POPULATION FLUCTUATIONS OF CERTAIN MITES ASSOCIATED WITH SOYBEAN AND COTTON PLANTS IN RELATION TO CLIMATIC FACTORS AND LEAF PHYTOCHEMICAL CONTENTS

KALMOSH, FATMA. SH. [1]; E.F. EL-KHAYAT[2], G. H. RADY[2], O. M. O. MOHAMED[1] and TAHANY R. ABDEL-ZAHIR[2]

1. Plant Protection Research Institute, ARC, Dokki Giza,Egypt.
2. Faculty of Agriculture, Benha University, Moshtohor, Egypt.

Abstract

Population fluctuations of certain mites associated with soybean and cotton plants were investigated during seasons, 2012 and 2013 at Sharkia Governorate, as well as its relation with some prevailing climatic factors. In soybean plants, the population of phytophagous mite, *Tetranychus urticae* Koch was recorded in high number in 2nd season than the 1st one, whereby represented by 272.83 and 202.69 individuals, respectively. While, the predacious mite, *Phytoseiulus macropilis* (Banks) recorded in high number in 1st season than the 2nd season were aggregated 37.72 and 25.91 individuals, respectively; on soybean plants. The population of *T. urticae* was higher in 1st year than the 2nd year (394.92 and 367.65 individuals, respectively; while the predacious mites were high in the 2nd year than that obtained in the 1st one on cotton plants. These results revealed that there is negative significant relation between the predacious mite species and the phytophagous mite species on soybean and cotton plants. The population of the spider mite *T. urticae* was significantly related to the leaf contents of protein and phosphorous, while there was no significance between the predator (*P. macropilis*) with leaf phytochemical contents of soybean during two seasons 2012/13. The population of the spider mite and leaf phytochemical contents of cotton during season 2013 revealed that there is highly significant correlation between the pest mite *T. urticae* with protein, carbohydrate, total sugar and reducing sugar, while there was no significance between the pest and non-reducing sugar. The population revealed that there is no significant correlation between the predator *Typhlodromus californicus* with protein, carbohydrate, reducing sugar and non-reducing sugar. The correlation coefficient was significant between the predator *Agistemus exsertus* and carbohydrate, total sugar and reducing sugar, they also recorded a highly significant correlation between the predator and protein; while there was no significance difference between the two predators (*A. swiriskii & E. scutalis*) with phytochemical contents.

INTRODUCTION

Cotton, *Gossypium barbadense* L. and soybean, *Glycine max* (L.) Merr. occupy an important position among field crops in Egypt, while cotton has traditionally been

the most important fiber crop in Egypt and the leading agricultural export crop and soybean which used for human consumption and oil extraction. Cotton and soybean are heavily infested by the phytophagous mite, *Tetranychus urticae*, Koch which considered one of the most important mites infesting many crops in the world and frequently causes a considerable loss in yield and fiber quality (Wilson *et al.*, 1993, El-Khouly *et al.,* 1998 and Taha *et al.,* 2001).

The wide use of pesticides for controlling cotton and soybean pests has hazard side effects on the wild life, human health and inducing considerable problems in the environmental balance between pests and its related biological agents. (John *et al.*, 1986). However, varieties of soybean exhibit variable reactions to the sucking pests infestation depending on plant physical properties or chemical components of plant leaves (Zaher *et al.,* 1980; Hildebrand *et al.,* 1986; McAuslane *et al.,* 1995 and McAuslane, 1996) as biochemical factors to a large extent, affect the behavior and metabolic processes of pest, while morphological factors mostly influence the mechanisms of locomotion, feeding, oviposition, ingestion and digestion of the pest (Kumar, 1984). Also, plan resistance to insects is generally derived from certain biochemical and / or the metabolism of insects which affect the damage caused by these insects (Metcalf and William, 1975).

So, the present work was carried out to study the population fluctuation of mites associated with soybean variety (Giza 311) and Cotton at Sharkia Governorate during two seasons, as well as, its relation with some prevailing weather factors and chemical contents of leaves.

MATERIALS AND METHODS

1. Population fluctuation studies of mite species associated with Soybean (Giza 311 variety) and cotton crops:

The present experiment was carried out at Hehia distract, Sharkia Governorate through 2012 and 2013 seasons. Samples (40 leave each) were collected randomly at early morning from cotton and soybean infested field. All collected samples were kept in paper bags. Necessary information including crop locality and date of collection and sowing were recorded.

Samples were directly transferred to the laboratory and examined using stereomicroscope to compare occurrence of the identified species on each crop. This process repeated weekly at the same region, as well as the temperature and relative humidity were recorded. All mite species were identified at Acarology Dept. Plant Protection Research Institute Sharkia Branch.

2. Chemical analysis:

2.1. Samplying technique:

Weekly samples of (40 leaves) were collected randomizely from field and transformed in paper bags to laboratory and dried in vain at 35ºC.

2.2. Determination of carbohydrate fractions:

One gram of dried leaves was hydrolysed by addition of 50 ml of 0.8N sulphuric acid, for 16 hours under a reflux condenser on a boiling water bath, then filtered and the filtrate was transferred into neutralized with 2N NaOH, clarified with lead acetate and transferred into measuring flask and completed with distilled water to 100 ml with. Ten ml of the filtrate were transferred into a 25 ml measuring flask and completed with distilled water. One ml was taken from a 25ml measuring flask in a test tube, 4 ml of distilled water and 2ml of 3, 5 dinitrosalicylic acid were added, mixed well, then heated in a boiling water bath for 10 min. After cooling to room temperature the density of the developed colour was measured with Spectrophotometer at 550 nm using (spectronic 20 colorimeter). Concentration of sugars was obtained according to a standard calibration curve prepared by the same way using glucose, then calculated as mg glucose / 100 mg dry weight.

2.21. Preparation of crude ethanolic extract:

Approximately one gram of the dried leaves was used for the extraction of total soluble sugars by boiling in 80 % of aqueous ethanol for 8 hours under a reflex condenser. The extract was filtrated and evaporated to dryness under reduced pressure, then the residue was taken up in a 50 ml measuring flask with 10% isopropanol. The ethanolic extract was used for the determination of total soluble carbohydrate and total reducing sugars.

2.3. Determination of total soluble sugars:

Twenty ml of soluble sugars extract were taken in to a 100 ml conical flask, then 10 ml of 0.8N sulphuric acid was added and the mixture was hydrolyzed under a refluxing condenser on a boiling water bath for 4 hours. The hydrolyzate was then neutralized with 2 N NaOH solutions and adjusted to 50 ml with distilled water. Ten ml of the diluted hydrolyzate was transferred into a 25 ml measuring flask and completed with distilled water. Five ml of the diluted hydrolyzate were taken in a test tube and 2 ml of 3, 5 dinitrosalicylic acid (reagent 1) was added. The mixture was heated on a water bath for 10 min, then the developed colour was measured by a Spectronic 20 colorimeter at 550 nm, total soluble sugar concentration was calculated from standard calibration curve for glucose as mg glucose / 100 mg dry matter according to A.O.A.C. (2000).

2.4. Determination of reducing sugars:

Eight ml of the ethanolic extract containing total soluble sugars was transferred into a 25 ml measuring flask, and completed with distilled water, then 5 ml of the solution were pipptted in a test tube, followed by addition of 2 ml of reagent (1). The test tube was then heated and the developed colour was measured after cooling to room temperature and reducing sugars were obtained from a standard calibration curve for glucose as above and calculated as mg glucose / 100 mg dry matter according to **A.O.A.C. (2000).**

2.5. Determination of non-reducing sugars:

The difference between the percentage of total soluble sugars and reducing sugars was taken as the percentage of non-reducing sugars. (% non-reducing sugars = % total soluble sugars - % total reducing sugars) according to A.O.A.C. (2000).

2.6. Determination of crud protein:

The crude nitrogen content of soybean and cotton leaf was determined by micro-Kjeldahl method. Crude protein content was calculated as percentage of the dry weight bases by multiplying crude nitrogen percentage by the conversion factor of 6.25 according to A.O.A.C. (2000).

2.7. Determination of phosphorus content:

Phosphorus content was determined by flame photometer according to the method described by Jackson (1970).

RESULTS AND SISCUSSION

Data in Table (1) showed that sixteen mite species belonging to four families were identified in the total collected samples (cotton & soybean). From the economical point of view the identified Acari can be classified according to their feeding habits to three major groups; phytophagous mites, predaceous mites and uncertain feeding behavior mites.

Soybean:

Data in Tables (2&3) and Figs., (2&3) revealed that the population of *Tetranychus urticae* Koch has a single high peak in the first week of August recording was 56.73 individual / soybean leaflet in the first season (2012) while it was 77.5 individuals/ soybean leaflet in the second season (2013).

Data in Tables (2&3) and Figs., (2&3) showed that the population of predacious mite *Phytoseiulus macropilis* was highly increased in the first week of August in both two seasons of study and it was the same (13.25 individuals / leaflet).

Data obtained in Tables (2&3) showed that the total population of the phytophagous mite *T. urticae* was high in the second season (272.825 individuals/ leaflet) compared with the first one (202.69 individuals/ leaflet). On the other hand, the predacious mite *P. macropilis* was higher in the first season (37.72 individuals/ leaflet) than that the second one (25.91 individuals/ leaflet).

As shown from obtained data in Figures (2&3) there is a clear relation between the predacious mite and the phytophagous mites.

Table 1. Survey of mite species associated with two field crops (cotton & soybean) in Hehia district , Sharkia Governorate.

Mite species	Host Plant	Population
I. Predacious mites:		
I.1.Family: Phytoseiidae Berlese *Amblyseius swirskii* Athias-Henriot	Soybean & Cotton	Moderate
Amblyseius zaheri Yousef and El-Brollosy	Soybean	Moderate
Amblyseius enab El-Badry	Soybean	Rare
Amblyseius cucumaris (Oudemans)	Soybean & Cotton	Low
Amblyseius yousefi Zaher and El-Brollosy	Cotton	Low
Euseius scutalis (Athias-Henriot)	Soybean & Cotton	High
Phytoseiulus macropilis (Banks)	Soybean	High
Typhlodromus cardiae	Soybean & Cotton	Low
Typhlodromus californicus McGregor	Cotton	Low
Typhlodromus pyri Schueten	Cotton	Rare
Typhlodromus zaheri Denmark	Soybean & Cotton	Low
I.2.Family:Stigmaeidae Oudemans *Agistemus exsertus* Gonzalez	Cotton	High
II. Phytophagous mites II.1.Family:Tetranychidae Donnadien *Tetranychus urticae* Koch	Soybean & Cotton	High
Tetranychus cucurbitacearum (Sayed)	Soybean & Cotton	High
III.Uncertain feeding behavior mites III.1. Family: Tydeidae Kramer *Tydeus oregonesis* Baker	Cotton	Low
Tydeus californicus (Banks)	Cotton	Moderate

High= Cosmopolitan, recorded in most samples.

Moderate = Recorded in 50 % of the samples.

Low= Recorded in 25% of the samples.

Rare= Recorded in less than 10 % of the samples.

Table 2. Population fluctuations of mites associated with Soybean plants during season 2012.

Inspection date	T .urticae	P. macropilis	Mean temperature	R.H%
July, 1st	3.125	0.53	27.29	42.29
July, 8th	26.23	1.33	27.71	44.86
July, 15th	47.35	1.075	28	47.71
July, 22th	54.85	3.175	29.86	55
July, 29th	56.73	11.63	29.71	54.71
August, 5th	12.73	13.25	29	54.71
August, 12th	1.15	1.8	28.86	54
August, 19th	0.075	0.25	31.43	48.86
August, 29th	0.025	0.55	30	58.71
September, 2nd	0.05	0.45	30.29	57.57
September, 9th	0	0.15	30	53.57
September,16th	0.175	1.8	31	44.57
September, 23th	0.2	1.73	29.71	54.57
Total	202,69	37.72	____	___

Table 3. Population fluctuations of mites associated with soybean plants during season 2013.

| Inspection date	T .urticae	P. macropilis	Mean temperature	R.H%
June, 27th	0.5	0.53	25.7	69
July, 4th	6.25	1.33	25.9	68.21
July, 11th	8.6	1.075	25.36	73.14
July, 18th	30	3.175	24.53	72.71
July,25th	74	0.55	25.62	68.14
August, 1st	74.5	13.25	25.84	67.79
August, 8th	77.5	1.5	26.8	69
August, 15th	1.15	2.75	23.8	74
August, 22th	0.075	1.75	26.4	67
August, 29th	0.025	0	25.4	68
September, 5th	0.05	0	26	69
September, 12th	0	0	22.7	73
September, 19th	0.175	0	23.6	72
Total	272.82	25.91	___	___
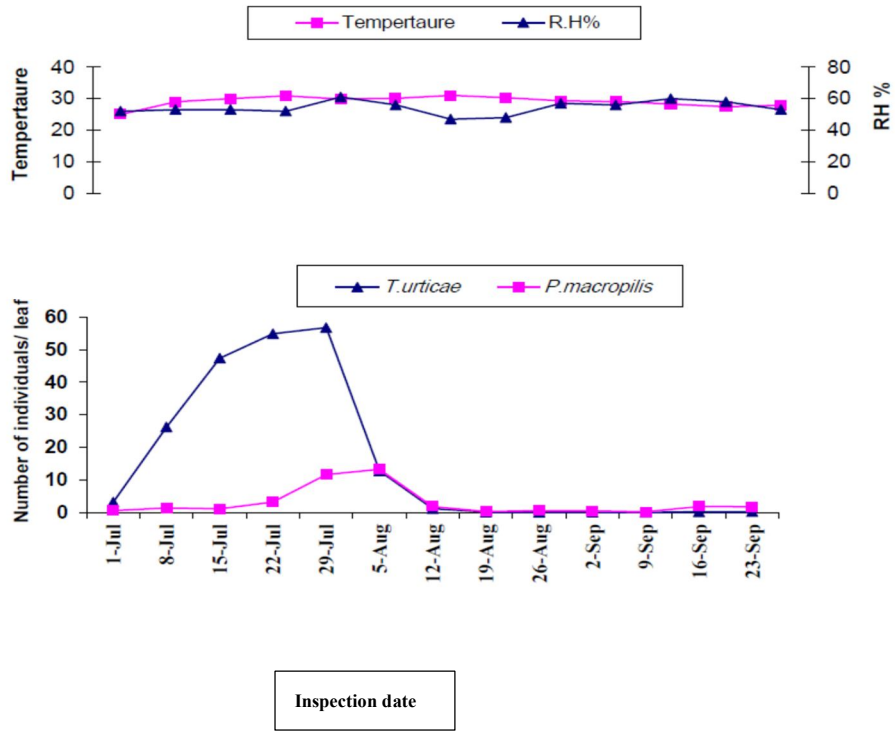
Fig 2. Population fluctuations of mites on soybean plants during season 2012.
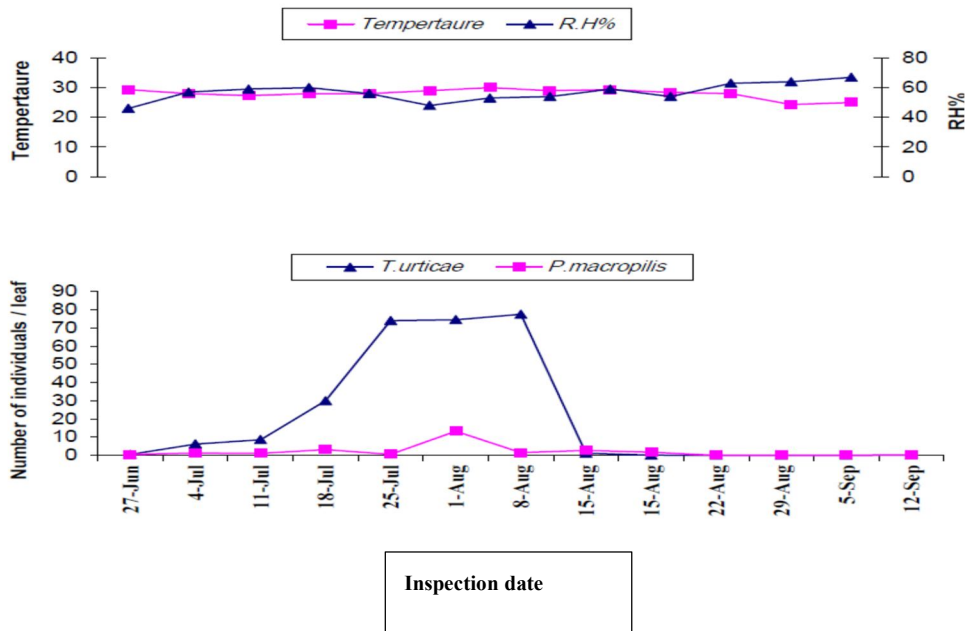

Fig 3. Population fluctuation of mites on soybean plants during season 2013.

1.1.2. Cotton:

Data in Tables (4&5) and Figs., (4&5) revealed that the population of *Tetranychus urticae* Koch has two peaks in the first week of July and the first of August recording 17.23 & 28.34 individual / leaf, respectively in the first season (2012) while it was 17.75& 35.25 individuals/leaf in the first week of July and last week of August, respectively in the second season (2013).

Data in Tables (4&5) and Figs., (4&5) showed that the population fluctuation of predacious mites *T. californicus, A. exsertus* and *A. swirskii* represented the highest peak in the first season 2012 and it was 5.0, 10.23 and 4.21 individuals / leaf, respectively. But the predacious mite *E. scutalis* recorded two peaks 7.35 & 6.25 individual / leaf in the second week of June and July respectively. While the second year (2013) *T. californicus* showed the highest peak (5.5 individuals/leaf), *A. exsertus, A. swirskii* and *E. scutalis* indicated two peaks (6.25, 11.25), (4.75, 4.8) and (7.7, 6.75) individuals / leaf, respectively.

Data obtained in Tables (4&5) showed that the total population of the phytophagous mite *T. urticae* was higher in the first season (394.92 individuals) compared with the second one (367.65 individuals/40leaves). On the other hand the predacious mites were high in the second year than that in the first one.

Obtained data in figures (4&5) showed that there is a clear relation between the predacious mite species and the phytophagous mite species.

Table 4. Population fluctuations of mite species associated with cotton during season 2012.

Inspection date	T. urticae	A. swirskii	E. scutalis	T. californicus	A. exsertus	Mean temperature	R.H%
April,12th	3.92		0	0	0	25.14	35.43
April,19th	7.11		0	0	0	25.86	40.86
April,24th	9.5	0	2.5	0	0	24.71	48.86
May,3rd	8.06	0	2.5	0	1.9	27.43	48.86
May,10th	7.35	2.31	3.7	0	2.3	29.29	48
May,17th	13.86	1.5	2.3	1.5	0	30.57	45.29
May,24th	13.88	0.5	1.44	0	0	29.86	49.14
May,31th	14.05	1.21	3.5	0	1.69	30.86	49.43
June,7th	17.23	2.5	4.62	1	3.95	27.71	44.86
June,14th	16.25	3.6	7.35	2.0	5.46	28	47.71
June,21th	15.42	4.5	5.63	0.5	4.3	29.86	55
June,28th	19.33	3.16	2.45	1	3.16	29.71	54.71
July,5th	17.45	2.53	3.43	1	2.45	29	54.71
July,12th	23.12	1.44	6.25	0	6.5	28.86	54
July,19th	22.91	2.5	4.02	0	7.19	31.43	48.86
July,26th	24.13	4.21	5.13	2.3	10.23	30	58.71
August,2rd	28.34	3.12	2.5	4.2	7.15	30.29	57.57
August,9th	27.18	0.5	3.4	5.0	4.13	30	53.57
August,16th	21.73	1.2	2.75	4.0	3.92	31	44.57
August,23th	22.51	0.9	1	1.5	2	29.71	54.57
August,30th	17.22	1.5	3.11	0.7	1.32	33.43	63.86
September,6th	18.13	1.31	0.9	1.2	3.5	28.57	59.29
September,13th	15.66	0	1.11	1.5	1	27.71	58.57
September,20th	10.58	0	1.35	0.5	0.5	27.71	52.43
Total	394.92	38.49	70.94	27.9	72.65		

Table 5. Population fluctuations of mites associated with cotton plants during season 2013.

| Inspection date	T. urticae	A. swirskii	E. scutalis	T. californicus	A. exsertus	Mean temperature	R.H%
April,12th	2.25	0	0	0	0	18.4	71
April,19th	4.75	0	0	0	0	18.1	75
April,24th	7.5	0	3.25	0	0	18.1	71
May,3rd	7.25	0	2.8	0	2.1	24.25	60
May,10th	7.75	2.5	4.4	1.5	2.5	25.3	69
May,17th	10.5	1.75	2.8	2.25	0	23	66
May,24th	12.00	1.00	1.95	0	1.65	27.1	60
May,31th	12.7	1.35	4.25	1.25	1.9	25.3	53
June,7th	14.7	3.35	5.25	0	4.25	27.15	58
June,14th	15.5	3.6	7.7	2.0	6.25	26.35	63
June,21th	15.75	4.75	6.15	0.75	4.4	24.05	71
June,28th	17.75	3.5	2.8	1.6	3.55	24.75	72
July,5th	16.5	3.05	4.35	1.65	2.8	25.35	72
July,12th	25.5	1.6	6.75	0	7.25	24.6	72.5
July,19th	30.25	3.25	4.75	2.0	7.19	25.6	68
July,26th	30.75	4.8	5.75	2.55	11.25	25.86	68
August,2rd	35.25	3.8	3.25	4.7	7.7	26.15	70
August,9th	34.75	0.75	4.3	5.5	4.75	24.8	67.5
August,16th	25.25	1.45	3.4	4.2	4.4	21.5	76.5
August,23th	12.5	1.15	1.4	1.9	2.7	25.45	67
August,30th	11.25	2.25	3.8	1.0	1.9	22.15	68
September,6th	10	3.75	1.4	1.5	3.9	20.3	65
September,13th	4.75	4.75	1.45	2.25	1.75	21.05	73.5
September,20th	2.5	2.5	1.65	1.05	1.25	21.65	70.5
Total	367.65	54.9	83.6	37.65	63.44		
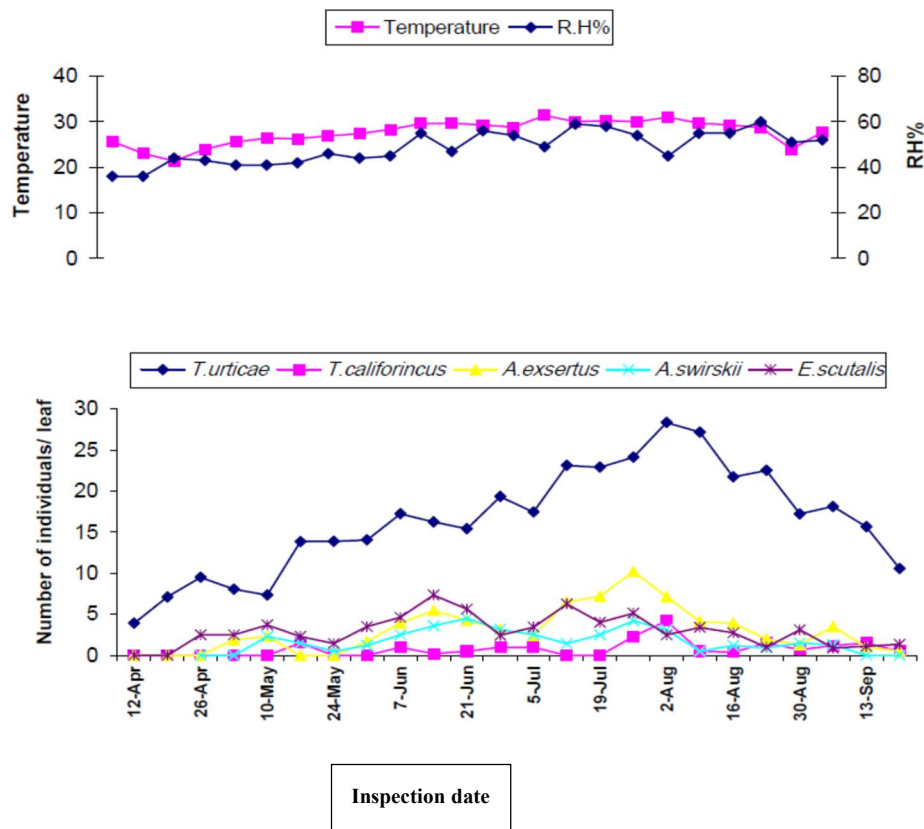
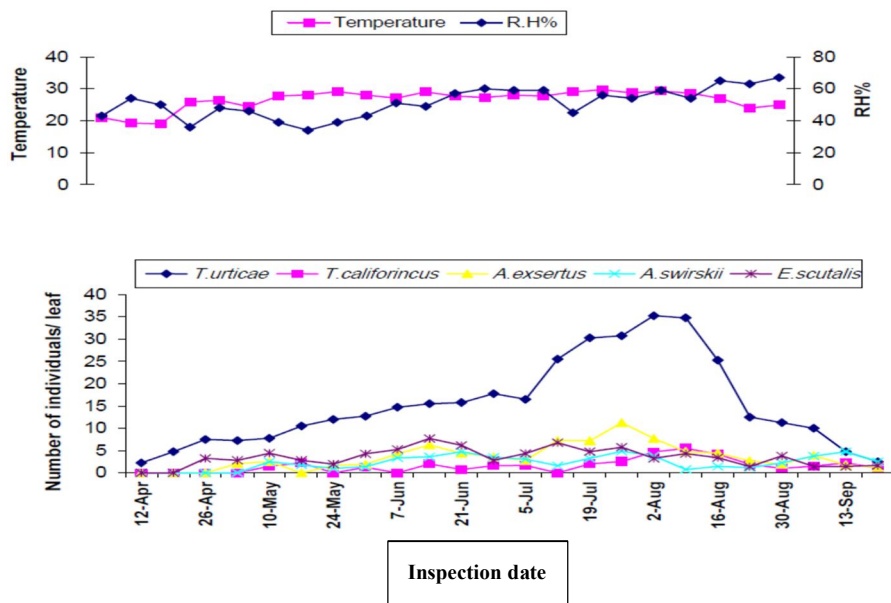Fig 4. Population fluctuations of some mite species associated with cotton during season 2012.

Fig 5. Population fluctuations of mites associated with cotton during season 2013

1.2. Statistical Analysis:

1.2.1. Correlation between the population of two mite species, some climatic factor and leaf chemical contents of soybean during two successive seasons 2012-13 (Tab., 6):

The results of correlation coefficient analysis revealed positive relation between *T.urticae* and *P. macropilis* population and each of weekly temperature (r= 0.418 &0.302) and weekly mean R.H.% (r= 0.142 & 0.372) during 2012 season. During 2013 season the same results were found for temperature (r= 0.151 & 0.201) for two mite species, respectively; and relative humidity for *P.macropilis* (r= 0.195) but differed with negative correlation for R.H% (r= -0.323) fot *T.urticae.*

In regard to the relation between mite population and chemical content of soybean, the results showed no significant correlation between all measured chemical except reducing sugar with *P. macropilis* (r= -0.619*) during 2013 and protein+ phosphorus with both mite species (r = 0.6166*, 0.5614* and 0.5494* , 0.6960*) during 2012 and 2013 seasons, respectively.

Table 6. Correlation coefficient values (r) between two mite species and each of weekly mean temperature, relative humidity and leaf chemical contents of soybean during seasons 2012-13.

Mite species	Temp.	R.H.	Total sugar	Reducing sugar	Nonreducing sugar	Total carbohydrate	Total protein	Protein + Phosphorus
Season 2012								
T. urticae	0.418	0.142	0.426	0.138	0.057	-0.413	-0.002	0.6166*
P. macropilis	0.302	0.372	0.054	0.070	0.056	0.169	-0.244	0.5614*
Season 2013								
T. urticae	0.151	-0.323	0.093	-0.338	0.196	-0.400	0.142	0.5494*
P. macropilis	0.201	0.195	-0.276	-0.619 *	-0.153	-0.317	-0.149	0.6960*

Also, the results indicated not stable trend for the effect of chemical components of soybean leaves on mite species population where the correlation values were differed as positive and negative significant from season to another for the same component and mite species except that of *P. macropilis* which had negative insignificant correlation with all chemical components during 2013 season. This results are partially agree with those of Gamieh and El-Basuony (2001), (De Angelis *et al.,* 1983 and Wermelinger *et al.;* 1991) who mentioned a positive correlation between reducing sugar and mite population.

1.2.2. Correlation between the mite species of cotton and both temperature and R.H. during 2012:

The correlation coefficient as shown in Table (7); revealed that there is highly significant correlation between the *T. urticae* and two predators *Typhlodromus californicus* & *Agistemus exsertus* (r = 0.563 & 0.732), resp., as affected by temperature and relative humidity (r = 0.792 & 0.720), resp., but it was significant between the *T. urticae* with *Amblyseius swirskii* (r = 0.447); while there was no significance between *Euseius scutalis*. The correlation coefficient revealed that there is no significant correlation between *Typhlodromus californicus* with *Amblyseius swirskii*, *Euseius scutalis* and Temperature. As exption appeared showing a highly significant correlation between R.H. (r = 0.554), but it was significant between the *Agistemus exsertus* (r = 0.441). The correlation coefficient revealed that there is highly significant correlation between the *Agistemus exsertus* with *Amblyseius swirskii* and *A. exsertus* with *Euseius scutalis* (r = 0.679 & 0.661)., respectively, as affected by temperature and relative humidity (r = 0.669 & 0.558)., respectively, but it was significant between the predator with the *Typhlodromus californicus* (r = 0.411). The correlation coefficient revealed that there is no significant correlation between *Amblyseius swirskii* and *Typhlodromus californicus* as affected by relative humidity. As exption appeared showing a highly significance between the predator with *Agistemus exsertus* and *Euseius scutalis* (r = 0.679 & 0.651), resp., as affected by temperature (r = 0.542).

The correlation coefficient revealed that there is no significant correlation between the *Euseius scutalis* and *Typhlodromus californicus* as affected by temperature and relative humidity. As exption appeared showing a highly significant correlation between *E. scutalis* with *A. exsertus* and *A. swirskii* (r = 0.661 & 0.651), respectively.

Table 7. Correlation coefficient values (r) between temperature, relative humidity and population fluctuations of mite associated with cotton during season 2012.

Species	Mite species					
	T. californicus	A. exsertus	A. swirskii	E. scutalis	Temp.	R.H.
T. urticae	0.563***	0.732***	0.447*	0.371	0.792***	0.720***
T.californicus	___	0.411*	0.379	-0.065	0.352	0.554 **
A. exsertus	0.411*	____	0.679***	0.661***	0.669***	0.558**
A. swirskii	0.379	0.679***	____	0.651**	0.542**	0.256
E. scutalis	-0.065	0.661***	0.651**	___	03891	0.257

*= Significant

**= High significant

*** Highly significant

1.2.3. Correlation between the mite species of cotton and both temperature and R.H. during 2013:

The correlation coefficient as shown in Table (8); revealed that there is highly significance between the pest mite *T. urticae* and with *Typhlodromus californicus* , *Agistemus exsertus* and *Euseius scutalis* (r = 0.683, 0.827 and 0.538), resp. as affected by temperature (r = 0.621); while there was no significance between the predator with *Amblyseius swirskii* as affected by R.H.

The correlation coefficient revealed that there is no significant correlation between the predator *Typhlodromus californicus* with *Amblyseius swirskii* and *Euseius scutalis* as affected by relative humidity. As exption appeared showing significant correlation between the predator and *Agistemus exsertus* (r = 0.435) as affected by temperature (r = 0.478).

Table 8. Correlation coefficient values (r) between temperature, relative humidity and population fluctuation of mite species associated with cotton during 2013.

Species	Mite species					
	T. californicus	*A. exsertus*	*A. swirskii*	*E. scutalis*	Temp.	R.H.
T. urticae	0.683***	0.827***	0.297	0.538**	0.621**	0.114
T. californicus	-------	0.435*	0.269	0.138	0.478*	0.234
A. exsertus	0.435*	-----	0.578 **	0.657***	0.589**	0.204
A. swirskii	0.269	0.578 **	----	0.421*	0.433*	0.319
E. scutalis	0.138	0.657***	0.421*	-----	0.499*	-0.118

*= Significant

**= High significant

*** Highly significant

The correlation coefficient revealed that there is no significant correlation between *Amblyseius swirskii* and *Typhlodromus californicus* as affected by R.H. As exption appeared showing significant correlation between *A. swirskii* with *Euseius scutalis* (r = 0.421) as affected by temperature (r = 0.433); also, they recorded the correlation coefficient sowing a highly significance between the predator and *Agistemus exsertus* (r = 0.578).

The correlation coefficient revealed that there is highly significant correlation between the predator *Euseius scutalis* and *Agistemus exsertus* (r = 0.657); while there was no significance difference between *Typhlodromus californicus* as affected by

R.H., but it was significant between the predator with *Amblyseius swirskii* (r = 0.421) as affected by temperature (r = 0.499).

1.2.4. Correlation between the mite species and leaf phytochemical contents of cotton leaves during 2013 (Table 9):

The correlation coefficient revealed that there was highly significant between *T. urticae* with protein, carbohydrate, total sugar and reducing sugar (r = 0.812, 0, 74, 0.675 & 0.587), respectively; while there was no significance between the mite and nonreducing sugar.

The correlation coefficient revealed that there is no significant correlation between the predator *Tyhplodromus californicus* with protein, carbohydrate, reducing sugar and nonreducing sugar. As exption appeared showing significant correlation between *T. californicus* with total sugar (r = 0.431).

The correlation coefficient revealed that there is significant correlation between the *Agistemus exsertus* and carbohydrate, total sugar and reducing sugar (r = 0.502, 0.465 & 0.407), respectively. They also recorded the correlation coefficient showing a highly significant correlation between the predator and protein (r = 0.551); while there was no significance between the predator and nonreducing sugar.

The correlation coefficient revealed that there is no significant correlation between the two predators (*A. swirskii* & *E. scutalis*) with leaf phytochemical contents.

Table 9. Correlation coefficient values (r) between leaf phytochemical and population fluctuations of mites associated with cotton during 2013.

Mite Species	Some Phytochemical Contents				
	Protein	Carbohydrate	Total sugar	Reducing sugar	Nonreducing sugar
T. urticae	0.812***	0.740***	0.675***	0.587**	0.201
T. californicus	0.403	0.399	0.431 *	0.184	0.291
A. exsertus	0.551**	0.502*	0.465*	0.407*	0.136
A. swirskii	0.276	0.299	0.187	0.190	0.263
E. scutalis	0.313	0.304	0.162	0.279	-0.070

*= Significant
**= High significant
*** Highly significant

These results coincided with those obtained by Omar *et al.*, (2013) they studied interrelation between *Oligonychus pratensis* and *Amblyseius zaheri* with both temperature and relative humidity; they declared that no significance relationship between *O. paratensis* and *A. zaheri* as affected by temperature and R.H. at the both localities during both seasons. As exption appeared showing significant correlation between *A. zaheri* with R.H. at the two Governorates at both seasons. The correlation coefficient revealed that there is highly significance between the pest mite and its predator during the second season at El-Sharkia Governorate (r = 0.929); while there was no significance during the first season (r = 0.044). In El-Dakahlia, the correlation coefficient revealed that there is no significance (r = 0.060 & 0.311) at both seasons, respectively.

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تذبذب التعداد لبعض الأكاروسات المرتبطة بمحصولي فول الصويا والقطن وعلاقتهما بالظروف المناخية والمحتوي الكيميائى للأوراق

فاطمة شحاتة قلموش¹، عزت فرج الخياط²، جاد حماده حسن راضي²،
عمر محمد عمر¹ ، تهاني رشدي عبدالظاهر²

١- معهد بحوث وقاية النباتات – مركز البحوث الزراعية – الجيزة – مصر.

٢- قسم وقاية النبات – كلية الزراعة – جامعة بنها – مصر.

تمت دراسة تذبذب التعداد لبعض الأكاروسات المرتبطة بمحصولي القطن وفول الصويا خلال موسمي الزراعة ٢٠١٢- ٢٠١٣ وعلاقتها ببعض العوامل المناخية السائدة والمحتوي الكيميائي للأوراق.

وقد وجد أن تعداد الأكاروس النباتي *T. urticae* أعلي خلال الموسم الثاني (٢٠١٣) (٢٧٢,٨٢٥ فرد) بالمقارنه بالموسم الأول (٢٠١٢) (٢٠٢,٦٩ فرد). بينما كان المفترس الأكاروسي *P. macropilise* أعلي في التعداد خلال الموسم الأول (٣٧,٧٢ فرد) بالمقارنه بالموسم الثاني (٢٥,٩١ فرد) علي محصول فول الصويا. أما بالنسبة لمحصول القطن فقد وجد أن الأكاروس النباتي سجل أعلي تعداد في الموسم الأول (٣٩٤,٩٢ فرد) بالمقارنه بالموسم الثاني (٣٦٧,٦٥ فرد) من ناحية أخري فإن المفترس الأكاروسي كان أعلي في الموسم الثاني بالمقارنه بالموسم الأول .

وتشير هذه النتائج أن هناك علاقة معنوية سالبة بين المفترس الأكاروسي والأكاروس النباتي علي كلا من محصولي فول الصويا والقطن. أيضا كانت هناك علاقة معنوية بين تعداد الأكاروس *T. urticae* وعنصري البروتين والفسفور كأحد مكونات ورقة نبات فول الصويا. بينما توجد علاقة معنوية بين محتوي أوراق فول الصويا والمفترس الأكاروسي *P. macropilis* خلال الموسمين ٢٠١٢-٢٠١٣.

وتشير نتائج العلاقة بين مكونات أوراق القطن خلال عام ٢٠١٣ والتعداد أن هناك علاقة معنوية مرتفعة بين تعداد الأكاروس النباتي مع كلا من البروتين والكربوهيدرات والسكريات الكلية والسكريات المختزلة. بينما لاتوجد علاقة معنوية بين التعداد والسكريات الغير مختزلة. وقد اشار التعداد انه لايوجد اختلافات معنوية بين المفترس *Typhlodromus californicus* مع البروتين، والكربوهيدرات، والسكريات المختزلة والسكريات الغير مختزلة. وقد اشار معامل الارتباط. ان هناك اختلافات معنوية بين تعداد *Agistemus exsertus* وكلا من الكربوهيدرات والسكريات الكلية والسكريات المختزلة، وقد سجل ايضا علاقة اختلافات معنوية مرتفعة بين المفترس والبروتين ; بينما لاتوجد اختلافات معنوية بين كلا من *A. swirskii* و *E. scutalis* والمحتوي الكيميائي للاوراق.