Tanta University
Faculty of Agriculture
Plant Protection Department

STUDY EFFECT OF SPIDER MITE ON SOME FIELD CROPS, AND ITS CONTROL AT EL-GHARBIA GOVERNORATE

By

Mohamed Reda Hassan Hassan Ammar

B. Sc. Agric., Science, (Field Crops) Fac., of Agric., Al-Azhar Univ., 2006.

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SUMMARY

Maize (*Zea mays* L.) and Soybean (*Glycine max* (L.) Merr.), are the major oil seed cropping grown and consumed in the world. They are the most important grain crop in Egypt and produced throughout the country under diverse environments, as it widely distributed all over the world. Corn and soybean infested withmanyinsect andmite peststhroughvarious stages ofgrowth, and the most importantplantpests are phytophagous mites, especially the two-spotted spider mite*Tetranychus urticae*due to its high potential to cause damage.

Consequently,the objective of the present study aimed to throw some lights on the following points:-

A.Ecological studies

I. Occurrence of phytophagous mites and predators inhabiting Maize and Soybean at Kafr Alzaiat, Gharbia Governorate

II. Population fluctuation of *Tetranychus urticae* Koch and predacious mites inhabiting Maize and soybean crops at Gharbia Governorate during the two successive years 2015-2016.

III. Biological studies of *Tetranychus urticae* Koch on three varieties of Soybean crops at three constant temperatures at laboratory.

IV. Study of the possible acaricidal effect of Romactin, Challenger and Ortus alone and in combination under laboratory and field condition on *T. urticae*.

Results revealed the following:

A.Ecological studies

I.1 Occurrence of phytophagous mites and predators inhabiting Maize and Soybean at Kafr Alzaiat, Gharbia Governorate. Phytophagous mites were represented by 7 species belonging to four families and two orders. However, arthropod predators were represented by 8 species belonging to 4 families and 4 orders

1- Phytophagous mites, which frequently occurred on corn and soybean, were observed to cause severe harms to leaf. Mite feeding produces variable symptoms such as rusting, surface browning. Severe infestation can be defoliation of leaves and deteriorate the crops. Seven phytophagous mites belonging to four families and two orders. *Tetranychus urticae* Koch and *Eutetranychus orientalis* (Klein) (**Tetranychidae);** *Steneotarsonemus sayedi*

Zaher& Kandeel and *Polyphagotarsonemus latus* (Banks) (**Tarsonemidae)**; *Tydeus californicus* (Banks) (**Tydeidae) and** *Tyrophagous putrescentiae* (Schrank) and *Rhizoglyphus robini* Claparede (**Acaridae).**

2- Predators:

arthropod predators were represented by 8 species belonging to 4 families and 4 orders. *Pronematus ubiquitous* (McGregor) (**Tydeidae);** *Chyletogenus ornatus* (Can. &Fanz.) (**Cheyletidae);** *Agistemus exertus* Gonzalez **(Stigmaeidae);** *Amblyseius swirskii* (A.-H.) and *Euseius scutalis* (A.-H.) (**Phytoseiidae);** the true spider, *Thanatus albini* (Audouin) (**Philodromidae**); *Thomisus spinifer* Cambridge (**Theridiidae**) and the predatory insect, *Stethorus punctillum* Weise (**Coccinellidae**).

II.1. Population fluctuation of phytophagous mites, *Tetranychus urticae* Koch and the predatory mite, *A. swirskii*on single- cross maize hybrids:

1- The population fluctuation of the two spotted spider mite *T. urticae* Koch throughout the year 2015-2016 at the Kafr Alzaiat Gharbia Governorate. The study was conducted on five maize single-cross hybrids (i.e. Pioneer30K8, SC2030, SC2031, SC2055 and SC3084), and their relation to weather factors.

2- The *T. urticae* motile stages have two peaks in mid July and late August during two seasons 2015-2016 on most maize single hybrids during the two successive years.

3- Statistical analysis of population fluctuation of *T. urticae* revealed that, there were non-significant positive correlated between population density of *T. urticae* with temperature and relative humidity during the two successive seasons.

4- The susceptibility of different single cross maize hybrids to *T. urticae* infestation. Indicated that, the tested hybrids into four different groups as follows: the highly infested group was represented by SC3084 followed by SC2031 and SC2030 without any significant difference between them. The moderately infested included pioneer30k8 hybrid, while SC2055 hybrid was represented by the highly resistant.

5- The predatory mite *A. swirskii* have one peak of seasonal abundance, which was recorded in late August on all single hybrids (Pioneer30K8, SC2030, SC2031, SC2055 and SC3084) during the two successive years**.** The predatory

mite, *A. swirskii* is important for controlling the population density of *T. urticae* during the two successive seasons on five single maize hybrids.On five maize single hybrids it was found significant positive correlation between the predatory mite population and both minimum and maximum temperatures. While, insignificant positive correlation between the predatory mite and mean relative humidity in the first season 2015.

II.2. The population fluctuation of the two spotted spider mite *T. urticae* Koch and the predatory mite, *A. swirskii*during the two seasons 2015-2016 on three-cross maize hybrids.

1- The study was conducted on five maize three-cross hybrids (i.e. TWC130, TW310, TWC323, TWC324, and TWC352), and their relation to weather factors**.**

2- The *T. urticae* motile stages have two peaks in mid July and late August during two seasons 2015-2016 on most maize three hybrids during the two successive seasons 2015-2016.

3- Statistical analysis for general mean of five maize three-cross hybrids population fluctuation of *T. urticae* revealed that, there were non-significant positive correlated between population density of *T. urticae* with maximum temperature and relative humidity during the first season, while the correlation between the minimum temperature and population was significant positive in the first season**.**

4- The susceptibility of different maize three-cross hybrids to *Tetranychus urticae* infestation during seasons 2015-2016.The tested hybrids into three different groups; the highly infested group (**a**) was represented by TWC352, TWC324 and TWC310 followed by TWC323 group (**b**), followed by TWC130 by the highly resistant group**.**

5- The predatory mite *A. swirskii* have one peak of seasonal abundance, which was recorded in 3rd of August on all three hybrids (TWC130, TWC310, TWC323, TWC324 and TWC352) during the two successive years**.** The predatory mite, *A. swirskii* is important for controlling the population density of *T. urticae* during the two successive seasons on five three maize hybrids.Significant positive correlation between the predatory mite population

and both of at maximum, minimum temperature, while insignificant between population and mean relative humidity during seasons 2015**.**

III. The population fluctuation of *T. urticae* Koch and predatory mite *Euseius scutalis*on three Soybean cultivars at Gharbia Governorate was studied during two successive 2015-2016 seasons.

1- The results indicated that significantly differed in their *T. urticae* infestations according to the mean numbers of motile stages through 2015 and 2016 seasons on three cultivars Giza21, Giza35 and Giza83.

2- The population of *T. urticae* has two peaks in the first season 2015, the first peak in the late in June on the three soybean varieties. Whereas, the second peak was recorded during the third week of July on Giza21 and Giza83 varieties. In the second season 2016, *T. urticae* it has one peak in 7th of July on Giza21 and Giza35, but it's reach the maximum number in mid July for Giza83.

3- Soybean Giza35 variety was a high significant response to *T. urticae* infestation recording of 552.56 and 440.5 motile stages/ leaflets for two successive seasons, respectively, which in turn showed significant differences with the other varieties, Giza21 and Giza83. Whereas, Giza21 variety was the most tolerant variety recorded 130.38 and 174.88 ind./ leaflet for two successive seasons.

4- Insignificant positive effect of temperature maximum and minimum temperatures on the population of *T. urticae* infested the three Soybean varieties during 2015 and 2016.

5- Significant positive correlation between the *T. urticae* population and the predatory mites**,** *Euseius scutalis*in all soybean varieties, the predatory mite was the main important predator for suppressing population density of *T. urticae* population during the two successive seasons

B. Some biological aspects of *Tetranychus urticae* Koch on some Soybean cultivars at three constant temperatures

1- Some biological aspects of *Tetranychus urticae* Koch on Soybean cultivars (i.e. Giza21, Giza35 and Giza83) at three constant temperature of 22, 26 and 30°C, Relative humidity 65% and 16:8 L: D photoperiods were studied.

2- The results indicated that, *T. urticae* successfully developed on all experimental soybean cultivars at the three constant temperatures. The life cycle of *T. urticae* was long at 22°C followed by 26°C than 30°C. The longevity of female *T. urticae* was 18.18, 18.88 and 19.18 days on at 22°C, followed by 15.83, 16.78 and 17.80 days at 26°C, while the shortest period was 13.65, 13.85 and 15.30 days at 30°Con Giza21, Giza84 and Giza35, respectively.

3- Significant differences occurred between all stages at the three levels of temperatures. The highest fecundity and daily rate at 30°C was 95.65 eggs/female and 8.72 eggs/♀/day, while the lowest was at 22°C as 71.58 eggs/female and 5.33 eggs/♀/day. Significant differences occurred between the three varieties diets as fecundity was the highest on Giza35 and the lowest on Giza21.

4- The shortest developmental time and generation period and the high fecundity were recorded was recorded on Giza35, whereas the longest life cycle and generation period and the lowest fecundity was recorded on Giza21, these results indicated that Soybean Giza35 more susceptible to infestation by spider mite, while Giza21 more tolerance, whereas Giza83 was moderately infestation.

C. Chemical study

1. Toxicity of tested compounds against *T. urticae*treated with different concentration of Romactin using the leaf disks were diping at six concentrations (10.8, 7.2, 3.6, 1.8, 0.9, 0.9 and 0.45 ppm). The mortality rate of *T. urticae*after 24, 48 and 72h gave 100% for 8.1 and 5.4 ppm, followed by 96 and 90% for 2.7 and 1.3 ppm. Romactin was the most toxic to adult mites after 72h followed by 48h.

2. For testing the influence of Challenger on mortality rates of *T. urticae* Koch, six concentrations (216; 144; 72; 36; 18 and 9ppm). The percentage of *T. urticae* females after 72h from treatment, it can be conducted that recommended dose 144 ppm was more toxic followed by 216 and 72 ppm concentrations. The LC_{50} value was 24.38, 25.15 and 21.57% after 24, 48 and 72h, respectively.

3. Different concentrations (37.5, 25, 12.5, 6.25, 3.125 and 1.562 ppm) of Ortus against the tetranychid mite, *T. urticae*after three days of

treatment.TheMortality % was higher at 37.5 and 25 ppm followed by 12.5 ppm. The LC_{50} values for the tested Ortus were 7.07, 6.373 and 5.10% after 24, 48 and 72h, respectively.

4. No differences between the LC_{50} of Romactin, Challenger and Ortus on Soybean plant using the dipping technique after 24, 48 and 72h under laboratory condition. The mean reduction percentage was 82.6, 88.7 and 85.3% for Romactin, Challenger and Ortus, respectively.
5. The effect of the combination between LC_{50} of Romactin, Challenger and Ortus on Soybean plant under filed condition.The rate of reduction was significantly with the lapse of time. Romactin+ Challenger was the most toxic Acaricide as they caused (94.73%) mean reduction, followed by Romactin+ Ortus (90.04%) while Ortus gave low effect compared with other Acaricide caused (83.7%).
6. The effect of the combination between LC_{50} of Romactin, Challenger and Ortus on Maize plant under filed condition. Theresults showed that Romactin+ Challenger and Romactin+ Ortus gave highest reductions as 97.6 and 95.9%, respectively. Romactin and Challenger resulted in 93.4% and 91.2% reduction after two weeks of treatment, with no significant difference occurred between them. While, the least reduction was recorded for Ortus as 90.2% after two weeks of application.