

RELATIONSHIP BETWEEN ABUNDANCE OF  
COMMON WEEDS IN FIELDS OF SOME  
VEGETABLE CROPS AND POPULATION  
OF THE ASSOCIATED TWO-SPOTTED  
SPIDER MITE, *TETRANYCHUS*  
*URTICAE* KOCH

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**ABSTRACT:** An experiment was carried out at Southern Tahreer Province during 2004 summer season, to survey the most common weeds in fields of the four vegetable crops tomato, squash, cucumber and kidney beans and the occurrence of the two-spotted spider mite, *Tetranychus urticae* Koch in order to determine the role of weeds on the infestation size of the mite.

The obtained results indicated that the four vegetable crops were accompanied with 26 weed species (*Amaranthus ascendens*, *Amaranthus cruentus*, *Amaranthus hybridus*, *Amaranthus sylvestris*, *Avena fatua*, *Brassica nigra*, *Chenoposium ambrosioides*, *Chenopodium murale*, *Convolvulus arvensis*, *Conyza aegyptiaca*, *Cynodon dactylon*, *Cyperus longus*, *Dicanthium annulatum*, *Digitaria sanguinalis*, *Echinochloa colonum*, *Echinochloa crus-galli*, *Eleusine indica*, *Hibiscus trionum*, *Kochia indica*, *Malva parviflora*, *Phalaris minor*, *Portulaca oleracea*, *Senecio vulgaris*, *Sisymbrium irio*, *Solanum nigrum* and *Sonchus oleraceus*). Among which, *Portulaca oleracea*, *Digitaria sanguinalis*, *Amaranthus ascendens*, *Amaranthus sylvestris*, *Chenoposium ambrosioides* were found to be frequent with the four crops, while *Solanum nigrum*, *Senecio vulgaris* were observed with three of them.

Data also proved that the weeds accompanied with squash plants harboured the least number of mite moving stages, followed by

weeds with cucumber, tomato and then kidney bean plants. In squash plants, *Conyza 2 aegyptiaca* weed was found to be infested with the highest number of mite individuals followed by *Senecio vulgaris*; while *Portulaca oleracea* had the lowest number of mites. Under cucumber plants, *Hibiscus trionum* weed had the highest total number of mite moving stages followed by *Senecio vulgaris*; while *Cynodon dactylon* weed had the lowest number of mites. In tomato fields, *Amaranthus ascendens* had the highest total number of mite moving stages followed by *Malva parviflora* and *Senecio vulgaris*; while *Sisymbrium irio* weed had the lowest number of mites. With bean crops, *Brassica nigra* and *Phalaris minor* weeds followed by *Chenopodium ambrosioides* had the highest total number of mite moving stages, while *Amaranthus ascendens* showed the lowest number. Also, number of mites on tilling crops was smaller.

**Key words:** Common weeds, vegetable crops, spider mite, *Tetranychus urticae koch*.

## INTRODUCTION

Vegetable crops are usually infested under field conditions with several pests, among which species of genus *Tetranychus* Doufer are considered one of the most important one where it attack foliage of plants causing serious damage (El-Kifl *et al.*, 1974; Farrag *et al.*, 1980; Wahba *et al.*, 1986; Abdel-Malak, 1989; Faris *et al.*, 1991; Megali *et al.*, 1992; Doss *et al.*, 1995; Megali and Faris, 1997).

Several weed species were found in association with vegetable plants in their fields. Weeds are accused of two major defects; competing with the cultivated crop

for nutrients (Abidin *et al.*, 1996), and harbouring pests that move to the crop plants (Shalaby, 1974; Awadallah *et al.*, 1976; El-Nagar *et al.*, 1979; Abdel-Fattah *et al.*, 1985; Das and Ram, 1988; El-Sheikh *et al.*, 1994 and Belal, 2002). In organic farming, weeds should be left in the farm because they also harbour predators and other natural enemies of some pests. The matter is, therefore, to evaluate the harm of weeds against their benefits, and to see whether their two major defects can be outweighed by the benefit of keeping natural enemies nearby, and not using agrochemicals, so as agricultural products can be exported free of pesticides (Abdel-Malak, 1997).

Organic farming advocate (agriculture without using any chemicals) is a new approach in the recent years to avoid the hazardous effects of using chemicals (Pesticides, herbicides, fungicides, scalcicides, ... etc.) especially for vegetable crops.

Thus, the present study is an attempt for surveying for the most common weeds found under four vegetable crops; tomato (*Lycopersicon esculentum* L.), squash (*Cucurbita pepo* L.), cucumber (*Cucumis sativus* L.) and kidney beans (*Phaseolus vulgaris* L.) and the occurrence of the two-spotted spider mite, *Tetranychus urticae* Koch in order to determine the role of weeds in the actual infestation size of the mite which may help in planning appropriate control programmes for both weeds to mites and reduce the need for chemical control and give chance for a healthy environment by encouraging the abundance and diversity of biocontrol fauna in fields.

## MATERIALS AND METHODS

The present experiment was carried at Southern Tahreer Province during 2004 summer season, to evaluate the population of the two-spotted spider mite, *Tetranychus urticae* Koch in four

vegetable crops, i.e. squash (*Cucurbita pepo* L.), cucumber (*Cucumis sativus* L.) (family: Cucurbitaceae), tomato (*Lycopersicon esculentum* L.), (family: Solanaceae) and kidney beans (*Phaseolus vulgaris* L.) (family: Leguminosae) and on weeds accompanied with these crops.

An area of about half feddan was chosen and divided into eight experimental plots (each plot about 250 m<sup>2</sup>), and two plots for each vegetable crop. The cucumber, squash and bean seeds were planted in 16<sup>th</sup> March, 2004 each in the two plots, while tomato seedlings was transplanted 4 at the first week of April in the two plots also. The first plot of the four vegetables was left without hoeing all over the sampling dates, while in the second plot, weeds were removed periodically.

Sampling started from 13<sup>th</sup> April and continued weekly for six weeks later. In each date, leaf samples of the economic crop were picked from every plot in a separate paper bag. Also, in the same time, samples of each weed species found accompanied with the target crop were collected separately each in a separate paper bag. All samples were transferred to the laboratory, then 50 gram of

each of the collected samples were weighed and put in Tullgren funnel. The samples were kept for 24 hours below a 60-Watt electric lamp. Mites were collected in Petri-dishes half-filled with water. Mites moving stages were identified, counted and recorded for each sampling date. Weed species were identified in Flora and Phyto-Taxonomy Res. Sec., Hort. Res. Inst., A.R.C., Egypt.

## RESULTS AND DISCUSSION

Data presented in Tables I, II, III & IV and graphically illustrated in Figs. 1, 2, 3 & 4 illustrate the most common weed species found accompanied with four economic vegetable crops (squash, cucumber, tomato and kidney bean) along with respective mite moving stages associated with weed species and the four vegetable crops.

Data in Table I and Fig. 1 proved that 11 weed species were found accompanying with squash crops. The weeds were, *Portulaca oleracea* L., *Digitaria sanguinalis* (L.) Scop., *Amaranthus ascendens* Lois., *Dicranthium annulatum* (Forssk), *Amaranthus sylvestris* Desf., *Chenopodium ambrosioides* L., *Solanum nigrum* L., *Senecio*

*vulgaris* L., *Kochia indica* Wight, *Conyza aegyptiaca* (L.) Ait., and *Amaranthus 7 hybridus* L. Also, it is clear that weeds under squash harboured least number of mites moving stages than weeds under the other three tested vegetable crops, i.e. cucumber, tomato and kidney bean. The total number of mites on weeds under squash was 3405.4 individual after six samples (84.06 %), while the corresponding number of mites on squash plants was 132.7 individuals/50 g leaves (20.54%). The weed *Conyza aegyptiaca* had the highest total number of mite moving stages, 1065 individuals/50 g leaves (31.27% of mites on all weed species) followed by *Senecio vulgaris* with 526.4 individuals/50 g (15.45% of total no. of mite moving stages). On the other hand, *Portulaca oleracea* had the lowest number of mites 42.5 individuals/50 g leaves. Squash plants in tillered area had 132.7 individuals/ 50 g leaves.

Data in Table II and Fig. 2 proved that there was 13 weed species accompanied cucumber crops. These were *Portulaca oleracea* L., *Digitaria sanguinalis* (L.) Scop., *Amaranthus ascendens* Lois., *Cynodon dactylon* (L.) Pers., *Amaranthus sylvestris* Desf.,



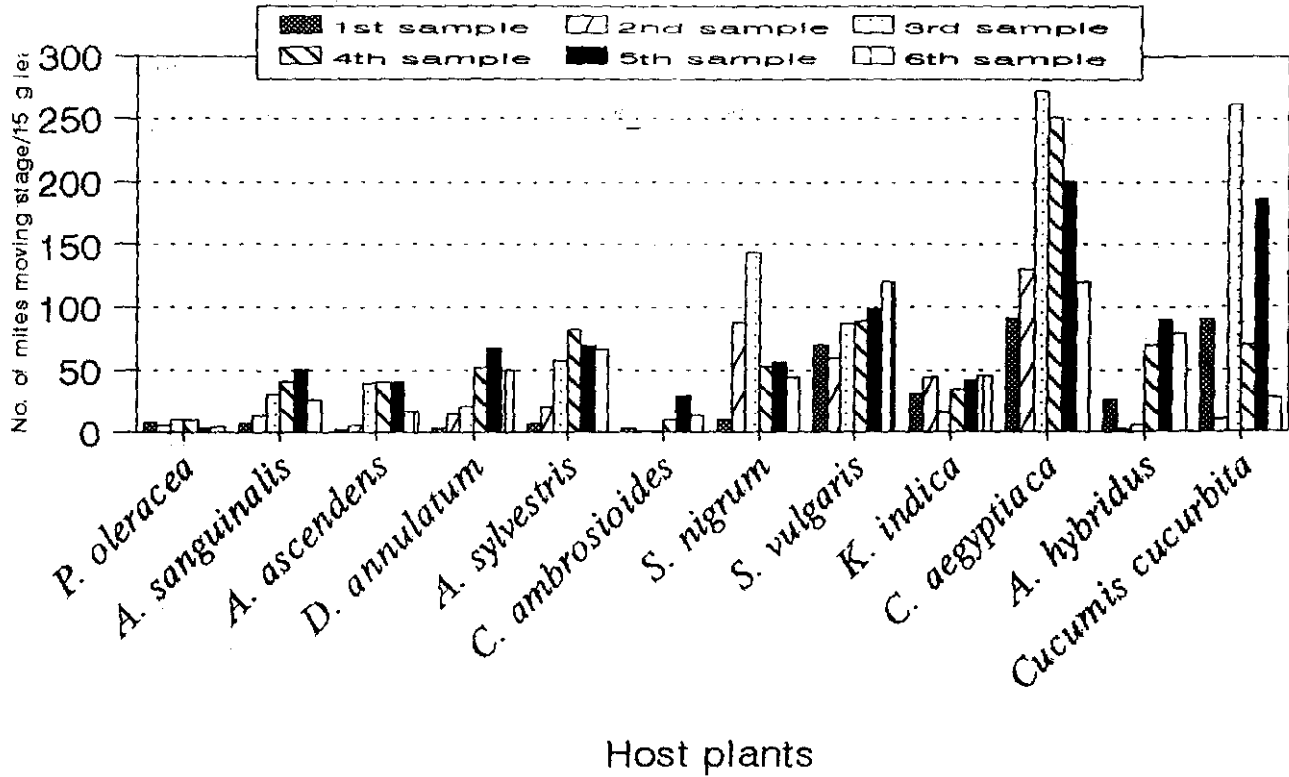


Fig. 1 : Number of mites moving stages on squash plants and its associated weeds.



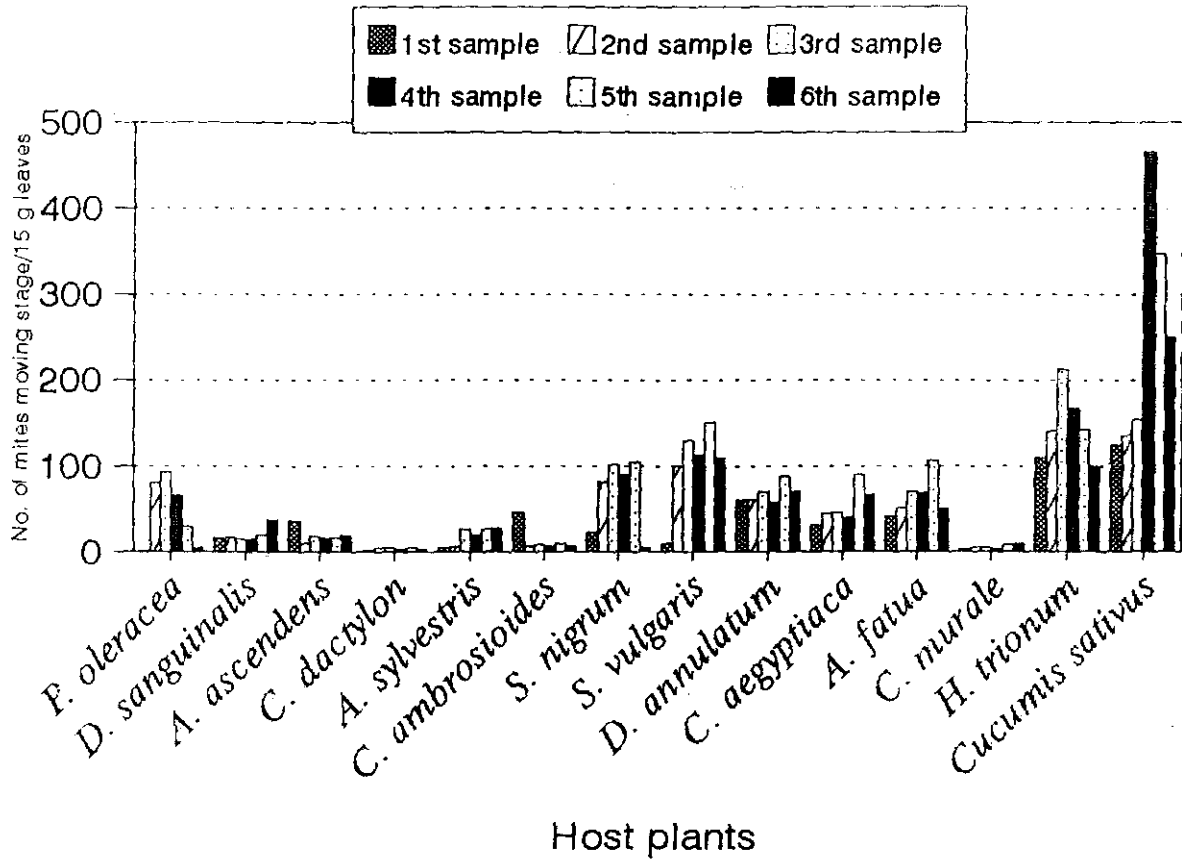


Fig. 2 : Number of mites moving stages on cucumber plants and its associated weeds.





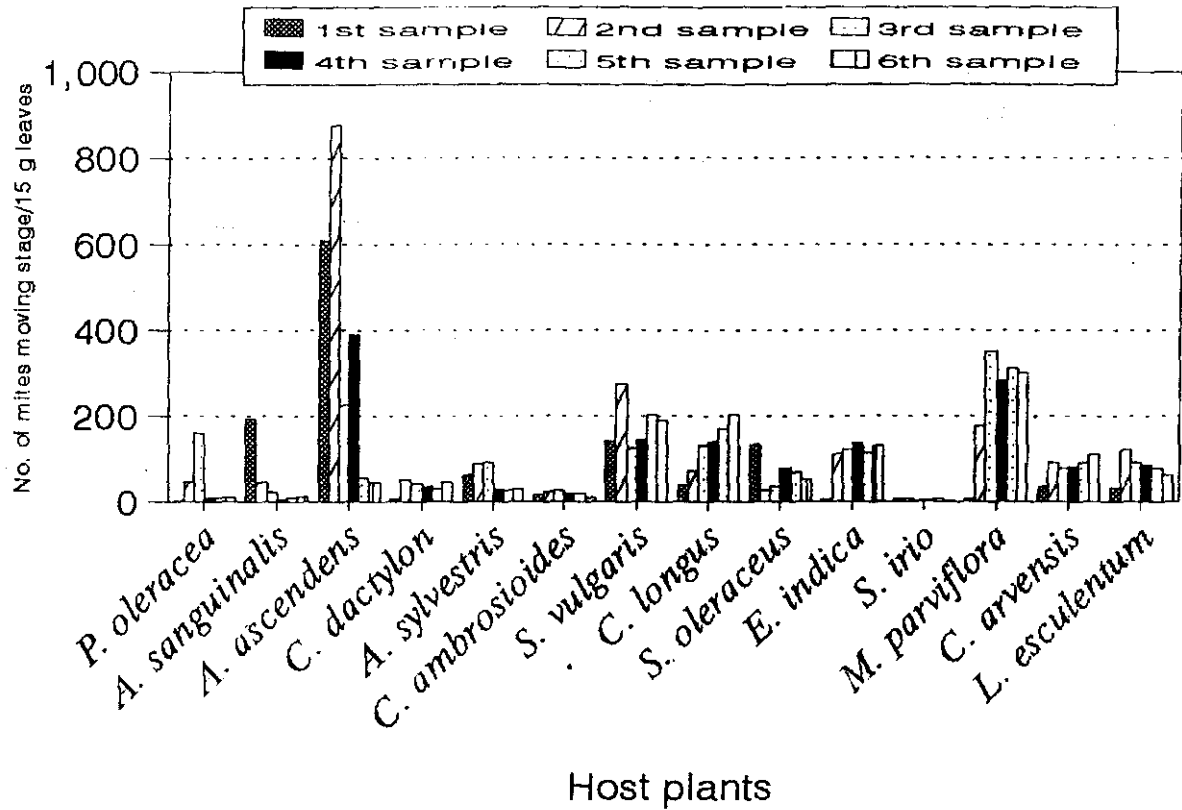


Fig. 3: Number of mites moving stages on tomato plants and its associated weeds.



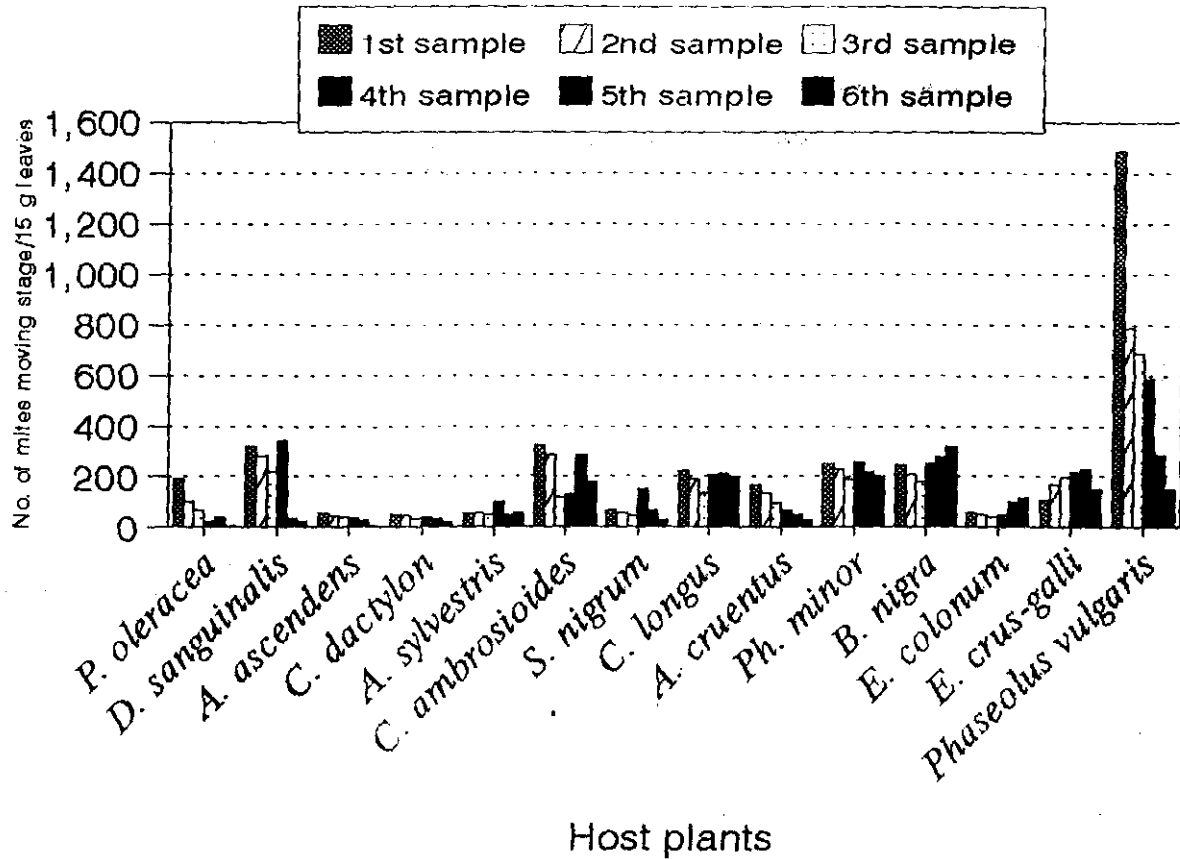


Fig. 4: Number of mites moving stages on bean pinats and its associated weeds.

*Chenopodium ambrosioides* L., *Solanum nigrum* L., *Senecio vulgaris* L., *Dicanthium annulatum* (Forsk), *Conyza aegyptiaca* (L.) Ait., *Avena fatua* L., *Chenopodium murale* L., and *Hibiscus trionum* L. It is clear that weeds under cucumber harboured total number of tetranychid mite moving stages 3744.5 individuals/50 g leaves after six samples (71.70%), while the corresponding number of mites on cucumber plants was 1478.2 individuals/50 g leaves (28.30%). The weed *Hibiscus trionum* had the highest total number of mite moving stages 872.2 individuals/50 g leaves (23.29% of mites on all weed species) followed by *Senecio vulgaris* that harboured 611.1 individuals/50 g (16.31 % of total no. of mite moving stages). On the contrary, *Cynodon dactylon* had the lowest number of mites (21.0 individuals/50 g leaves (0.05% of total number). Cucumber plants in tillered area had 98 individuals/50 g leaves. 10 data in Table III and Fig. 3 showed that 13 weed species accompanied tomato crops. These were *Portulaca oleracea* L., *Digitaria sanguinalis* (L.) Scop., *Amaranthus ascendens* Lois., *Cynodon dactylon* (L.) Pers., *Amaranthus sylvestris* Desf.,

*Chenopodium ambrosioides* L., *Senecio vulgaris* L., *Cyperus longus* L., *Sonchus oleraceus* L., *Eleusine indica* (L.) Gaertn., *Sisymbrium irio* L., *Malva parviflora* L., and *Convolvulus arvensis* L. These weeds under tomato harboured total number of the two-spotted mite 8134.3 individuals after six samples (93.47%), while the corresponding number of mites on tomato plants was 567.5 individuals/50 g leaves (6.53%). The weed *Amaranthus ascendens* had the highest total number of mite moving stages, 2199.4 individuals/50 g leaves (27.03% of mites on all weed species) followed by *Malva parviflora* and *Senecio vulgaris* with respectively 1422.3 and 1078.9 individuals/50 g (17.48 and 13.26% of total no. of mites moving stages). While *Sisymbrium irio* had the lowest number of mites by 24.3 individuals/50 g leaves (0.002% of total no. of mite moving stages).

Data in Table IV and Fig. 4 proved the occurrence of 13 weed species associated with bean crops. These were *Portulaca oleracea* L., *Digitaria sanguinalis* (L.) Scop., *Amaranthus ascendens* Lois., *Cynodon dactylon* (L.) Pers., *Amaranthus sylvestris* Desf.,

*Chenopodium ambrosioides* L., *Solanum nigrum* L., *Cyperus longus* L., *Amaranthus cruentus* L., *Phalaris minor* Retz., *Brassica nigra* L., *Echinochloa colonum* (L.) Link, and *Echinochloa crissigalli* (L.) Beauv. These weeds under kidney bean harboured the highest number of mite moving stages than weeds under the other three tested vegetable crops. The total number of mites on weeds under kidney bean was 10337 individuals after six samples (72.17%), while the corresponding number of mites on tomato plants was 3985.4 individuals/ 50 g leaves (27.83%). The weed *Brassica nigra*, *Phalaris minor* followed by *Chenopodium ambrosioides* had the highest total number of mite moving 15 stages recording 1491.2, 1359.0 and 1331.0 individual/50 g leaves, respectively (40.44 % of mites on all weed species), while *Amaranthus ascendens* had the lowest number of mites 222.1 individual/50 g leaves).

Generally, it was clear that the four economic crops with tilling for weed species decrease significantly the tetranychid mite moving stages (Tables I-IV).

From the above-mentioned results, it could be stated that all

the four vegetable crops were accompanied with several species of weeds (26 weed species). Among which, *Portulaca oleracea*, *Digitaria sanguinalis*, *Amaranthus ascendens*, *Amaranthus sylvestris*, *Chenopodium ambrosioides* were found to be frequent with the four crops; *Solanum nigrum* and *Senecio vulgaris* with three crops. Shalaby (1974), in Egypt, came to the same results, as he found that *Portulaca oleracea*, *Sonchus oleraceus*, *Chenopodium album*, *Cynodon dactylon* and *Convolvulus arvensis* grew among vegetable crops and harboured several pests. Tawfik *et al.* (1976), in Giza, found 60 insect species attacking weeds with various economic plants as pests, *i.e.*, *Convolvulus arvensis*, *Portulaca oleracea* and *Amaranthus caudatus*. El-Bishlawy (1978) recorded 41 phytophagous and predaceous mite species inhabiting wild weeds and green leaves on the farm of the Faculty of Agriculture at Giza. Some may be considered as source of infestation while the latter could play a considerable role in controlling harmful mites and insects. Das and Ram (1988) stated that *Chenopodium album*, *Solanum nigrum*, *Portulaca oleracea*, *Amaranthus viridis* and *Evolvulus alsinoides* were

considered as alternative host plants for several pests. El-Sheikh *et al.* (1994) found that *Datura*, *Gynndropsis*, *Portulaca oleracea*, *Medicago polymorphe*, *solanum nigrum*, *Sonchus oleraceus* and *Amaranthus hybridus* were infested with pests in potato plants. Ben-Yakir *et al.* (1996) reported squirting cucumber, *Ecballium elaterium* (L.), as a common weed in the Mediterranean basin, it often became as agricultural 16 pest and might also serve as a reservoir for viruses that infected cucurbitaceous crops. Abdel-Malak (1997) surveyed twenty one species of weeds from 4 vegetable crops. She found that the most frequent weeds were *Amaranthus viridis*, *Chenopodium murale*, *Portulaca oleracea* and *Echinochloa colona*.

On the other hand, all weed species was liable to infestation with the two-spotted spider mite moving stages with different densities. In case of both kidney beans and cucumber it was found that these crops harboured higher numbers of mite moving stages than its accompanied weeds, this means that leaves of both hosts are preferable than weeds, and this may be due two the nature of leaves of both crops (Abdel-Malak, 1997).

## REFERENCES

- Abdel-Fattah, M.I., A. Hendi and A. El-Said. 1985. Abundance of *Bemisia tabaci* associated with common weeds in tomato fields at Shebin El-Kom region, Egypt. Bull. Soc. ent. Egypté, 65 : 109-117.
- Abdel-Malak, V.Sh.G. 1989. Ecological and biological studies of some insects associated with vegetables in the Nile Valley. M.Sc. Thesis, African Institute, Cairo Univ., 340 pp.
- Abdel-Malak, V.Sh.G. 1997. Study on some environmental consequences of insects associated with weeds growing in vegetable fields in A.R. Egypt. Ph.D. Thesis, Institute of Environmental Studies and Research, Ain Shams Univ., 213 pp.
- Abidin, Z., F.A. Bahar and E. Koswara. 1996. The effect of weed control methods on yield of tomato in paddy field. Buletin Penelitian Hortikultura (Indonesia), 26 (2) : 1-6.
- Belal, E.M. 2002. Host range, seasonal abundance, biology and predation capacity of *Campylomma* spp. Reuter and Puton (Hemiptera: Miridae). Univ. of Gezira, Wad Medani (Sudan), Fac. of Agric. Sci., 2002, 47 p.17.

- Ben Yakir *et al.* 1996. Potential of *Aspongopus viduatus* F. (Heteroptera: Pentatomidae) as a biocontrol agent for squirting cucumber, *Ecballium elaterium* (L.) A. Rich. (Cucurbitaceae). *Biol. Cont. Theory & Appl. in Pest Manag. (USA)*, 7 (1) : 48-52.
- Das, B.B. and G. Ram. 1988. Incidence, damage and carry-over of cutworm, *Agrotis ypsilon* attacking potato (*Solanum tuberosum*) crop in Bihar. *Indian J. Agric. Sci.*, 58 (8): 650-651. (c.f. *Weed Abstr.*, 40, No. 1, 1991).
- Doss, S.A., S.M. Ibrahim, N.G. Iskander and A.K.F. Iskander. 1995. Relative susceptibility of three bean cultivars planted under plastic greenhouse to both of leafminer, *Liriomyza trifolii* (Burgess) and spider mite, *Tetranychus arabicus* Attiah. *Bull. Ent. Soc. Egypté*, 73 : 135-142.
- El-Kifl, A.H., A.E.A. Wahab, M.A. Assem and A.A. Metwally. 1974. List of insects, mites and pests associated with leguminous crops in Egypt. *Bull. Soc. ent. Egypté*, 58 : 297-302.
- El-Sheikh, M.A.K., S. El-Nagar, F.M. Maklad and S.S.A. Kabeil. 1994. Aphid fauna and seasonal incidence on potato and associated wild plants at Giza, Egypt. *Bull. Soc. ent. Egypté*, 72 : 203-215.
- Faris, F.S., M.K. Megali, Y.S. Khafagi and Kh.M. Adam. 1991. Susceptibility of some beans cultivars to whitefly, mites and rust diseases with special references to yield and pod characteristics. *Fourth Arab Congress of Plant Protection*,: 391- 402.
- Farrag, A.M.I., A.S. Abdel-Salam, M.L. Wahba and M.S. Abul-Ela. 1980. Effect of soil fertilization on the population density of the spider mite, *Tetranychus arabicus* Attiah on soybean plants (Acari: Tetranychidae). *Proc. 1st Conf., Plant Prot. Res. Inst.*, Vol. 3: 31-39.
- Megali, M.K. and F.S. Faris. 1997. Evaluation of some snap bean cultivars for yield and yield component and infestation by spider mites, *Tetranychus arabicus* Attiah. *Egypt. J. Appl. Sci.*, 12 (11): 257-266.18
- Megali, M.K., S.A.G. Metwally and F.S. Faris. 1992. Evaluation of some pea cultivars to leaf miner, thrips and two spotted spider mite with reference to yield and yield components. *Zagazig J. Agric. Res.*, 19 (4): 1897-1905.



- El-Bishlawy, Shahira M.O. 1978. Ecological and biological studies on mites associated with weeds, with special reference to lawn grasses. Ph.D. Thesis, Fac. of Agric., Cairo Univ., 148 pp.
- Shalaby, F.F. 1974. Studies on insects associated with weeds. Ph.D. Thesis, Fac. Agric., Cairo Univ., 210 pp.
- Tawfik, M.F.S., K.T. Awadallah and F.F. Shalaby. 1976. Survey of insects found on common weeds in Giza region. Bull. Soc. ent. Egypté, 60: 7-14.
- Wahba, M.L., S.A. Doss, F.S. Faris and M.K. Nakhla. 1986. Evaluation of some *Phaseolus vulgaris* cultivars to infestation with aphids and mites. Agric. Res. Rev., Cairo, 64(1):163-170.

## العلاقة بين تواجد الحشائش في حقول بعض محاصيل الخضر وتعداد العنكبوت الأحمر العادي ذو البقعتين تحت الظروف الحقلية

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أجريت هذه التجربة في قطاع جنوب التحرير خلال الموسم الصيفى لعام ٢٠٠٤ وذلك بغرض حصر أنواع الحشائش التى توجد مصاحبة لأربعة من محاصيل الخضر الصيفية الهامة وهى الطماطم، قرع الكوسة، الخيار، الفاصوليا وذلك تحت الظروف الحقلية وعلاقة ذلك بالوفرة العددية للعنكبوت الأحمر العادى ذو البقعتين *Tetranychus urticae* Koch على كل من الحشائش ومحصول الخضر وذلك لتحديد الدور الذى تلعبه هذه الحشائش فى حجم الإصابة الفعلية بالآفة فى محاصيل الخضر ذات الأهمية الاقتصادية.

أظهرت النتائج التى تم الحصول عليها إنتشار ٢٦ نوعا من الحشائش فى حقول محاصيل الخضر الأربعة وهى: عرف الديك *Amaranthus ascendens* ، أبوطرطور *Amaranthus cruentus* ، الرعاف *Amaranthus hybridus* ، شجرة الساتين *Amaranthus sylvestris* ، الزمير *Avena fatua* ، الخردل *Brassica nigra* ، المننتة *Chenopodium murale* ، الرمرا م *Chenopodium ambrosioides* ، العليق

*Convolvulus arvensis*، نشائش الدبان ، *Conyza aegyptiaca* ، النجيل البلدى ، *Dicanthium* ، السعد ، *Cyperus longus* ، نجيل فارس ، *Cynodon dactylon* ، *Echinochloa annulatum*، أبوركبة ، *Digitaria sanguinalis* ، حشيشة الأرناب ، *colonum*، الدنيبة ، *Echinocloa crus-galli* ، نجيلة حمرة ، *Eleusine indica* ، نيل شيطاني ، *Hibiscus trionum* ، كوخيا ، *Kochia indica* ، خبيزة برية ، *Malva parviflora*، ديل القط ، *Phalaris minor* ، الرجلة ، *Portulaca oleracea* ، مرير ، *Senecio vulgaris*، فجل الجمل ، *Sisymbrium irio* ، عنب الديب ، *Solanum nigrum*، جعضيض ، *Sonchus oleraceus*. وكانت حشائش الرجلة، أبوركبة، عرف الديك والمنتنة هي أكثرها تواجدا حيث وجدت منتشرة في حقول محاصيل الخضر الأربعة تلتها حشائش عنب الديب، المرير والتي وجدت في حقول ثلاثة محاصيل فقط. ٢.

أظهرت النتائج أن الحشائش المصاحبة لنباتات قرع الكوسة كانت أقلها إصابة بالعنكبوت الأحمر تلتها الحشائش في حقول الخيار، ثم الطماطم وأخيرا الحشائش في حقول الفاصوليا وذلك بغزى للأفضلية النسبية لأوراق محاصيل الخضر أو أوراق الحشائش فعندما يكون المحصول الرئيسي مفضلا تزداد أعداد الآلة على النباتات وتقل على الحشائش كما في حالة الفاصوليا والعكس كما في الكوسة. كما أنه في معاملة قرع الكوسة وجد أن حشيشة نشائش الدبان أصيبت بأعلى تعداد للعنكبوت الأحمر تلتها حشيشة المرير وكانت حشيشة الرجلة أقلها إصابة بالعنكبوت الأحمر؛ بينما في حقول الخيار كانت حشيشة النيل أكثرها إصابة تلتها حشيشة المرير وكانت حشائش النجيل البلدى أقلها إصابة؛ وفي حقول الطماطم كانت أعلى إصابة بحشائش عرف الديك تلتها الخبيزة البرية والمرير بينما حشيشة فجل الجمل كانت أقلها إصابة؛ وفي حالة الفاصوليا كانت حشائش الخردل، ديل القط، المنتنة أكثر الحشائش عرضة للإصابة بالعنكبوت الأحمر وكانت حشيشة عرف الديك أقلها إصابة. حيث إتضح من النتائج السابقة وجود أفضلية لبعض الحشائش في الإصابة بالعنكبوت الأحمر عن غيرها وأن إزالة الحشائش بالعزيق في معاملات الخضر الأربعة سبب إنخفاض تعداد العنكبوت الأحمر بها بصورة مغنوية.