider mites (Kheradpir et al., 2013). The predatory mite Phytoseiulus persimilis Athias-Henriot has been studied extensively with respect to its potential for biological control of tetranychid mites on vegetables and ornamentals in greenhouses (Friese and Gilstrap, 1982, Van Lenteren and Woets, 1988, McMurtry and Croft, 1997). With the exception of larvae, all immature stages and adult of P. persimilis feed exclusively on tetranychid mite eggs, immatures, and adults (Chittenden and Saito, 2001); however, P. persimilis demonstrated a significant preference for eggs, it is a selective predator that is able to suppress spider mites rapidly, due to a high numerical and functional response (Blackwood et al., 2001). A bio control measure to be effective by predators, the knowledge on their feeding nature, feeding efficiency or voracity is very much essential (Haque, 2005; Parvin and Haque, 2008).

Measuring the voracity of predators is an important step in assessing the potential of biological control agents. Therefore, it is important to know the prey preference of the predator. Assessing preference by presenting the two prey species in equal numbers is an incomplete test because the predator response is strongly influenced by the ratio of the two preys presented. When tested with different prey ratios, a predator can show four types of response, i.e., (1) a constant preference for one prey species, (2) no preference, when the ratio of consumed prey is equal to the ratio of prey individuals in the environment, (3) a switching behavior, when the predator eats disproportionately more of the more abundant prey, and (4) an anti-switching behavior, when the predator eats disproportionately more of the less abundant prey (Chesson, 1984). Biological control is an alternative strategy for management of mites in agricultural systems. It is necessary to minimize the pollution hazards caused by huge amount of chemicals that have been used for management of various pests in different crops.

This study aimed to compare the voracity, predation preferences and efficiency of S. gilvifrons, O. albidipenis, S. longicornis, P. macropilis and P. persimilis towards the egg and motile stages of T. urticae.

MATERIALS AND METHODS

Maintenance of the colonies:
Culture of mite:
The two-spotted spider mite, Tetranychus urticae Koch (Acari: Tetranychidae) was collected from naturally infested Kidney bean, Phaseolus vulgaris (L.) fields in El-Hosainia plain district, El-Sharkia Governorate. A mass culture of the two-spotted spider mite was maintained on potted Kidney bean plants in the laboratory of Plant Protection Department at El-Hosainia Agricultural Research Station for more than six months. The method adopted by Guirguis et al. (1977) was employed for mass culture of the two-spotted spider mite.
Culture of predators:
The original samples of the predators; coccinellid predatory beetles, *Stethorus gilvifrons* (Mulsant) (Coleoptera: Coccinellidae), the predatory bugs, *Orius albidipenis* (Reuter) (Hemiptera: Anthocoridae), the predatory thrips, *Scolothrips longicornis* Priesner (Thysanoptera: Thripidae) and the phytoseiid predacious mites, *Phytoseiulus macropilis* (Banks), *Phytoseiulus persimilis* (Athias-Henriot) (Acari: Phytoseiidae), used in this experiment were collected from Castor bean plants, *Ricinus communis* in El-Hosainia plain district, where they appeared grown naturally in the area and brought to the laboratory. Later they were studied and identified at the laboratories of the Plant Protection Research Institute, ARC of Egypt.

The method adopted by Sarhan *et al.* (1989) was followed for rearing the predatory beetles; *S. gilvifrons*, the predatory bugs; *O. albidipenis* was reared according to the method of Isenhour and Yeargan (1981), the predatory thrips; *S. longicornis* was reared according to the method of Gotoh *et al.* (2004) and the method adopted by Heikal and Ali (1996) was employed for rearing the phytoseiid predacious mites; *P. macropilis* and *P. persimilis*.

Voracity of certain predators:
Several pilot experiments were made with the predator to confirm their predation on the two-spotted spider mite. After being confirmed of their predation on mites they were released on potted bean plants that were infested earlier by the two-spotted spider mite. They were maintained for six months before testing their efficiency. Voracity of predators on egg and motile stage of the two-spotted spider mite was conducted in laboratory.

The experiments were conducted as follow:
1. In the first experiment, testing the voracity of *S. gilvifrons* on motile stage and egg of *T. urticae*. The test consisted of two treatments: one Adult of *S. gilvifrons* with 60 motile stage of spider mites and one adult of *S. gilvifrons* with 60 egg of spider mites.
2. In the second experiment, testing the voracity of *O. albidipenis* on motile stage and egg of *T. urticae*. The test consisted of two treatments: one adult of *O. albidipenis* with 60 motile stage of spider mites and one adult of *O. albidipenis* with 60 egg of spider mites.
3. In the third experiment, testing the voracity of *S. longicornis* on motile stage and egg of *T. urticae*. The test consisted of two treatments: one Adult of *S. longicornis* with 60 motile stage of spider mites and one adult of *S. longicornis* with 60 egg of spider mites.
4. In the fourth experiment, testing the voracity of *P. macropilis* on motile stage and egg of *T. urticae*. The test consisted of two treatments: one Adult of *P. macropilis* with 60 motile stage of spider mites and one adult of *P. macropilis* with 60 egg of spider mites.
5. In the fifth experiment, testing the voracity of *P. persimilis* on motile stage and egg of *T. urticae*. The test consisted of two treatments: one Adult of *P. persimilis* with 60 motile stage of spider mites and one adult of *P. persimilis* with 60 egg of spider mites.
6. In the sixth experiment, the control treatment without any predators containing only the prey (motile stage and egg) of *T. urticae*. 
All the previously mentioned experiments were carried out based on three replicates.

The experiments were carried out on Kidney bean plants grown in a laboratory and cleared of all arthropods before the experiments. The equally-sized and undamaged of six plant leaves were prepared for each experiment. Plant leaves were placed on cotton bed in petri dish (2 cm high with a 9 cm diameter) facing under surface upward. Each species of predator having three replications were conducted simultaneously for each prey.

Sixty individuals of each prey were transferred on each leaf in each petri dish. The individuals were transferred to new leaves very carefully with the help of fine hairbrush. The tested predators were fed and then starved for 24 hrs. before the experiments. One predator was released per each leaf which containing preys. The Petri dishes were covered by muslin to avoid excessive moisture, then placed in an incubator (25°C, 65% R.H., L14:D10) during 24 hrs. The cotton bed was kept wet by soaking with water twice daily to maintain their freshness. Thirty six Petri dishes were used for all experiments, three replicates for each predator on each prey, including the replicates of control treatment. After 24 hours, the Petri dishes were placed in a refrigerator for 15 min and checked. The unconsumed preys were counted with a binocular microscope according to Sabelis (1985). The number of prey consumed per days by an individual of predators was recorded. After counting each consumption sufficient number of preys was added to the leaves to maintain the prey's number. Leaves were changed when necessary considering the freshness of them. The experiments were continued for three consecutive days.

Estimation of mite consumption:

The predation of each predator was conducted individually on an excised of kidney bean leaf. Analyses were carried out on the data adjusted with the control treatments using the following equation:

$$C = C_1 - T$$

Where $C$ = number of preys consumed after 24 hr., $C_1$ = number of preys not found in the test, and $T$ = number of preys not found in the control treatment.

Predation efficiency and prey preferences:

Five treatments, corresponding to five different ratios of prey, were presented to each tested predator, enclosed in an experimental set up as previously described. Each replicate contained the following treatments: one predator with 10 motile stage and 50 egg of spider mites, one predator with 20 motile stage and 40 egg of spider mites, one predator with 30 motile stage and 30 egg of spider mites, one predator with 40 motile stage and 20 egg of spider mites and one predator with 50 motile stage and 10 eggs of spider mites. For prey preferences, the dependent variable was the consumed spider mite ratio, i.e., the number of spider mites consumed over the total number of prey consumed. For the five treatments (egg/ motile: 10/50, 20/40, 30/30, 40/20, 50/10), the consumed spider mite ratios were compared to the proposed spider mite ratios. Confidence intervals of the mean consumed spider mite ratios were calculated at $p = 0.05$. The proposed spider mite ratio was then compared to the
confidence interval of the corresponding consumed spider mite ratio. The mean consumed spider mite ratios were compared with a two-way ANOVA (prey ratio and predator species) using Manly’s preference index (Manly et al., 1972). The Manly’s preference index was the method that took into account the prey densities depletion by predation during experiments. Reviewing the literature on feeding preference. Sherratt and Harvey (1993) concluded accordingly Manly’s preference index:

\[ a = \frac{r_1/n_1}{r_1/n_1 + r_2/n_2} \]

Where \( a \) = feeding preference, \( r_1 \) = proportion of prey type 1 in the predators diet (where \( r_1 = \) egg of mite), \( n_1 \) = proportion of prey type 1 available (0.20, 0.50, 1.00, 1.50 and 5.00), and \( r_2 \) = proportion of prey type 2 in the predator diet (here \( r_2 = \) motile of mite), \( n_2 \) = proportion of prey type 2 available (5.00, 1.50, 1.00, 0.50 and 0.20). The predation efficiency was estimated from the total number of prey consumed by the predator for each initial ratio.

RESULTS AND DISCUSSION

Voracity of certain predators:
The daily means consumption of egg and motile stage of \( T. urticae \) by different predators for three consecutive days are presented in Table (1). During all days of the tested periods the predators consumed more egg than motile stage and vary significantly during different days except few exceptions.

The predation of \( S. gilvifrons \) on egg and motile stage of \( T. urticae \) differed significantly among different days. The means of consumption of \( S. gilvifrons \) were 41.83 and 35.37 individuals of egg and motile stage of \( T. urticae \), respectively.

The daily means consumption of \( O. albidipenis \) on \( T. urticae \) varies significantly among the different days. The predator consumed more egg than motile stage of prey. The means of consumption of \( O. albidipenis \) were 33.20 and 27.17 individuals of egg and motile stage of \( T. urticae \), respectively.

Table (1). The daily means consumption of egg and motile stage of \( T. urticae \) by certain predators

<table>
<thead>
<tr>
<th>Tested predators</th>
<th>Prey</th>
<th>1st day</th>
<th>2nd day</th>
<th>3rd day</th>
<th>*Means consumption of preys by certain predators (C = C1-T)</th>
<th>Grand mean</th>
<th>Comparative voracity</th>
<th>LSD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( S. gilvifrons )</td>
<td>egg</td>
<td>43.5( ^a )</td>
<td>40.3( ^b )</td>
<td>41.7( ^c )</td>
<td>41.83</td>
<td>100</td>
<td>1.32</td>
<td></td>
</tr>
<tr>
<td></td>
<td>motile</td>
<td>36.2( ^a )</td>
<td>34.6( ^b )</td>
<td>35.3( ^c )</td>
<td>35.37</td>
<td>100</td>
<td>0.63</td>
<td></td>
</tr>
<tr>
<td>( O. albidipenis )</td>
<td>egg</td>
<td>34.9( ^a )</td>
<td>31.5( ^b )</td>
<td>33.2( ^c )</td>
<td>33.20</td>
<td>79.4</td>
<td>1.51</td>
<td></td>
</tr>
<tr>
<td></td>
<td>motile</td>
<td>27.4( ^a )</td>
<td>25.5( ^b )</td>
<td>28.6( ^c )</td>
<td>27.17</td>
<td>76.8</td>
<td>1.16</td>
<td></td>
</tr>
<tr>
<td>( S. longicornis )</td>
<td>egg</td>
<td>37.5( ^a )</td>
<td>35.4( ^b )</td>
<td>34.7( ^c )</td>
<td>35.87</td>
<td>85.8</td>
<td>0.65</td>
<td></td>
</tr>
<tr>
<td></td>
<td>motile</td>
<td>31.6( ^a )</td>
<td>30.2( ^ab )</td>
<td>31.3( ^b )</td>
<td>31.03</td>
<td>87.7</td>
<td>1.41</td>
<td></td>
</tr>
<tr>
<td>( P. macropilis )</td>
<td>egg</td>
<td>30.5( ^a )</td>
<td>26.3( ^b )</td>
<td>27.4( ^c )</td>
<td>28.07</td>
<td>67.1</td>
<td>2.73</td>
<td></td>
</tr>
<tr>
<td></td>
<td>motile</td>
<td>24.7( ^a )</td>
<td>21.5( ^b )</td>
<td>23.8( ^c )</td>
<td>23.33</td>
<td>65.9</td>
<td>0.81</td>
<td></td>
</tr>
<tr>
<td>( P. persimilis )</td>
<td>egg</td>
<td>28.4( ^a )</td>
<td>26.2( ^b )</td>
<td>24.3( ^c )</td>
<td>26.30</td>
<td>62.9</td>
<td>1.85</td>
<td></td>
</tr>
<tr>
<td></td>
<td>motile</td>
<td>23.1( ^a )</td>
<td>20.4( ^bc )</td>
<td>21.7( ^b )</td>
<td>21.73</td>
<td>61.4</td>
<td>1.31</td>
<td></td>
</tr>
</tbody>
</table>

LSD 1.13

*Means within rows followed by the same letters are not significantly different at P=0.05
The daily means consumption of *S. longicornis* on *T. urticae* varies significantly among the different days except predation of motile. The predator consumed more egg than motile stage of prey. The means of consumption of *S. longicornis* were 35.87 and 31.03 individuals of egg and motile stage of *T. urticae*, respectively.

The daily means consumption of *P. macropilis* on *T. urticae* varies significantly among the different days except predation of motile. The predator consumed more egg than adult stages of prey. The means of consumption of *P. macropilis* were 28.07 and 23.33 individuals of egg and motile stage of *T. urticae*, respectively.

The daily means consumption of *P. persimilis* on *T. urticae* varies significantly among the different days. The predator consumed more egg than motile stage of prey. The means of consumption of *P. persimilis* were 26.30 and 21.73 individuals of egg and motile stage of *T. urticae*, respectively.

In most of the cases daily consumption varies significantly among different days, predation rate of different predators on egg and motile stage of *T. urticae* differed remarkably. The voracity of all tested predators to egg and motile stage of *T. urticae* in first day of experiments are more than other days that may be due to its starved in the day before.

**Predation efficiency:**

The total number of prey consumed differed significantly according to predator’s species and prey ratios (Table 2). The values of consumed egg ranged from 6.4 to 36.1 individuals for a ratio of 10 egg/50 motile and for ratio of 50 egg/10 motile mites, whereas values of consumed motile ranged from 27.5 to 5.8 individuals for a ratio of 10 egg/50 motile and for ratio of 50 egg/10 motile mite for the predator *S. gilvifrons*, respectively.

**Table (2). Mean numbers of prey consumed in 24 hrs by 5 predators for different ratios of egg/ motile of spider mite, *T. urticae***

<table>
<thead>
<tr>
<th>Proposed egg/motile of spider mite</th>
<th><em>S. gilvifrons</em></th>
<th><em>O. albidipenis</em></th>
<th><em>S. longicornis</em></th>
<th><em>P. macropilis</em></th>
<th><em>P. persimilis</em></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>egg</td>
<td>motile</td>
<td>egg</td>
<td>motile</td>
<td>egg</td>
</tr>
<tr>
<td>10/50</td>
<td>6.4</td>
<td>35.6</td>
<td>6.1</td>
<td>35.5</td>
<td>7.3</td>
</tr>
<tr>
<td>20/40</td>
<td>12.5</td>
<td>31.4</td>
<td>13.5</td>
<td>24.6</td>
<td>14.5</td>
</tr>
<tr>
<td>30/30</td>
<td>23.1</td>
<td>22.5</td>
<td>23.7</td>
<td>21.3</td>
<td>22.1</td>
</tr>
<tr>
<td>40/20</td>
<td>30.7</td>
<td>13.1</td>
<td>31.5</td>
<td>10.4</td>
<td>31.7</td>
</tr>
<tr>
<td>50/10</td>
<td>36.1</td>
<td>5.8</td>
<td>32.3</td>
<td>5.7</td>
<td>37.2</td>
</tr>
<tr>
<td>Total</td>
<td>108.8</td>
<td>108.4</td>
<td>107.1</td>
<td>89.5</td>
<td>112.8</td>
</tr>
<tr>
<td>Consumed egg+motile</td>
<td>43.44</td>
<td>39.32</td>
<td>41.48</td>
<td>29.18</td>
<td>24.74</td>
</tr>
</tbody>
</table>

*Means within columns followed by the same letters are not significantly different at P<0.05*

The values of consumed egg ranged from 6.1 to 32.3 egg for a ratio of 10 egg/50 motile and for ratio of 50 egg/10 motile mites, whereas values of consumed motile ranged from 27.5 to 5.7 individuals for a ratio of 10 egg/50 motile.
motile and for ratio of 50 egg/10 motile mite for the predator *O. albidipenis*, respectively.

The values of consumed egg ranged from 7.3 to 37.2 individuals for a ratio of 10 egg/50 motile and for ratio of 50 egg/10 motile mites, whereas values of consumed motile ranged from 30.7 to 4.7 individuals for a ratio of 10 egg/50 motile and for ratio of 50 egg/10 motile mite for the predator *S. longicornis*, respectively. The values of consumed egg ranged from 4.5 to 25.3 individuals for a ratio of 10 egg/50 motile and for ratio of 50 egg/10 motile mites, whereas values of consumed motile ranged from 25.1 to 5.2 individuals for a ratio of 10 egg/50 motile and for ratio of 50 egg/10 motile mite for the predator *P. macropilis*, respectively. The values of consumed egg ranged from 3.2 to 23.1 individuals for a ratio of 10 egg/50 motile and for ratio of 50 egg/10 motile mites, whereas values of consumed motile ranged from 21.5 to 3.2 individuals for a ratio of 10 egg/50 motile and for ratio of 50 egg/10 motile mite for the predator *P. persimilis*, respectively. The mean numbers of total consumed (egg plus motile) were 43.44, 39.32, 41.48, 29.18 and 24.74 individuals for *S. gilvifrons*, *O. albidipenis*, *S. longicornis*, *P. macropilis* and *P. persimilis*, respectively (Table 2). There were significant differences found between these extreme values. The total numbers of adults consumed decreased gradually as the proportion of egg increased. Also, total numbers of egg consumed decreased gradually as the proportion of motile mites increased.

**Prey preference:**

The Manly's preference index for different ratios of egg and motile of *T. urticae* over total prey proposed (egg plus motile of prey) for certain predators shown in Table (3). The means of preference index was not significantly for *S. gilvifrons*. While, *O. albidipenis* and *S. longicornis* more preferring egg than motile of spider mite with preference index (1.13, 1.17) for egg and (0.87, 0.83) for motile of spider mite, respectively. Whereas, the phytoseiid predaceous mites, *P. macropilis* and *P. persimilis* more preferring motile than egg of spider mites with preference index (1.17, 1.13) for motile and (0.83, 0.87) for egg of spider mite, respectively.

**Table (3). Manly's preference index for different ratios of egg and motile of *T. urticae* over total prey proposed (eggs plus motile of prey) for certain predators**

<table>
<thead>
<tr>
<th>Proposed egg/motile of spider mite</th>
<th><em>Manly’s preference index a = (r1/n1) / (r1/n1 + r2/n2)</em></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><em>S. gilvifrons</em></td>
</tr>
<tr>
<td>egg/motile</td>
<td>egg</td>
</tr>
<tr>
<td>10/50</td>
<td>0.15</td>
</tr>
<tr>
<td>20/40</td>
<td>0.28</td>
</tr>
<tr>
<td>30/30</td>
<td>0.51</td>
</tr>
<tr>
<td>40/20</td>
<td>0.70</td>
</tr>
<tr>
<td>50/10</td>
<td>0.86</td>
</tr>
<tr>
<td>Means</td>
<td>0.50</td>
</tr>
<tr>
<td>Preferences index</td>
<td>1.00</td>
</tr>
</tbody>
</table>

*Means within columns followed by the same letters are not significantly different at P<0.05"
The obtained results cleared that the predatory beetles, *S. gilvifrons* is more voracious than other predators; the predatory bugs, *O. albidipenis*, the predatory thrips *S. longicornis* and the predaceous mites, *P. macropilis* and *P. persimilis*.

Also, the predators; *O. albidipenis* and *S. longicornis* are attacked egg more than motile stage of *T. urticae*, while, the predaceous mites, *P. macropilis* and *P. persimilis* are attacked motile stage more than egg of *T. urticae*, and vice versa. Rott and Ponsonby (2000) stated that *S. punctillum* is a voracious predator and is able to prevent outbreaks of mites, which may not be controlled by regular releases of predatory mites.

They also recommended that *S. punctillum* is considered a promising biological control agent against *T. urticae* in glasshouses. Ragkou et al. (2004) conducted laboratory experiments on daily consumption and predation rate of different *S. punctillum* instars feeding on *T. urticae* and reported that the first instar larva consumed 16.67, 18.56, 19.56 and 14.33 egg, larva, nymph and adult respectively of the prey *T. urticae*. Shih (1999) found that the early release of *S. sexmaculatus* suppressed the two-spotted spider mite population effectively in beans. Haque (2005) observed that an adult *S. sexmaculatus* consumed 78.80 adult, 38.47 immature and 114.33 egg of the two-spotted spider mite per day separately. Badriea et al. (2011) recorded that the population predates power values (PPP) of *S. gilvifrons*, *O. albidipenis*, *P. macropilis* and *P. persimilis* were 30.22, 16.78, 7.75 and 11.5 individuals of the two-spotted spider mite *T. urticae* individual predator/day, respectively. Latifian (2012) found that adult of *S. gilvifrons* consumed significantly more mites than larvae, the adult consumed 33.67 and 21.33, whereas predator larvae consumed 32.33 and 19.67 adult and larvae of 40 spider mites, respectively in 24 hrs. Parvin et al. (2010) prevailed that *S. sexmaculatus*, *P. persimilis* and *S. punctillum* consumed more egg and immature than adult stages of the two-spotted spider mite. Food selection and preference could be influenced by a previous exposure to one food type in phytophagous species. Therefore, prey acceptance and prey suitability are two important factors in prey selection (Papaj and Prokopy, 1989).

The insectal predators: *S. gilvifrons*, *O. albidipenis*, *S. longicornis*, preferred egg stage of the two-spotted spider mite while *P. macropilis* and *P. persimilis* are much predacious and effectiveness predators on *T. urticae* motile stages. These results are necessary for the recommendation of the biological control agents in the agro ecosystems open field and greenhouses.

REFERENCES


Tetranychus urticae Koch (Acari: Tetranychidae)

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تم دراسة الشراهة والإفضاء الإفتراسي لبعض المفترسات على الأكاروس العنكبوتي ذو البقعتين تحت الظروف المعملية. وتم حساب متوسط الاستهلاك اليومي من الفريسة.

أوضح النتائج أن متوسط استهلاك المفترسات المختبرة للبيض كان أعلى مقارنة باستهلاكها من الأقراد المتغيرة. كما وجد أن المفترس S. gilvifrons كان أكثر الفريسة شراهة في استهلاك الفريسة حيث كان متوسط استهلاك البيض خلال ثلاثة أيام هو 41، 43، 35، 26 بيضة ، بينما للأطوار المتحركة كان S. gilvifrons، O. albidipenis، S. longicornis، P. macropilis، P. persimilis على الترتيب.

كما أوضحت النتائج أيضا أنه لاوجد فرق معنوي في الفضيال الذئب للهورس S. gilvifrons والأطوار المتحركة بينما وجد أن المفترس O. albidipenis والهورس S. longicornis، P. macropilis، P. persimilis أثر أكبر في استهلاك طور البيض مقارنة بالأطوار المتحركة.

توضح الدراسة أن المفترسات الحشرية تفضل طور البيض أما المفترسات الأكاروسية تفضل الأطوار المتحركة وهذا يجب أن يؤخذ في الاعتبار عند وضع برامج المكافحة الحيوية للأكاروس العنكبوتي ذو البقعتين.