

POPULATION FLUCTUATIONS OF THE TWO SPOTTED SPIDER MITE, *TETRANYCHUS ARABICUS* ATTIAH INFESTING DIFFERENT CUCURBIT VEGETABLES AT DIFFERENT GOVERNORATES

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Abstract

Four experiments were conducted in the four governorates; Giza, Kalubia, Menofia and Fayoum to evaluate the fluctuations in the two-spotted spider mites, *Tetranychus arabicus* Attiah population on the four cucurbits, i.e. squash, cucumber, cantaloupe, and watermelon.

The four cucurbit vegetables were exposed to mite infestation with different degrees according to localities and cucurbit vegetables. In all governorates, cucumber and cantaloupe were the most favourable hosts as infested with the highest mite numbers, while watermelon and squash came after in this respect.

As regards to locations, Giza and Kalubia had the highest infestations, while Fayoum had the lowest level.

INTRODUCTION

Cucurbits (watermelon, *Citrullus vulgaris* L., cucumber, *Cucumis sativus* L., squash, *Cucurbita pepo* L. and cantaloupe, *Cucumis melo* L.) are considered important vegetable for human consumption all over the world because of its nutritional value. Moreover, squash and cucumber are found along the year months as popular vegetable crops.

The two spotted spider mite, *Tetranychus arabicus* Attiah is one of the most important pests of cucurbits causing serious damage to plants and reducing yield and quality of fruits (Sayed, 1946; El-Atrouzy, 1968; Abdel -Salam et al., 1982; Mhammad, 1987; Masaki, 1991).

The announcement for minimizing the use of chemical pesticides was increased during the last few years to avoid their hazardous effect to our environmental elements and to human himself. The new approach in this respect is to use all elements which can serve as agents in the control which so-called Integrated Pest Control (IPM). The first step in this concern is to determine and monitor the mite population

and its fluctuations in different locations to acknowledge its distribution on different hosts at different localities.

The present work aims to study the incidence and fluctuation in mite populations on the four important cucurbit vegetables in Giza, Menofia, Kalubia and Fayoum Governorates.

MATERIALS AND METHODS

To determine differences in *T.arabicus* population levels on the four cucurbit vegetables in some different localities in Egypt, four experiments were conducted at Kalubia, Menofia (Lower Egypt), Giza and Fayoum (Middle Egypt) during 1996 summer growing season.

The four cucurbits were planted on March 25 at Kalubia and Giza and on March 26 at Menofia and Fayoum Governorates. An area of about half feddan in each governorate, was chosen and divided into 16 plots. The four vegetables were distributed in a complete randomized blocks with four replicates each. Different agricultural practices were carried out and no chemical pest control was done.

Samples of cucurbit leaves were randomly collected every week after three weeks from planting and continued for three months. Every sample consisted of 40 leaves from each vegetable (10 leaves from each plot) representing the three levels of the plant. Samples were then sent to the laboratory for examination of one square inch from each leaf surface. All moving stages were counted and the mean per one square inch were recorded.

RESULTS AND DISCUSSION

Data in Tables 1, 2, 3 and 4 show the difference in mite populations on the four cucurbit vegetables at the four governorates.

At Giza Governorate, the infestation had a good start at mid April with means of 7.2, 9.8, 11.1 and 21.1 individuals/square inch of watermelon, squash, cucumber and cantaloupe leaves, respectively. The infestation then increased gradually to reach its highest levels in May with averages 53.7, 74.3 and 79.4 individuals/leaf of the aforementioned hosts, respectively. The mite populations then decreased in June. However, it is shown from Table 1 that cucumber had the highest infestation level followed by cantaloupe then both squash and melon, with population total average of 48.5, 42.6, 38.4 and 37.1 individuals/square inch, respectively.

Table 1. Population of the two-spotted spider mite, *T.arabicus* on different cucurbit at Giza Governorate, during summer plantation of 1996 growing season.

| Date of inspection | Average number of mite moving stages/one square inch | | | | Average |
|--------------------|--|-------------|------------|----------|---------|
| | Squash | Water-melon | Cantaloupe | Cucumber | |
| April, 15 | 9.8 | 7.2 | 21.1 | 11.1 | 12.30 |
| 22 | 19.7 | 12.9 | 34.6 | 23.6 | 22.70 |
| 29 | 36.9 | 21.6 | 57.8 | 41.7 | 39.50 |
| May 6 | 74.3 | 39.7 | 79.6 | 74.3 | 66.98 |
| 13 | 68.2 | 51.3 | 81.3 | 61.2 | 65.50 |
| 20 | 71.4 | 53.7 | 47.6 | 65.8 | 59.63 |
| 27 | 46.3 | 49.3 | 31.9 | 79.4 | 51.73 |
| June, 3 | 48.9 | 48.7 | 23.7 | 65.3 | 46.65 |
| 10 | 47.6 | 51.6 | 35.6 | 54.9 | 47.43 |
| 17 | 24.6 | 47.1 | 46.8 | 48.6 | 41.78 |
| 24 | 11.2 | 36.8 | 31.7 | 32.9 | 28.15 |
| July, 1 | 1.9 | 25.1 | 19.8 | 23.7 | 17.63 |
| Total | 460.8 | 445.0 | 511.5 | 582.5 | |
| average | 38.4 | 37.1 | 42.6 | 48.5 | |

L.S.D. at 5% for:

Crops (C) = 0.32

Dates (D) = 0.52

C X D = 1.03

At Fayoum Governorate, data in Table 2 indicate that the infestation started also at mid April but with relatively low populations except on cantaloupe and cucumber which had moderate population (2.3, 2.8, 9.6 and 10.8 individuals/leaf square inch of squash, watermelon, cantaloupe and cucumber, respectively). The infestation increased gradually on all host plants to reach its highest levels in June and early July at the end of the growing season of all the tested crops. On squash the peak occurred at June, 25th with an average of 32.6 individuals/square inch; while on watermelon on July, 2nd with an average of 44.4 individuals/square inch; on cantaloupe, on June 25th and July 2nd with total averages of 46.8 and 47.3 individuals/leaf square inch, respectively; on cucumber, the peak occurred during the last three weeks of the season on June, 18th & 28th and July, 2nd with averages of 58.9, 59.4 and 68.3 individuals/leaf square inch, respectively. Cucumber had the highest infestation level followed in a descending order by cantaloupe, watermelon and cucumber with population total average 30.9, 26.2, 21.4 & 16.0 individuals/leaf square inch, respectively.

At Kalubia governorate, data in Table 3 show that mite population started on the 2nd week of April with moderate infestation on watermelon, squash and cucumber with averages of 7.8, 10.3 and 13.5 individuals/leaf square inch, respectively, and high infestation on cantaloupe, 31.2 individuals/leaf square inch. The population then increased to reach its highest numbers on squash and cantaloupe on May, 6th with averages of 63.5 and 75.3 individuals/leaf square inch, respectively, and on May, 20th on watermelon and June, 3rd on squash with an average of 50.6 and 72.3 individuals/leaf square inch, respectively. It is obvious that high populations occurred at the first two weeks of May on squash and cantaloupe and later on the other two vegetables.

At Menofia Governorate, data in Table 4 indicate that the infestation began with low to moderate numbers with averages of 2.3, 3.2, 8.4 and 9.3 individuals/leaf square inch of watermelon, squash, cantaloupe and cucumber, respectively. The number increased gradually in the following inspections to reach its maximum around the end of the growing seasons; at the last week of June and the first week of July. The maximum occurred on squash on June, 25th and on watermelon, cantaloupe and cucumber on July, 2nd with averages of 52.9, 52.8 and 73.6 individuals/leaf square inch, respectively. Here again, cucumber followed by cantaloupe had the highest infestations.

As regards for the fluctuations on mite populations on the four cucurbit vege-

tables at the different governorates, data in Table 1, 2, 3, and 4 show that Giza harboured higher infestation with *T.arabicus* mite on the four cucurbit hosts comparable with the other three governorates with averages of 48.54, 42.63, 38.40 and 37.08 individuals/ square inch of cucumber, cantaloupe, squash and watermelon leaves, respectively. Kalubia Governorate came in the second rank in this respect with averages of 45.9, 39.2, 35.6 and 31.7 individuals/square inch of cucumber, cantaloupe, watermelon and squash leaves, respectively. Menofia Governorate came the third, with averages of 32.7, 28.5, 24.2 and 18.7 individuals/leaf square inch of aforementioned cucurbits, respectively. Finally, Fayoum Governorate came in the fourth rank with averages of 30.88, 26.20, 21.42 and 15.96 individuals/square inch, respectively.

From the above-mentioned results, it may be concluded that all cucurbit vegetables are suitable hosts for the two spotted spider mite, *T.arabicus* in the four governorates with different degrees, and the hosts differed in their susceptibility to mite infestation. In all governorates, cucumber and cantaloupe were the most favourable hosts for mite infestation, while watermelon and squash came later, then we can recommend to avoid cultivation of cucumber and cantaloupe on the location with high mite population. As regard to governorates, Fayoum was the least one, followed by Menofia for their mite occurrence and then we can recommend to choose it in any extension for cucurbits cultivation in the future and avoid extension at Giza and Kalubia Governorates.

These results agreed with the previous results of Al-Atrouzy (1968), Dhooria and Sagar (1975), Mohammad (1987) and Perring (1987) who stated that there were a relative difference between host plants and localities in their availability to infestation with mites.

Table 2. Population of the two-spotted spider mite, *T.arabicus* on different cucurbit vegetables at Fayoum Governorate, during summer plantation of 1996 growing season.

| Date of inspection | Average number of mite moving stages/one square inch | | | | Average |
|--------------------|--|-------------|-------------|-----------|---------|
| | Squash | Water-melon | Cantal-oupe | Cucum-ber | |
| April, 16 | 2.3 | 2.8 | 9.6 | 10.8 | 6.4 |
| 23 | 6.7 | 6.5 | 11.8 | 11.9 | 9.2 |
| 30 | 13.6 | 7.4 | 13.4 | 13.6 | 12.0 |
| May 7 | 13.8 | 10.4 | 16.1 | 14.5 | 13.7 |
| 14 | 14.9 | 16.5 | 18.5 | 19.3 | 17.3 |
| 21 | 16.4 | 18.5 | 23.8 | 23.9 | 20.7 |
| 28 | 18.5 | 21.6 | 24.4 | 25.0 | 22.4 |
| June, 4 | 19.6 | 25.6 | 30.8 | 28.4 | 26.1 |
| 11 | 20.4 | 30.3 | 35.2 | 36.6 | 30.6 |
| 18 | 21.2 | 31.5 | 36.7 | 58.9 | 37.1 |
| 25 | 32.6 | 36.5 | 46.3 | 59.4 | 43.8 |
| July, 2 | 11.5 | 44.4 | 47.3 | 68.3 | 42.9 |
| Total | 191.5 | 257.0 | 314.4 | 370.6 | |
| average | 16.00 | 21.4 | 26.2 | 30.9 | |

L.S.D. at 5% for:

Crops (C) = 0.31

Dates (D) = 0.43

C X D = 0.86

Table 3. Population of the two-spotted spider mite, *T.arabicus* on different cucrbit vegetables at Kalubia Governorate, during summer plantation of 1996 growing season.

| Date of inspection | Average number of mite moving stages/one square inch | | | | Average |
|--------------------|--|-------------|-------------|-----------|---------|
| | Squash | Water-melon | Cantal-oupe | Cucum-ber | |
| April, 15 | 10.3 | 7.8 | 31.2 | 13.5 | 15.7 |
| 22 | 23.5 | 13.3 | 46.7 | 38.0 | 30.4 |
| 29 | 45.7 | 23.2 | 52.5 | 39.3 | 39.5 |
| May 6 | 63.5 | 45.0 | 75.3 | 62.5 | 62.0 |
| 13 | 52.8 | 49.4 | 68.6 | 48.9 | 55.0 |
| 20 | 49.7 | 50.6 | 43.4 | 61.1 | 51.2 |
| 27 | 45.2 | 48.2 | 27.5 | 67.2 | 47.0 |
| June, 3 | 38.5 | 46.4 | 12.4 | 72.3 | 42.4 |
| 10 | 47.4 | 45.2 | 21.8 | 62.6 | 44.2 |
| 17 | 9.3 | 41.3 | 40.3 | 46.1 | 34.2 |
| 24 | 9.8 | 35.7 | 36.6 | 27.4 | 27.4 |
| July, 1 | 4.2 | 21.6 | 14.4 | 12.3 | 13.1 |
| Total | 379.9 | 427.7 | 470.7 | 551.2 | |
| average | 31.7 | 35.6 | 39.2 | 45.9 | |

L.S.D. at 5% for:

Crops (C) = 0.48

Dates (D) = 0.90

C X D = 1.80

Table 4. Population of the two-spotted spider mite, *T.arabicus* on different cucurbit vegetables at Menofia Governorate, during summer plantation of 1996 growing season.

| Date of inspection | Average number of mite moving stages/one square inch | | | | Average |
|--------------------|--|-------------|-------------|-----------|---------|
| | Squash | Water-melon | Cantal-oupe | Cucum-ber | |
| April, 16 | 3.2 | 2.3 | 8.4 | 9.3 | 5.8 |
| 23 | 7.4 | 7.4 | 12.6 | 12.6 | 10.0 |
| 30 | 12.8 | 9.2 | 14.2 | 14.7 | 12.7 |
| May 7 | 14.3 | 11.6 | 17.3 | 16.2 | 14.9 |
| 14 | 15.2 | 18.7 | 19.7 | 21.3 | 18.7 |
| 21 | 17.3 | 23.1 | 25.1 | 25.8 | 22.8 |
| 28 | 19.6 | 26.5 | 28.4 | 28.2 | 25.7 |
| June, 4 | 21.3 | 29.4 | 33.5 | 31.7 | 29.0 |
| 11 | 22.8 | 32.7 | 39.2 | 39.6 | 33.6 |
| 18 | 24.3 | 34.8 | 41.7 | 57.4 | 39.6 |
| 25 | 37.5 | 41.9 | 48.6 | 61.9 | 47.5 |
| July, 2 | 28.1 | 52.9 | 52.8 | 73.6 | 51.9 |
| Total | 224.8 | 290.5 | 341.5 | 392.3 | |
| average | 18.7 | 24.2 | 28.5 | 32.7 | |

L.S.D. at 5% for:

Crops (C) = 0.48

Dates (D) = 0.72

C X D = 1.43

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تقلبات تعداد العنكبوت الأحمر العادى على القرعيات الهامة فى بعض المحافظات

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أجريت أربعة تجارب فى أربعة محافظات لدراسة تقلبات تعداد العنكبوت الأحمر العادى (النوع الأخضر) *Tetranychus arabicus* Attiah على أربعة من أكثر محاصيل الخضر التابعة للعائلة القرعية شيوعا وانتشارا فى مصر وهى : الكوسة ، الخيار ، الكنتالوب، البطيخ.

أظهرت الدراسة أن القرعيات الأربعة كانت عرضة للإصابة بالعنكبوت الأحمر العادى فى محافظات الاختبار الأربعة: الفيوم، الجيزة، القليوبية، المنوفية (وهى التى تنتشر فيها زراعة هذه الخضر) وقد اختلفت درجة الإصابة باختلاف المحصول وباختلاف المحافظة. وبصفة عامة كان الخيار يليه الكنتالوب أكثر القرعيات عرضة للإصابة، تلاهما البطيخ وجاء قرع الكوسة فى المرتبة الأخيرة من حيث التعداد.

ومن ناحية التقلبات فى التعداد بين المحافظات فقد كانت محافظة الفيوم أقل المحافظات الأربع المختبرة من حيث عدد أفراد العنكبوت على القرعيات الأربع، وجاءت محافظة المنوفية فى المرتبة الثانية. وكانت محافظة القليوبية تليها محافظة الجيزة أكثر المحافظات تعرضا للإصابة.