

Survey and Seasonal Abundance of Acari Associated with Stored Onion (*Allium Cepa*, L.) and Insects Occurring in Field, EGYPT

Abou-Tayesh, M.A.M.¹; M.M.Y. El-Shazly,² and, A.M. Khalil¹

¹ Plant Protection Research Institute, Agricultural Research Centre, Dokki, Egypt

² Faculty of Agriculture saba basha, Alexandria University, Egypt ²

ABTRACST

Results revealed that 11 mite species belonging to four families and three suborders were found associated with the onion during storage. Among them, three species are of Acaridida, five of Actinedida and three of Gamasida. High population densities of mites occurred in summer and autumn while low populations existed in spring and winter. Acaridida was found to occur in great abundance and also dominated other acari groups in number since was found to be like most 79.32% of all numbers, while, Gamasida constituted with 7.32%. Actinedida 13.35% came in-between. Vegetative growth of onion crop, a survey was carried out at Kafr El-sheikh and Menoufyia regions. Results revealed in recording eleven species of insects at Kafr El-Sheikh, while, at Menoufyia region it was only ten species of insects were captured.

These insects could be classified as follows:

1. Harmful: three insect species belonged to three families and two orders in Kafr El-Sheikh and Menoufyia during both seasons.
2. Beneficial: six insect species belong to four families and three orders obtained in Kafr El-sheikh region during the two seasons. While, at Menoufyia region 5 insect species belong to 4 families and 3 orders found during the two seasons.
3. Visitor insects: two insect species belong to two families and two orders were obtained at Kafr El-Sheikh and Menoufyia regions in two seasons.

Diversity index values of suborder Acari indicated was 0.9813, 1.4569 and 1.0401 for Acaridida, Actinedida and Gamasida mites at Menoufyia region in the first season, respectively, while, in the second season it was 1.0209, 1.1469 and 1.0855, in the onion stored, respectively. While, vegetative growth of onion crop, diversity index values of insects indicated was 0.7343 & 0.4645, 1.4997 & 1.4162 and 0.522 & 0.646 for insect pests, beneficial and visitor insects at Kafr El-Sheikh region, respectively. While, at Menoufyia region it was 0.7714 & 0.7199, 1.5665 & 1.632 and 0.4292 & 0.6144, respectively.

INTRODUCTION

Onion (*Allium cepa* L.) is considered one of the main vegetable crops in Egypt due to its economic importance for local consumption and

abroad exportation. Large numbers of mites are known to infest a variety of stored products throughout the world. Their distributional pattern are however, not constant every where due to climate variation and other ecological factors these pests are either free living granivorous, fungivorous and saprophagous or parasitic or predators on other mites and insects.

Mites associated with stored products are of great economic importance as they cause serious levels of damage, not only by consuming large amounts of stored products, but also by contaminating food with its bodies and faeces. Records of mites and insects which attack onion in the store and field in Egypt were recorded by Aboul Zahab (1976), Gendy (1978), Dimetry *et al.* (1979), Saleh *et al.* (1986), El-Bolok *et al.* (1990) and Hoda *et al.* (1990).

Records of other mites and insects which attack onion in other countries are given by Kagan (1976), Hughes (1976), Khaingfields (1976), Wallis *et al.* (1978), Mauray and Jamil (1982), Tsutsumi and Mitsui (1982), Aihara *et al.* (1985) and Takatoshi (2006). Many natural enemies had been recorded on insects attacking onion (Klein-Krautheim, 1934; Lange, 1964; El-sherif, 1971; Gherasim & Lacausu, 1977; Whisecraft *et al.*, 1984; Tomlin, 1985; El-Bolok *et al.*, 1990 and Takatoshi, 2006).

Therefore, the objectives of the present investigation were to survey mites and insects infesting the tested onion in the store and field, to estimate the mite and insect population densities and their fluctuations during two successive years of study and measuring the species diversity occurring in the onion on the basis of Shannon and weaner index equation.

MATERIALS AND METHODS

Samples of stored onion of about 250 gms was collected from Menoufyia governorate from markets and mites were extracted by using the modified berlese funnel set up with 40 watt bulbs for 48 hours and the extracted species were received in Petri-dishes containing water + 1% formaldehyde. Extraced mites were mounted in Hoyer's solution for identification purposes. The experiment lasted for two years from April 2006 to November 2007. Samples were two times per month from onion sources, for replicates each sample and four samples in every date. Taxonomic data of research based on review were given by Lindquist and Evans (1965), Attiah (1969), Kantz (1975), Hughes (1976) and Taha (1985). On the other hand, the survey of insects occurring in onion fields (Giza 6) was carried out at Kafr El-Sheikh (Desouk city) and Menoufyia

(Sadat city) regions during two seasons, the first from December 2005 till June 2006 and the second from December 2006 till June 2007. The chosen area from the present work was approximately two feddans in each location. Every site was divided into plots of ½ feddan each.

The regular agricultural practices were followed without any chemical control throughout the growing seasons to determine the number of insect pests species and common associated predators, samples were collected bi-weekly of 10 plants from each plot, taken at random were examined. Shannon-weaner diversity index (S.W.I.) was adapted to measure the diversity of arthropods as it is the one most commonly used (Price, 1984). The index was calculated for species and families of collected mites and insects from onion field and store.

Shannon and weaner formula is as follows:

$$HS = \sum_{i=1}^S P_i \log P_i$$

- HS = The amount of diversity in a group of species in this case the category of classification used in the species (hence the subscripts) but other categories could be used as well it may be applicable to families, orders,etc.
- S = Number of species within a sample.
- P_i = The proportion of the species in the total sample, it measures the relative abundance and ranges between 0.00 to 1.0
- Loge = Natural logarithm, the negative sign is added to make the come out positive value = 2.718.

This function was derived independently by Shannon and weaner and is sometimes mislabeled as the Shannon-weaner function in the ecological literature (Kerbs, 1978).

RESULTS AND DISCUSSION

1. Survey

A . Survey of mites species on stored onion:

Surveying mites of stored onion bulbs in Menoufyia region (Sadat city) proved the incidence of 11 species of 5 families and 10 genera. species of Acaridida mites ranked the highest on population, while Gamasida mite were the lowest (Table1 & 2). This matches with the findings Hoda *et al.* (1990). Members of the predatory families cheyletidae and stigmatidae were the most common species associated with almost of

stored onion which were highly infested with Acaridida mites, species of the family Acaridae were the most abundant on the tested stored onion. This phenomena resemble the findings of Zaher *et al.* (1986).

Members of the Acaridae and cheylatidae were the most common species, associated with stored onion, while species of stimgacidae was fairly common.

The most common species associated with stored onion were the predacious mites, specially cheyletid and laelapid species which were highly infested with astigmatid mites species of the family Acaridae were the most abundant on the tested stored onion. These results are similar to those of Zaher *et al.* (1986) and El-Naggar *et al.* (1992) it is obvious that high population densities occurred in summer and autumn seasons and low populations occurred in spring and winter during the first season 4105%, 31.61%, 17.69% and 9.64%. While, the second season was 45.79%, 31.95%, 14.36% and 7.94%.

Acaridida, Actinedida and Gamasida contributed 79.84%, 12.19% and 7.96% in the first season (2006), respectively. While, in the second season (2007) comprised 78.87%, 14.36% and 6.76%, respectively, as indicated in Table (2).

Finally, it can be stated that each genus mentioned above had its own range of distribution during the whole year of storage.

According to the predator's population recorded in this work in association with a stigmatid mites of stored onions, an important role of these group of predatory mites could be played in biological control of these astigmatid mites (Table 2). Therefore, further studies to evaluate the role of predatory mites in controlling mites of stored onion bulbs in storage houses and grainaries are of great importance to be carried out.

B. Survey of insect species on vegetative onion:

a. Insect pests:

Results in Table (3) revealed the presence of 3 species of insect pests affiliated to 3 families and two orders from onion in the first and second seasons at Kafr El-sheikh region. In the first and second seasons thysanoptera was the most dominant order, including thripidae family. Thripidae was represented by *Thrips tabaci* Lind. showing 74.78 and 85.53% out of total. Order Diptera ranked the second, including syrphidae and anthomyiidae families. Syrphidae was represented by *Eumerus amoenus* Loew. Showing 15.10 and 12.81% out of total anthomyiidae was represented by *Delia alliaris* (Fonseca) comprising 10.11 and 1.65% out of

total. On the other hand, data in Table (3) indicated the presence of 3 species of insect pests belonging to 3 families and two orders from onion in the first and second seasons at Menoufyia region. In the first and second seasons. Thysanoptera was the most dominant order, involving thripidae family. Thripidae was represented by *Thrips tabaci* Lind. comprising 71.69 and 74.46% out of total. order Diptera ranked the second, including Syrphidae and Anthomyiidae families. Syrphidae was represented by *Eumerus amoenus* Loew showing 19.45 and 18.31% out of total. Anthomyiidae was represented by *Delia alliaris* (Fonseca) comprising 8.85 and 7.22% out of total it is noticeable that petiforous insects were higher than beneficial ones and visitor insects they composing 77.41 and 72.85% of the total catch in the first and second season, respectively at Kafr El-Sheikh region compared with 74.24 and 78.97% at Menoufyia in the first and second seasons, respectively.

Several investigators recorded many insect pests associated with onion vegetables crop, i.e. Elbolok *et al.* (1990) recorded 37 insect species belong to 23 families and 10 orders on onion plants at Giza and Assiut regions. Takatoshi (2006) recorded 7 insect species on onion plants in central and southern Vietnam. Variation in the recorded insect pests among investigators may be due to crop, location differences, soil type and annual weather fluctuations and probably other unknown factors.

b. Beneficial insects:

Data in Table (3) show the presence of 6 species of beneficial insects in four families and three order in both seasons of study at Kafr El-Sheikh region. Compared with five species of beneficial insects in four families and three orders in the first and second seasons at Menoufyia region. Data in Table (3) showed the presence of beneficial insects in the first season 2005/2006 and the second seasons 2006/2007. Coleoptera was the first largest group and contained two families, being coccinellidae and staphylinidae coccinellidae was represented by *Coccinella undecimpunctata* (R) *Cydonia (chilomenes) Vicina nilotica* (Muls) and *Scymnus punctillum* (Weise) accounting 30.28 & 26.80, 29.72 & 28.51, 3.23 & 0.62% out of total, respectively.

Staphylinidae was represented by *Paederus alfieri* (Koch.) (33.52 & 28.05% as total) order diptera ranked the second and was represented only by one family, syrphidae (*Syrphus corolae* F.) comprising 2.11 & 15.42% out of the total of beneficial insects. Order Neuroptera ranked the third and was represented by one family, being chrysopidae, *Chrysoperla carnea*

(Steph). having 1.11 & 0.56% out of total, respectively. While, Menoufyia region, the results came in the same trend the largest group of beneficial insects in the first season was Coleopterous insects, represented by two families, coccinellidae as *Coccinella undecimpunctata* (R) and Cydonia (chilomenes) *Vicina nilotica* (Muls) with 26.23 & 27.72 and 26.11 & 28.80%, respectively. Staphylinidae was only represented by *Paederus alfieri* (Koch) (28.40 and 27.32% out of total). Diptera was represented by *Syrphus corollae* F. comprising 19.13 and 14.70% out of total. Neuroptera was the least abundant order and was represented by Chrysopidae (*Chrysoperla carnea* Steph) composing 0.13 and 1.44% out of total respectively. Several investigators recorded many beneficial species associated with the insect pests on onion vegetable crops, i.e. El-Bolok *et al.* (1990) recorded 12 beneficial insect species on onion plants at Giza and Assiut Governorates. Takatoshi (2006) recorded 4 beneficial insect on onion plants in central and Southern Vietnam. In the current study, beneficial insects were scant in comparison with the insect pests composing 21.77 and 26.45% in the first and second seasons, at Kafr El-Sheikh region, while, Menoufyia region comprising 25.34 and 20.71% in the first and second seasons, respectively. This may be due to species composition, crop plantations, soil type, and toxic effects of pesticides (El-Mezayyen, 1998 and Helal *et al.* (2003).

c. Visitor insects:

Data in Table (3) revealed the presence of two species of visitor insects, belonging to two families and two orders in both seasons of study at Kafr El-Sheikh and Menoufyia regions. In the first and second seasons, Hymenoptera was the largest group represented by one family, Apidae as *Apis mellifera* (L.) which was considered the most dominant species during the 1st and 2nd seasons (78.37 & 65.22%) at Kafr El-Sheikh region compared with there obtained at Menoufyia region (84.62 & 69.56%), respectively. Order diptera ranked second and represented by one family being syrphidae and one species namely *Erstalis taenax* (L.) (21.63 & 34.78%) at Kafr El-Sheikh region compared with 15.38 & 30.44% at Menoufyia region. Visitor insects reaching 0.18 and 0.69% of the total catch in the first and second seasons at Kafr El-Sheikh region. While, at Menoufyia region composing 0.42 and 0.32% of the total catch in the first and second season. El-Bolok *et al.* (1990) recorded two visitor insects on onion plants at Giza and Assiut Governorates.

2. Shannon-weaner diversity index (S.W.I) for species on onion:

A. Mites:

Data in Table (4) presented the computed values of the Shannon-weaner of diversity indices in relation to onion stored from which samples were taken. The S.W. diversity index for Acaridida in the sampled onion stored was higher in the second season than in the first one, being 1.0209 and 0.9813, respectively at Menoufyia region. The number of species in it were 3 species for the former onion stored in the first and second season.

It could be concluded that onion stored had dominant and subdominant mites species which can affect the diversity index values. The relationship between species and ecological process can change quantitatively and qualitatively with environment context (Cardinale & Nelson, 1999). Data in Table (4) revealed the S.W. diversity index for Actinedida was higher in the first season than the second one being 1.4569 and 1.1469. The number of species was five for the former onion stored in the first and second seasons at Menoufyia region. The same Table indicated the S.W. diversity for Gamasida was higher in the second season than the first one being 1.0855 and 1.0401 the number of species was three for the former onion stored in the first and second seasons at Menoufyia region.

Table (4): Shannon-weaner indices as computed from data of Acaridida, Actinedida and Gamasida of onion stored during 2006 and 2007 seasons at Menoufyia Governorate.

Sub order Seasons	Acaridida			Actinedida			Gamasida		
	Mean No.	Number of species	S.W.	Mean No.	Number of species	S.W.	Mean No.	Number of species	S.W.
2006	402.06	3	0.9813	64.40	5	1.4569	40.26	3	1.0401
2007	370.23	3	1.0209	68.73	5	1.1469	31.95	3	1.0855

b. Insect:

Results in Table (5) presented the computed values of the Shannon-weaner diversity indices in relation to onion plants from which samples were taken. The S.W. diversity index for pests in the sampled onion plants was higher in the first season than in the second one, being

0.7343 and 0.4645, respectively at Kafr El-Sheikh region, but it was higher in the first seasons than the second one, being 0.7714 and 0.7199, respectively, at Menoufyia region. The number of species in it were three species for the former onion plants in the first and second season at Kafr El-Sheikh and Menoufyia regions.

Table (5): Shannon-weaner indices as computed from data of insect pests, beneficial and visitor insects from onion vegetative system during 2005/2006 and 2006/2007 seasons from Kafr El-Sheikh and Menoufyia regions.

Seasons	Insect pests			Beneficial insects			Visitor insects		
	Mean No.	Number of species	S.W.	Mean No.	Number of species	S.W.	Mean No.	Number of species	S.W.
2005/2006	540	3	0.7343	151.88	6	1.4997	5.69	2	0.522
2006/2007	372.3	3	0.4645	135.16	6	1.4162	3.54	2	0.646
2005/2006	529.99	3	0.7714	180.91	5	1.5665	3.00	2	0.4292
2006/2007	436.93	3	0.7199	114.58	5	1.6320	1.77	2	0.6144

It could be concluded that onion plants had dominant and subdominant insect species which can affect the diversity index values. The relationship between species and ecological process can change quantitatively and qualitatively with environment context (Cardinale & Nelson, 1999). Data in Table (5) revealed the S.W. diversity index for beneficial species was higher in the first season than the second one being 1.4997 and 1.4162. The number of species was six for the former onion in the first and second season at Kafr El-Sheikh region, while, was the highest in the second than first season, being 1.6320 and 1.5665 respectively at Menoufyia region. The number of species were five species for the former onion plants in the first and second season at Menoufyia region.

Similar results were obtained by El-Dakhakhni *et al.* (1995) who reported that clover had the highest number of beneficial insect species (22), while cotton and soybean had less species, 12 species, for each crop. For natural enemy species on the sampled crops was the highest in clover being 2.52 while, in maize it was the lowest being 1.81. As for cotton and soybean it was 2.08 and 2.41, respectively. Also, El-Mezayyen (2001) indicated that the S.W. diversity index for pests, beneficial and visitor species in the sampled crops was the highest in alfalfa at Sebha (Libya)

being 1.6641, 0.6129 and 0.8222 while, in the Egyptian clover at Kafr El-Sheikh, it was the lower, being 0.6154, 0.5152 and 1.1480 and the number of species were 14, 11 and 5 for alfalfa while, they were 13, 8 and 6 for the Egyptian clover, respectively. Helal *et al.* (2003) indicated that diversity indices were 2.8761 and 1.0983 for pestiferous and beneficial insects in it 85 k-105-2 and it TVU-12349 genotypes in the first season, respectively in the second one, diversity indices were 1.4294 and 1.5616 for pests and beneficial insects in 90 K-284-2 and it 833911 genotypes, respectively. In the current study, it was anticipated that the relative insect abundance of species on onion plants may have an effect on diversity index values of S.W. support such suggestion.

REFERENCES

- Aboul-Zahab, A.O. (1976).** Biological and ecological studies on certain insects infesting onion in A.R.E. M.Sc. Thesis, Ain Shams Univ., Egypt, 212 pp.
- Aihara, E.; Matsumoto, N. and Muramitsu, T. (1985).** Dipterous insects detected on imported onion bulbs with a tentative pictorial key to larvae. Res. Bull. Plant Protect. Serv, Japan. 21: 75-80 (C.F. R.A.E., 74(8): 426, 1986).
- Attiah, H.H. (1969).** Tyroglyphid mites with stored food in U.A.R. Egypt. Min. Agric., Plant Prot. Dept. Tech. Bull. 10: 1-51 pp.
- Cardinale, B.J. and Nelson, K. (1999).** The effect of spatial variation and disturbance on the relationship between species diversity and ecosystem function. The Ecol. of Amer., 84th Ann. Meet; Abstract. 12.
- Dimetry, N.Z.; Shokry, A. and Abou I-Zahab, A. (1979).** Insect injuries to onion in storage in Egypt. Proc. 3rd Arab Pest. Conf. Tanta Univ.: 303.
- El-Bolok, M.M.; Ismail, I.I. and El-Shabrawy, H.A. (1990).** Survey and abundance of insects attacking onion in field and store with the accompanied natural enemies at Giza and Assiut regions. Ann. Agric. Sci., Moshtohor, 28(3): 17191-1804.
- El-Dakhkhni, T.N.; El-Hawary, I.S.; Tadros, M.S.; Shawer, M.B. and El-Mezayyen, G.A. (1995).** Studies on the beneficial insects in the Egyptian clover, cotton, maize and soybean at Kafr El-Sheikh. Agric. Sci. Mansoura Univ. 20(6): 3125-3133.
- El-Mezayyen, G.A. (1998).** Population of main insect pests and their predators on clover and alfalfa plants as influenced by different

- environmental conditions. J. Agric. Sci. Mansoura Univ., 23(8): 5953-5962.
- EI-Mezayyen, G.A. (2001).** Field studies on the insect species on two forage crops the Egyptian clover in Egypt and alfalfa in Libya. Egypt. J. Agric. Res., 79(3): 923-934.
- EI-Naggar, M.E.; Rakha, M.A. and Taha, H.A. (1992).** Mites of stored grains in Egypt. Egypt. J. Biol. Pest. Cont., 2(2): 109-122.
- EI-Sherif, A.R. (1971).** Studies on insects infesting onion and garlic in field and storage. Ph.D. Thesis, Ain-Shams University, Egypt. 230 pp.
- Gendy, R.H. (1978).** Biological studies on certain onion flies and their control. M.Sc. Thesis, Ain-Shams University, Egypt. 133 pp.
- Gherasim, V. and Lacatusu, M. (1977).** *Aphaereta minuta* (Ness) (Hymenoptera Braconidae, principal factor limiting the population of Diptera injurious to onion crops in the socialist Republic of Romania. Ann. Instit. Decarcetari Pentru Protect. Plant. 12: 229-236 (C.F.R.A.E., 67, 1978).
- Helal, R.M.Y.; EI-Mezayyen, G.A. and Nasef, A.M. (2003).** Studies on the insect species in different genotypes of cowpea at Kafr El-Sheikh. J. Agric. Sci. Mansoura Univ., 28(4): 3071-3082.
- Hoda, F.M.; EI-Naggar, M.E.; Taha, H.A. and EI-Beheiry, M.M. (1990).** Prostigmatid mites associated with stored products. Agric. Res. Rev. 68: 77-85.
- Hughes, A.M. (1976).** The mites of stored products. Min. Agric., Fish and Food Tech. Bull., 9: 287 pp.
- Kagan, F. (1976).** The characteristics of development, appearance and noxiousness of the more important pests of vegetable plants in Poland Bull. Inst. Ochrany Roslin, 62: 251-289. (C.F.R.A.E., 68(8) 503, 1980).
- Kerbs, C.J. (1978).** Ecology: The experimental analysis of distribution and abundance. in 2nd Harper and Row Publ. New York, USA. 678 pp.
- Khaingfields, A.M. and Delfinado, M.D. (1976).** Terrestrial animal of New York, Acarina. Part (4) Cheyletidae and cheyletillidae. J. New York Entomol., 84(3): 189-196.
- Klein-Kroutheim, F. (1934).** The onion fly, *Eumerus strigatus*, as a pest of beet. Anz. Schadlingsk, 10(9): 99-101 Berlin. (C.F. R.A.E., 22: 661, 1934).

- Krantz, G.W. (1975).** A manual of Acarology. O.S.U. Book Stores, Carvallis Oregon, USA, 335 Pr.
- Lange, R. (1964).** The influence of the food of *Musca domestica* on mortality of the parasite *Aphaereta pallipes* (Say) (Hymenoptera: Braconidae). Z. Angew. Entomol., 54: 213-218 (C.F.R.A.E. 54: 566, 1966).
- Lindquist, E.E. and Evans, G.O. (1965).** Taxonomic concepts in Acaridae, with a modification setal nomenclature for idioseoma of the Gamasida (Acarina: Mesostigmata) Ent. Soc. 47.
- Muray, K.R. and Jamil, Z. (1982).** A survey of storage Acari in lucknow. India. Biol Mem., 6(2): 97-122.
- Price, P.W. (1984).** Insect Ecology, 2nd ed. J. Wiley Sons. Inc. Wiley Inter Science Publication: USA. 607 pp.
- Saleh, S.M.; El-Helaly, M.S. and El-Gayar, F.H.(1986).** Survey of stored product mites in Alexandria district. Egypt. Alex. J. Agric. Res. 31(1): 387-391.
- Taha, H.A. (1985).** Prostigmatid mites associated with stored products. Agric. Res. Rev. Cairo, 68: 77-85.
- Takatoshi, U. (2006).** Current status of insect pests attacking green bunching onion in central and Southern Vietnam. J. Fac. Agric. Kyushu Univ., 51(2): 275-283.
- Tomlin, A.D.; Miller, J.J.; Harris, C.R. and Rolman, J.H. (1985).** Arthropod parasitoids and predators of the onion maggot (Diptera: Anthomyiidae) in South Western Ontario. J. Econ. Entomo., 78: 975-981.
- Tsutsumi, M. and Mitsui, Y. (1982).** The seasonal prevalence of three species of Diptera on onion in sapporo district. Ann. Res. of the Soc. Protect. of Japan. 33L 114-121. (C.F.R.A.E. 73(8): 644, 1985.
- Wallis, L.W.; Moore, A. and Gladwell, G.I. (1978).** Narcissus bulb production Horticultural Enterprises In Booklet, Minist. of Agric. Fish and Food, U.K., 10: 79. (C.F. R.A.E. 68(10): 643, 1980.
- Whistecraft, J.W.; Harris, C.R.; Tomlin, A.D. and Tolman, J.H. (1984).** Mass rearing technique for abroconid parasite, *Aphaereta pallipes* (Say) (Hymenoptera: Braconidae). J. Econ. Entomo., 77(3): 814-816.
- Zaher, M.A.; Mohamed, M.I. and Abdel-Halim, S.M. (1986).** Incidence of mites associated with stored seeds and food products in Upper Egypt. Exp. & Appl. Acarology, 2: 19-24.

Table (1): Seasonal fluctuations and distribution of mite species in stored onion from Menoufya, during 2006/2007 (April 2006- November 2007).

Sub order	Families	Scientific names	Average number of Acarid/ kg stored onion															
			Seasons 2006								Seasons 2007							
			Spring		Summer		Autumn		Winter		Spring		Summer		Autumn		Winter	
Mean	%	Mean	%	Mean	%	Mean	%	Mean	%	Mean	%	Mean	%	Mean	%			
		<i>Tyrophagus putrescentiae</i> (Schrank)	71.66	36.25	160.33	32.01	102.90	25.59	42.90	35.71	85.00	28.73	218.33	34.19	129.00	29.01	46.25	37.22
Acaridida	Acaridae	<i>Rhizoglyphus echinopus</i> (Fumouze & Robin)	92.33	46.71	265.00	52.91	242.50	60.55	64.00	53.76	94.16	49.17	304.90	47.69	234.00	52.62	68.00	54.73
		<i>Acarus siro</i> (Linnaeus)	33.66	17.03	75.90	15.07	85.90	13.06	12.90	10.90	42.33	22.10	115.66	18.11	81.66	18.36	10.00	8.95
		Mean	197.65	73.21	508.83	79.96	490.90	85.05	119.80	86.95	191.49	78.15	638.49	78.78	444.66	78.47	124.25	88.27
	Cheyletidae	<i>Cheyletus malaccensis</i> (Oudemans)	18.33	25.62	24.83	29.86	16.75	33.50	8.00	8.00	24.83	49.01	44.16	39.05	24.33	34.76	3.75	46.87
	Cheyletidae	<i>Cheyletus eruditus</i> (Schrank)	13.16	32.64	21.83	26.25	13.75	27.50	9.00	71.00	15.00	29.61	29.33	23.28	21.00	30.00	2.00	25.00
Actinedida	Cheyletidae	<i>Chaetomorphus leptopterorum</i> (Shaw)	9.33	23.14	17.33	20.84	12.00	24.00	2.90	20.00	5.83	11.51	20.90	16.27	11.00	15.72	2.25	28.12
	Cheyletidae	<i>Acropetella ducta</i> (Berlese)	7.00	18.60	14.33	17.23	7.90	15.00	1.00	8.00	2.90	4.93	15.83	12.66	6.83	9.75	0.00	0.00
	Sitonaetidae	<i>Sitonaetes africanus</i> (Soliman & Gamas)	0.00	0.00	4.83	8.01	0.00	0.00	0.00	0.00	2.90	4.93	16.16	12.83	6.83	9.75	0.00	0.00
		Mean	48.32	14.93	83.18	13.27	90.00	18.36	12.90	8.98	98.66	19.88	123.98	15.83	69.99	12.38	8.00	3.68
	Laelapidae	<i>Bleniocheus tarsoletis</i> (Berlese)	14.83	46.35	20.83	49.21	13.90	42.52	14.00	90.32	2.90	19.75	26.90	43.78	19.33	37.18	3.75	67.63
Gamasida	Laelapidae	<i>Androlaelaps reticulatus</i> (Berlese)	6.33	19.78	10.00	23.62	8.00	25.19	0.00	0.00	2.33	18.40	12.16	25.97	16.90	31.74	0.00	0.00
	Macrocheilidae	<i>Macrocheles muscadomesticae</i> (Scopoli)	18.83	33.86	11.90	27.16	18.25	32.28	1.90	9.67	7.83	61.85	14.16	26.24	16.16	31.00	2.75	32.33
		Mean	31.99	11.85	42.33	6.76	31.75	6.58	18.98	18.84	12.66	4.96	46.83	5.77	51.99	9.17	8.90	6.84
		General mean	269.96		626.31		482.25		147.80		254.81		811.29		966.64		148.75	

Table (2): Seasonal fluctuations and distribution of suborder Acari in stored onion from Menoufya region during 2006 and 2007 seasons.

Sub order	Average number of Acari/lb of stored onion																				Total mean	%
	Season 2006										Season 2007											
	Spring		Summer		Autumn		Winter		Total	%	Spring		Summer		Autumn		Winter		Total	%		
	Mean	%	Mean	%	Mean	%	Mean	%	mean		Mean	%	Mean	%	Mean	%	Mean	%	mean			
Acarifida	197.68	73.31	306.83	79.96	406.80	83.85	119.00	86.93	1217.98	79.84	191.49	75.15	438.49	76.70	444.66	76.47	134.25	86.27	1398.89	78.87	1308.43	79.32
%		16.23		41.12		32.88		9.77				13.68		45.66		31.78		8.88				
Actiniedida	48.33	14.93	83.15	13.27	90.00	18.36	12.50	8.90	185.97	12.19	50.66	19.88	125.98	15.53	69.99	12.38	8.00	5.68	264.63	14.36	220.3	13.35
%		21.68		44.71		26.88		6.72				19.89		49.47		27.48		3.15				
Gamasida	31.99	11.85	42.33	6.76	31.75	6.58	15.50	10.54	121.57	7.96	12.66	4.96	46.82	5.77	51.99	9.17	8.90	6.04	119.97	6.76	128.77	7.32
%		26.31		34.82		26.12		12.75				18.55		39.83		43.33		7.88				
Total	269.96		626.31		482.25		147.00		1525.52		254.81		611.29		566.64		140.75		1773.49		1649.50	
Mean %		17.69		41.85		31.61		9.64				14.36		45.79		31.95		7.94				

Table (3): Mean number of insect pests, beneficial insects and visitor insects sampled from the vegetative onion crop during 2005/2006 and 2006/2007 seasons at Kafr El-Sheikh and Menoufya regions.

Order	Families	Scientific names	Average number of recorded arthropods/10 plants											
			Kafr El-Sheikh				Menoufya							
			2005/2006		2006/2007		Total	%	2005/2006		2006/2007		Total	%
Mean	%	Mean	%	mean		Mean	%	Mean	%	mean				
A. Insect pests:														
Thysanoptera	Thripidae	<i>Thrips tabaci</i> (Lind)	403.85	74.78	318.46	85.53	361.15	79.17	380.00	71.69	325.38	74.46	352.69	72.95
a	Syrphidae	<i>Emerus amoenus</i> (Loew)	81.54	15.10	47.69	12.81	64.61	14.16	103.07	19.45	80.00	18.31	91.53	18.93
Diptera	Anthomyiidae	<i>Della allaria</i> (Fonseca)	54.61	10.11	6.15	1.65	30.38	6.66	46.92	8.85	31.55	7.22	39.23	8.11
Diptera			Mean											
			540	77.41	372.30	72.85	456.14	73.73	529.99	74.24	436.93	78.97	483.45	76.30
B. Beneficial insects:														
Coleoptera	Staphylinidae	<i>Paederus affertii</i> (Koch)	50.93	33.52	37.92	28.05	44.42	28.13	51.38	28.40	31.31	27.32	41.34	27.98
Coleoptera	Coccinellidae	<i>Cydonia (chilomenes) Vicina nilotica</i> (Muls)	45.15	29.72	38.54	28.51	41.84	26.49	47.23	26.11	33.00	28.80	40.11	27.14
Coleoptera	Coccinellidae	<i>Coccinella undecimpunctata</i> (R)	46.00	30.28	36.23	26.80	41.11	26.03	47.46	26.23	31.76	27.72	39.61	26.81
Coleoptera	Coccinellidae	<i>Scymnus punctillum</i> (Weise)	4.92	3.23	0.83	0.62	2.8	1.82	-	-	-	-	-	-
Diptera	Syrphidae	<i>Syrphus corolla</i> (F.)	3.20	2.11	20.85	15.42	26.42	16.73	34.61	19.13	16.85	14.70	25.73	17.41
Neuroptera	Chrysopidae	<i>Chrysoperla carnea</i> (Steph)	1.69	1.11	0.77	0.56	1.23	0.77	0.23	0.13	1.66	1.44	0.94	0.64
Mean			151.88	21.77	135.16	26.45	157.9	25.52	180.91	25.34	114.58	20.71	147.74	23.32
C. Visitor insects:														
Hymenoptera	Apidae	<i>Apis mellifera</i> (L.)	4.46	78.37	2.31	65.22	3.38	73.32	2.54	84.62	1.23	69.56	1.88	78.99
a	Syrphidae	<i>Erstalis teanax</i> (L.)	1.23	21.63	1.23	34.78	1.23	26.68	0.46	15.38	0.54	30.44	0.50	21.81
Diptera			Mean											
			5.69	0.81	3.54	0.69	4.61	0.74	3.00	0.42	1.77	0.32	2.38	0.37
Total mean			697.57		511		618.65		713.9		553.28		633.57	

الملخص العربي

الحصر والوفرة الموسمية للأكاروسات المرتبطة بالبصل فى المخازن والحشرات فى الحقل فى مصر

¹ محسن عطية محمد ابو طايش ، ² محمد محروس يوسف الشاذلى ،
¹ علبدين محمود خليل

¹ معهد بحوث وقاية النبات ، مركز البحوث الزراعية – الدقى – مصر
² كلية الزراعة سابا باشا – جامعة الاسكندرية – مصر

نظرا لأهمية محصول البصل سواء بالنسبة للاستهلاك المحلى أو للتصدير الخارجى لذلك فقد أجرى هذا البحث لمعرفة أنواع الأكاروسات المختلفة المصاحبة للبصل (جيزه ٦) وكذلك الوفرة الموسمية لها بمحافظة المنوفية (مدينة السادات) وكذلك حصر الآفات الحشرية والنافعة والزائرة المتواجدة على المجموع الخضرى للبصل فى منطقة كفرالشيخ والمنوفية فى موسمين هما ٢٠٠٥/٢٠٠٦م ، ٢٠٠٦/٢٠٠٧م وذلك على مدار فصول السنة الأربع ومقارنة الأعداد المسجلة بكلتا المحافظتين موضع الاختبار كذلك تم دراسة التنوع بالنسبة للثلاث مجموعات المسجلة من الأكاروسات والحشرات. أظهرت نتائج الدراسة خلال العامين ٢٠٠٦-٢٠٠٧م حيث تم تسجيل ١١ نوع من الأكاروسات

هى:

Tyrophagus putrescentiae (Shrank), *Rhizoglyphus echinopus* (Fumouze & Robin), *Acarus siro* (Lineaus), *Cheyletus malaccensis* (Oudemans), *Cheyletus eneditus* (Schrank), *Cheletomorpha lepidopterorum* (Shaw), *Acaropsellina docta* (Berlese), *Stigmaeous africanus* (Soliman & Gomaa), *Blattisocius tarsalis* (Berlese), *Androlealaps reticulates* (Berlese) and *Macrocheles muscadomesicae* (Scopli).

تقع تحت ثلاث رتب أكاروسية هى: Acaridida, Actinedida and Gamasida وقد وجد أن ثلاثة أنواع منها تنتمى إلى عائلة واحدة هى Acaridae تابعة لرتبة Acaridida وخمسة أنواع تنتمى إلى عائلتين هما Cheyletidae and Stigmaeidae تابعة لرتبة Actinedida وثلاثة أنواع تنتمى إلى عائلتين هما: Lealalidae and Macrochelidae تابعة لرتبة Gamasida.

وقد تبين من الدراسة أن تحت رتبة الأكاريديدا هي الأكثر سيادة في البصل المخزون وأن تحت رتبة الأكتينيديدا أتت في المرتبة الثانية بينما جاءت تحت رتبة الجامسيديدا في المرتبة الأخيرة.

وقد أوضحت الدراسة أن تعداد الأكاروسات في البصل المخزن أثناء الصيف والخريف أعلى من في الربيع والشتاء على التوالي وقد كانت قيم دلالات التنوع هي ١,٠٤٠١ ، ١,٤٥٦٩ ، ٠,٩٨١٣ بالنسبة لتحت رتبة الأكاريديدا والأكتينيديدا والجامسيديدا على التوالي في البصل المخزن في الموسم الأول بينما في الموسم الثاني كانت قيم دلالات التنوع هي: ١,٠٢٠٩ ، ١,١٤٦٩ ، ١,٠٨٥٥ بالنسبة لتحت رتبة الأكاريديدا والأكتينيديدا والجامسيديدا على التوالي في منطقة المنوفية.

من ناحية أخرى أما بالنسبة لحصر الحشرات في منطقتي كفر الشيخ والمنوفية خلال الفترة من فترة التجربة فقد تم تسجيل ثلاثة أنواع من الحشرات الضارة تتبع ٣ عائلات هي: Thripidae, Syrphidae and Anthomyiidae ورتبتين حشريتين هما: Thysanoptera and Diptera في كلا الموسمين في منطقتي كفر الشيخ والمنوفية.

وقد وجد ستة أنواع من الحشرات النافعة تتبع أربع عائلات هي: Staphylinidae, Coccinellidae, Syrphidae and Chysopidae من ثلاثة رتب حشرية هي Coleoptera, Diptera and Neuroptera في كلا الموسمين بكفر الشيخ. بينما وجد خمسة أنواع من الحشرات النافعة تتبع أربع عائلات وثلاث رتب حشرية في كلا الموسمين بالمنوفية. كذلك وجد نوعين من الحشرات الزائرة تتبع عائلتان هما: Apidae and Syrphidae من رتبتين حشريتين هما: Hymenoptera and Diptera في كلا من كفر الشيخ والمنوفية.

وقد كانت قيم دلالات التنوع ١,٤٩٩٧ ، ٠,٧٣٤٣ بالنسبة للأفات الحشرية والحشرات النافعة على نباتات البصل في الموسم الأول بينما كانت قيم دلالات التنوع ١,٤١٦٢ ، ٠,٤٦٤٥ في الموسم الثاني بالنسبة للأفات والحشرات النافعة في منطقة كفر الشيخ في حين كانت قيم دلالات التنوع في منطقة المنوفية في الموسم الأول والثاني للأفات الحشرية والحشرات النافعة هي: ٠,٧٧١٤ ، ١,٥٦٦٥ ، ٠,٧١٩٩ ، ١,٦٣٢٠ على الترتيب وقد لوحظ أن التواجد النسبي للأصناف الأكاروسية والحشرية على البصل في المخزن وعلى نباتات البصل في الحقل لها تأثير على قيم دليل التنوع.