SURVEY OF SOME PESTS ON ONION INFESTING AND CONTROL OF *THRIPS TABACI* AT SHARKIA GOVERNORATE , EGYPT

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ABSTRACT:

Onion, *Allium cepa* L. family (*Alliaceae*) is very important crop in Egypt and all over the world. The present work was conducted during two successive seasons in the period from [2020/2021and 2021/2022] in (Fakous, Abou-kabeer and Abou- Hammad district),Sharkia Governorate, Egypt , to survey of (*Thrips tabaci*, *Aphisgossypii* and Maggot) insects infesting onion crop.

To assesse the efficacy of the tested pesticides against *Thrips tabaci* under field conditions data showed that Chlorpyrifos was the most effective followed by Methoxyfenozide, pymetrozine 20% +thiamethoxam15% and Imidacloprid. The reduction percentage after 1 day were 65.8 to Chlorpyrifos, 63.9, 62.5 and 61.5 to Methoxyfenozide, pymetrozine 20% +thiamethoxam15% and Imidacloprid but after 3 days were 79.3 , 76.9, 75.7 and 74.2 for the tested insecticides (Chlorpyrifos, Methoxyfenozide, pymetrozine 20%+thiamethoxam15% and Imidacloprid), respectively . After 7 days 88.6, 86.4, 84.9 and 82.4 for (Chlorpyrifos, Methoxyfenozide , pymetrozine 20% +thiamethoxam15% and Imidacloprid), respectively .but after 10 days. The residual effect of the tested insecticides were 79.1, 77.12 , 75.82 and 73.43 for the previous tested insecticides (Chlorpyrifos, Methoxyfenozide, pymetrozine 20% +thiamethoxam15% and Imidacloprid , respectively.

Keywords: onion , survey *Thrips tabaci* , *Aphisgossypii* and Maggot ,mangment *Thrips tabaci* .

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1.INTRODUCTION

Onion, *Allium cepa* L. (Alliaceae) is one of the most important crops in agricultural economy, in human feeding, processing and exportation. Onion consumption had been significantly increased in the world for its health benefits (Wang *et al* 2006). Onion plantations as well as bulbs during the storage are ofently subject to considerable insect infestation which affects crop quality and quantity. Onion plants usually subject to infestation by different insect pests during their different stages of growth as the onion thrips *tabaci* Lind., the onion aphid*, Aphis gossypii Glov*., and onion maggot (*Delia antique*) Which caused yield losses (Mahmoud,2008 in Egypt and Mahaffey and Cranshaw, 2010) in USA) Onion thrips , *Thrips tabaci* was consider the most economically insect injurious onion crops worldwide (Gill *et al* 2015). Thrips is the most injurious insect on onion plants during their seasonal growth in Egypt (Temerak *et al* 2015) . Feeding injury by thrips resulted in punching leaf surface and extracting sap from plant cells, then attack plant contents and consume

mesophyll cells, this followed by loss in chlorophyll and reduction in photosynthetic efficiency (Boateng *et al* 2014) found that yield loss caused by onion thrips was ranged from 26 to 57%; another study revealed that yield losses were between 10 and 85%. Iris yellow spot virus (IYSV) transmission via *Thrips tabaci* (Lind.) (Thysanoptera: Thripidae) has been reported in many countries, including Egypt (Abdelkhalek *et al* 2019) . Control strategies of *T. tabaci* include chemical insecticide treatments. Heavy application and indiscriminate uses of chemical pesticides in insect pest management has led to the advancement of resistance in all classes of insecticides. On the other hand, using natural plant oils are encouraged in order to decrease the application of chemical pesticides and their residues (Jensen 2011). Allelochemicals are the secondary metabolites of allelopathic organisms. Recently, plant extracts have been used for pest control as alternatives to chemical pesticides (Qari and Abdel-Fattah 2017). On the other hand nanotechnology is an emerging sector of nanoscale materials that have gained spectacular growth in recent decades. Control of *Thrips tabaci*on onion plants by chloropyifos , methoxyfenozide , pymetrozine 20% + thiamethoxam 15% and imidacloprid .

2.MATERIALS AND METHODS

1. Ecological studies:

The present work was amid to study the ecological of the important common insect pests (*Thrips tabaci*, *Aphisgossypii* and Maggot) were carried out of (Fakous, Abou-kabeer and Abou- Hammad district), at Sharkia Governorate during two successive seasons [2020/2021and 2021/2022]. Onion variety Giza 20. Plants were transplanted at 8 weeks age.

1.1. Survey of insect pests and sesonal fluctutionson onion:

The experimental area was about(1/24 fed., Feddan = 4200 m^2) divided into four plots. The normal agriculture treatment of land preparation, irrigation, mechanical weeds control and fertilization were followed. Chemical control was avoided entirely during the growth since the appearance of seedilings . Sampling began in the first week of January 2021 and 2022.Samples were carried out every 15 days until harvest.

Two methods used for estimating the population abundance of the insects on onion. Plant samples and yellow sticky traps according to Fourier *et al.,*(1995) were carried out during the two successive seasons.

* The first method : plant samples, 10 onion plants randomly selected from each plot were carefully cut ground level before formed the bulb in the early season. When bulbs were formed, plant samples were cut from the upper part of the bulb. Plants were carefully handled to avoid disturbing the insects on plants. Plants placed in plastic bags and transported immediately to the laboratory. All leaves of samples were carefully inspected and the number of the pests were counted and recorded by using stereoscope binocular.

* Second methods yellow sticky traps [YST] with 10 x 20cm constructed from cardboard and coated with thin layer of adhesives were used to evaluate the adult of some pests.

The traps were held by small wooden sticks in avertical position and five traps per plot were used . The height of the traps was adjusted with growth of plants the traps were placed in the field in the early morning after remaining in the field for two week . The traps were taken into the laboratory and the number of adult of the pests on the entire trap surface were counted with 10x hand lens.

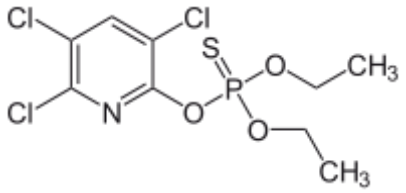
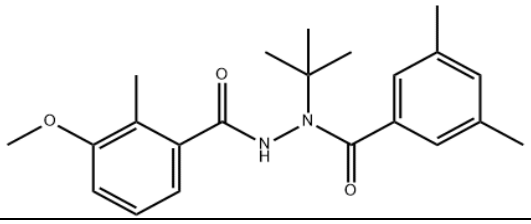
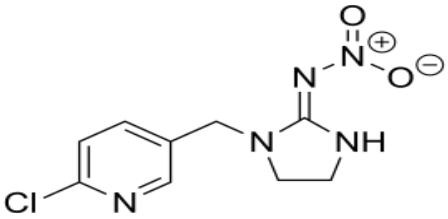
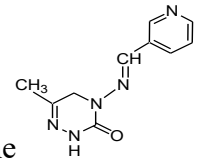
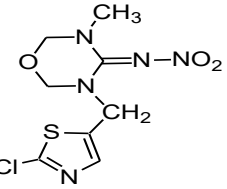
1.2. Effect of certain climatic factors (maximum and minimum temperatures and relative humidity) on the population density of pests infesting onion crops

Daily records of both maximum and minimum temperatures along with relative humidity were obtained from the Agrometeorological station at Sharkia Governorate which is located closely to the experimental areas during 2020/2021 and 2021/2022 seasons.

The relationship between each two weeks number of collected pests collected and the corresponding two weeks means of maximum, minimum temperatures and relative humidity were estimated. Partial regression was applied to show the effect of each factor on population density of pests.

The results obtained were statistically analyzed, correlation coefficient, explained variances and partial regression values were estimated according to **Costat (1995) .**

Table :(1). Chemical insecticides

Common name	Trade name	Chemical structure	concentration
Chlorpyrifos	**Ataban**		**5ml/10L**
Methoxyfenozide	**Methuran**		**3.75 ml/10L**
Imidacloprid	**Avenue**		**6gm/10L**
Pymetrozine20%+Thiamethoxam15%	**Cup extra**	Pymetrozine  Thiamethoxam 	**8gm/10L**

3. RESULTS AND DISCUSSION

1. ECOLOGICAL STUDIES

1.1. SURVEY OF CERTAIN INSECTS INFESTING ONIONS PLANTS.

In the present work the species were surveyed. These *Thrips tabaci***,** aphid , and onion maggot species during 2020/ 2021 and 2021/2022 seasons .

1.1.1. THRIPS TABACI

The numbers of *Thrips tabaci* collected from onions plants during 2020/2021 and 2021/2022 at Fakous, Abou-Kabeer and Abou Hammad districts, Sharkia Governorate are shown in Table(2) and illustrated graphically in Fig.(1).According to the obtained results it could be mentioned that the *Thrips tabac*i were found under the field conditions of onion during the period from of first of Jan. to first of May. The numbers of initial occurrence were 240, 253 and 232 for Fakous, Abou kabeer and abou Hammad at 17.08℃ at 65.91% R.H. in the first season 2020/2021 and (160, 182 and 150) for Fakous, Abou kabeer and Abou Hammad respectyively at12.76℃ at 67.04% in the second season 2021 /2022. The results showed that the high population density of *Thrips tabaci* individuals occurred in the first of April with number of(518, 530 and 498) for Fakous , Abou kabeer and Abou Hammad respectyively in 2020/2021 at17.51ºC and 56.45 R.H.% but the high population density of *Thrips tabaci* individuals occurred in the first of March with number of (408,418 and 399) for Fakous , Abou kabeer and Abou Hammad respectyively in 2021/2022 at 15.35ºC and 60.71 R.H.% .The number of *Thrips tabaci* was decline in the mid of April with number (302, 316 and 277) for Fakous , Abou kabeer and Abou Hammad respectyively in 2020/2021 at 23.41ºC and 47.25 R.H.% and (350, 370 and 330) for Fakous , Abou kabeer and Abou Hammad respectyively in 2021/2022 at 13,95 ºC and 54.66 R.H.%. In the first of May, the minimum number of *Thrips tabaci* (130, 156 and 120) for Fakous, Abou kabeer and Abou Hammad respectyively in 2020/2021 at 28.26ºC and 37.01 R.H.% while in the second season recorded (230, 263, 230) at 32.60℃ and 43.49 R.H.% .

In Fig(1) data obtained show high peak of activity of thrips tabaci on onion occurred in first of April in the first season 2020/2021 with a number 518, 530 and 498 in Fakous, Abou kabeer and Abou Hammad while the high peak of activity of thrips tabaci on onion occurred in first of March in the second season 2021/2022 with a number 408,418 and 399 in Fakous, Abou kabeer and Abou Hammad respectively.

This result showed that the number of thrips in season 2020/2021 more than the number of thrips in season 2021/2022.These results agreed with those of **Hamdy and Aref (2019)** who mentioned that Thrips population reached its maximum count in March, April and May, indicating to favorability of these periods for insect activity and reproduction. Seasonal average of thrips population on Giza 20 plants were ranged between 19.97 and 52.51 individual/ plant, whilst on Ahmartantawi plants, ranged between 16.77 and 44.17 individuals/ plant.

Sathe and pranothi (2015) recorded that Infestation of onion thrips was started from the first week of February and it became gradually increased up to the first week of April then it was declined. Thrips population was positively correlated with temperature and negatively with relative humidity and rainfall. **Wang *et al.* (2014)** Temperature is known to play a crucial role in the population dynamics of insects. Insects have evolved different mechanisms to resist unfavorable extreme temperatures. In recent years, western flower thrips, Frankliniella occidentalis (Pergande) (Thysanoptera: Thripidae), and onion thrips, Thrips tabaci (Lindeman) (Thysanoptera: Thripidae), have caused significant damage to vegetable crops. We exposed the various developmental stages of western flower thrips and onion thrips

to temperatures of 41, 43, or 45 degrees C for 2, 6, 12, 24, or 36 h to determine the effects of heat stress on survival.

1.2. Effect of certain climatic factors on the population density of the dominant *Thrips tabaci* insects infesting onion crops.

The statistical ananlysis of correlation Table (3) cleared That there were insiginificant negative correlation with mean temperature (r_1 = -0.274 ,- 0.31, -0.288) at Fakous, Abou kabeer and Abou Hammmad in 2020/2021 season, while it was positive and insignificant (r_1 = 0.2728, 0.4745 and 0.4967) at Fakous, Abou kabeer and Abou Hammmad in 2021/2022 season. The relationship between the numbers of *Thrips tabaci* and mean relative humidity, it was positive and insignificant (r_2 = 0.272, 0.297 and0.286) at Fakous , Abou kabeer and Abou Hammmad in 2020/2021 while it was insiginificant negative (r_2 =-0.314,-0.548 and-0.557) at Fakous , Abou kabeer and Abou Hammmad in 2021/2022 seasons,respectively. **Maher and Ansari (2014)** reported that Studies on population dynamics of adult and immature stage of thrips in relation to weather factors: temperature (maximum, minimum and average), relative humidity, wind velocity, dew point and rainfall were carried out for two cropping seasons of 2011-2012. Eight cultivars of onion were cultivated under the insecticides free field conditions. Density of adult and immature stages was observed weekly from randomized onion plants two weeks from day after transplanting (DAT) up to the harvesting. Infestation was started on almost onion cultivars at 56 DAT at 15.5°C with 74.1% relative humidity. A non-significant (P>0.05) variation occurred on average number of thrips on all cultivars. However, the correlation results showed that the temperature, relative humidity and dew point caused significant (P>0.05) effect on adult and immature stages of T. tabaci on almost all onion cultivars.

The partial regression between *Thrips tabaci* and mean temperature was positive and in significant (p_1= 0.475 ns, 0.416 ns and 0.451 ns) at Fakous, Abou kabeer and Abou Hammmad in season 2020/2021 and positive insignificant (p_1=0.458 ns, 0.196 ns and 0.173 ns) at Fakous, Abou kabeer and Abou Hammmad) during 2021/2022 season. While partial regression between the numbers of *Thrips tabaci.* and mean relative humidity was positive and insignificant (p_2=0.477ns, .436 ns and 0.455ns) at Fakous, Abou kabeer and Abou Hammmad in season 2020/2021 and partial regression between the numbers of *Thrips tabaci.* and mean relative humidity was positive and insignificant (p_2=0.458 ns, 0.126 ns and 0.119 ns) at Fakous , Abou kabeer and Abou Hammmad in 2021/2022 season, respectively.

Table (2): Total number of *thrips tabaci* infesting of onion during 2021 and 2022 seasons.

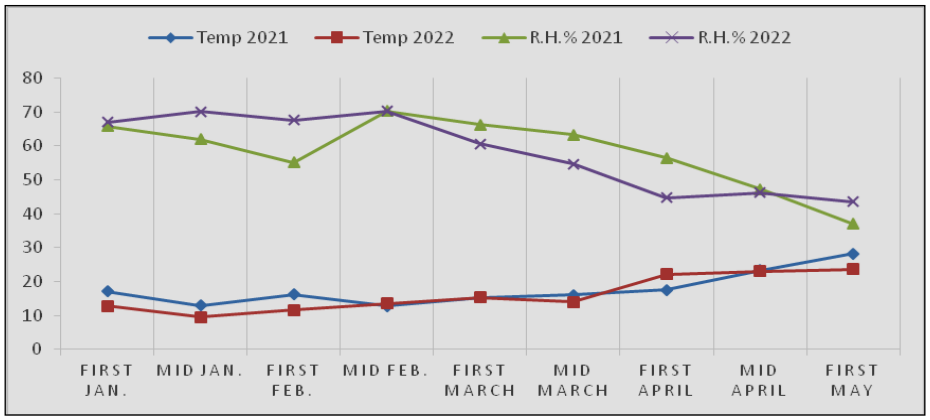
District	Fakous		Abou kabeer		Abou Hammad		Temp.℃		R.H.%	
No. of week in Manth / Season	2021	2022	2021	2022	2021	2022	2021	2022	2021	2022
First Jan	240	160	253	182	232	150	17.08	12.76	65.91	67.04
Mid Jan	199	120	210	138	186	108	12.90	9.52	61.95	70.14
First Feb.	325	153	380	178	319	146	16.22	11.67	55.09	67.62
Mid Feb.	212	310	270	253	200	220	12.87	13.52	70.32	70.26
First March	410	408	430	418	398	399	15.36	15.35	66.27	60.71
Mid-March	509	350	522	370	490	330	16.09	13.95	63.35	54.66

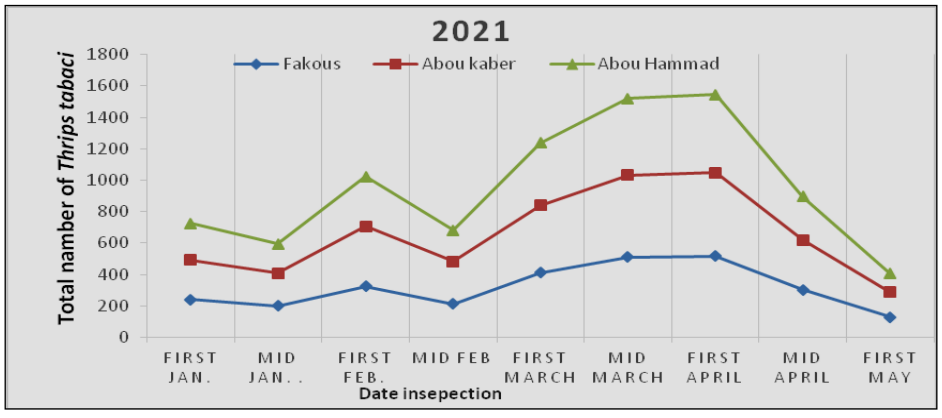
First April	518	300	530	334	498	313	17.51	22.19	56.45	44.80
Mid-April	302	240	316	312	277	296	23.41	23.01	47.25	46.26
First May	130	230	156	263	120	229	28.26	23.60	37.01	43.49
Total	2745	2271	3067	2448	2720	2191				

Table (3): Simple correlation coefficients and partial regression between mean temperature and mean relative humidity and total number of *Thrips tabaci* infesting onion plants during 2020/2021 and 2021/2022 seasons .

Localities	Simple correlation coefficient				Partial regression			
	2020/2021		2021/2022		2020/2021		2021/2022	
	r_1	r_2	r_1	r_2	p_1	p_2	p_1	p_2
Fakous	**-0.274**	**0.272**	**0.284**	**-0.314**	**0.475 ns**	**0.477 ns**	**0.458 ns**	**0.458 ns**
Abou kabeer	**-0.31**	**0.297**	**0.474**	**-0.548**	**0.416 ns**	**0.436 ns**	**0.196 ns**	**0.126 ns**
Abou Hammad	**-0.288**	**0.286**	**0.496**	**-0.557**	**0.452 ns**	**0.455 ns**	**0.173 ns**	**0.119 ns**

r_1= correlation coefficient between mean temp. and number of insects
r_2 = correlation coefficient between mean R.H.. and number of insects
p_1= partial regression between mean temp. and number of insects
p_2= partial regression between mean R.H.. and number of insect





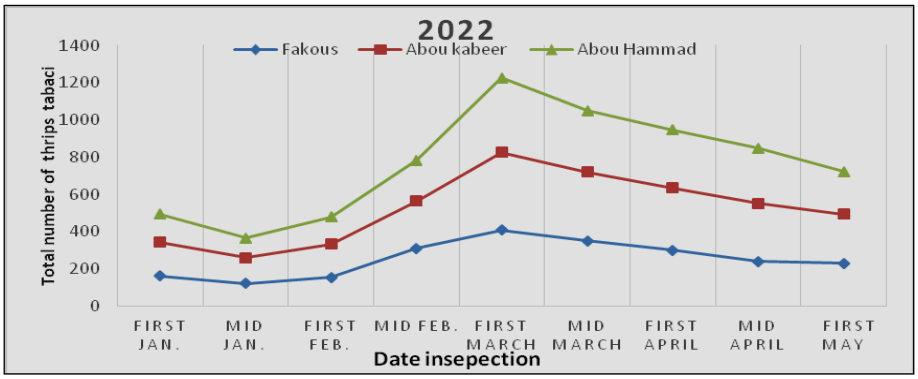


Fig (1): Population fluctuation of *Thrips tabaci* infesting onion plants collected by plant samples at 3 districts, Sharkia Governorate during 2021 and 2022 season, respectively .

1.1.2. *Aphis gosspyii*

The numbers of Aphids collected from onions plants during 2020/2021 and 2021/2022 at Fakous, Abou-Kabeer and Abou Hammad districts, Sharkia Governorate are shown in Table (4) and illustrated graphically in Fig.(2).According to the obtained results it could be mentioned that the *Aphis gosspyii* was found under the field conditions of onion during the period from mid of Feb. to first of May. The numbers of initial occurrence were(30, 35 and 29) for Fakous, Abou kabeer and abou Hammad at 12.87℃ at 70.32% R.H. in the first season 2020/2021 and (43, 38 and 40) for Fakous , Abou kabeer and Abou Hammad respectyively at13.52℃ at 70.26 % in the second season 2021 /2022. The results showed that the highest population density of *Aphis gosspyii* individuals occurred in the mid of March with number of(118, 163 and 161) for Fakous , Abou kabeer and Abou Hammad respectyively in 2020/2021 at16.09 ºC and 63.35 R.H.% but the highest population density of *Aphis gosspyii* individuals occurred in the first of March with number of(175,124 and 140) for Fakous , Abou kabeer and Abou Hammad respectyively in 2021/2022 at 15.35 ºC and 60.71 R.H.% The number of was few in the first of April with number (140,143 and 142) for Fakous , Abou kabeer and Abou Hammad respectyively in 2020/2021 at 17.51ºC and 56.45 R.H.% and (152, 108 and132)) for Fakous , Abou kabeer and Abou Hammad respectyively in mid of March 2021/2022 at 13,95 ºC and 54.66 R.H.%. In the first of May the minimum number of *Aphis gosspyii* (120, 72 and 94) for Fakous , Abou kabeer and Abou Hammad respectyively in 2020/2021 at 28.26ºC and 37.01 R.H.% while in the second season recorded (92, 66,94)at32.60℃and43.49R.H.% **Awadalla *et al.* (2011)** showed that The main insect pests inhabiting onion plants during the two seasons at Mansoura region were *Thrips tabaci* Lind.(36.3 and 36.9%), *Aphis gossypii* Glov.(28.7 and 28.5%), during the two successive seasons, respectively.

Sarwar *et al.* (2014) showed that the cotton aphid, aphis gossypii Glover (Hemiptera : Aphididae) is apolyphagus insect of cotton and many other ornamentals, crops and vegetables ,which sucks plants sap.Cotton aphids cause crop losses by extracting phloem sap and contaminating cotton opened boll lint with honeydew.

1.3. Effect of certain climatic factors on the population density of the dominant APhids insects infesting onion crops.

The statistical ananlysis of correlation Table (5) cleared That there were insiginificant positive correlation with mean temperature (r_1 =0.462 ,0.464 and0.503) at Fakous , Abou kabeer and Abou Hammmad in 2020/2021 season, while it was positive and insignificant (r_1 = 0.583, 0.602 and 0.675) at Fakous , Abou kabeer and Abou Hammmad in 2021/2022 season. The relationship between the numbers of Aphids and mean relative humidity, it was negative

and insignificant (r_2 =-0.303, -0.319 and-0.319) at Fakous , Abou kabeer and Abou Hammmad in 2020/2021 while it was insiginificant negative (r_2 =-0.701, -0.707 and-0.783) at Fakous , Abou kabeer and Abou Hammmad in 2221/2022 seasons,respectively.

The partial regression between Aphids and mean temperature was positive and in significant (p_1= .2481 ns , .2464 ns and .2033 ns)at Fakous , Abou kabeer and Abou Hammmad in season 2020/2021 and positive insignificant (p_1= .1292 ns , .1136 ns and . 0662 ns) at Fakous , Abou kabeer and Abou Hammmad) during 2021/2022 season. While partial regression between the numbers of *Aphis gosspyii.* and mean relative humidity was positive and insignificant (p_2=.4646 ns , . .4406 ns and .4225 ns) at Fakous , Abou kabeer and Abou Hammmad in season 2020/2021 and partial regression between the numbers of Aphids. and mean relative humidity was positive and insignificant (p_2=.0523 ns , .0497 * and .0215 *) at Fakous , Abou kabeer and Abou Hammmad in 2021/2022 season respectively.

Table (4): Total number of *Aphis gosspyii* infesting of onion during 2021 and 2022 seasons

District	Fakous		Abou kabeer		Abou Hammad		Temp.°C		R.H.%	
No. of week in Manth / Season	2021	2022	2021	2022	2021	2022	2021	2022	2021	2022
First Jan.	0	0	0	0	0	0	17.08	12.76	65.91	67.04
Mid Jan.	0	0	0	0	0	0	12.90	9.52	61.95	70.14
First Feb.	0	0	0	0	0	0	16.22	11.67	55.09	67.62
Mid Feb.	30	43	35	38	29	40	12.87	13.52	70.32	70.26
First March	78	175	65	124	97	140	15.36	15.35	66.27	60.71
Mid-March	188	152	163	108	161	132	16.09	13.95	63.35	54.66
First April	140	135	143	100	142	130	17.51	22.19	56.45	44.80
Mid April	129	100	118	74	133	103	23.41	23.01	47.25	46.26
First May	120	92	72	66	115	94	28.26	23.60	37.01	43.49
Tatol	685	697	596	510	677	639				

Table (5): Simple correlation coefficients and partial regression between mean temperature and mean relative humidity and total number of *Aphis gosspyii* infesting onion plants during 2020/2021 and2021/2022seasons

Localities	Simple correlation coefficient				Partial regression			
	2020/2021		2021/2022		2020/2021		2021/2022	
	r_1	r_2	r_1	r_2	p_1	p_2	p_1	p_2
Fakous	**0.462**	**-0.303**	**0.583**	**-0.701**	**.2481ns**	**.4646 ns**	**.1292 ns**	**.0523 ns**
Abou kabeer	**0.464**	**-0.319**	**0.602**	**-.707**	**.2464ns**	**0.4406ns**	**0.1136 ns**	**.0497***
Abou Hammad	**0.503**	**-.331**	**0.675**	**-.783**	**.2033ns**	**.4225ns**	**.0662ns**	**.0215***

r_1= correlation coefficient between mean temp. and number of insects
r_2 = correlation coefficient between mean R.H.. and number of insects
p_1= partial regression between mean temp. and number of insects
p_2= partial regression between mean R.H.. and number of insects

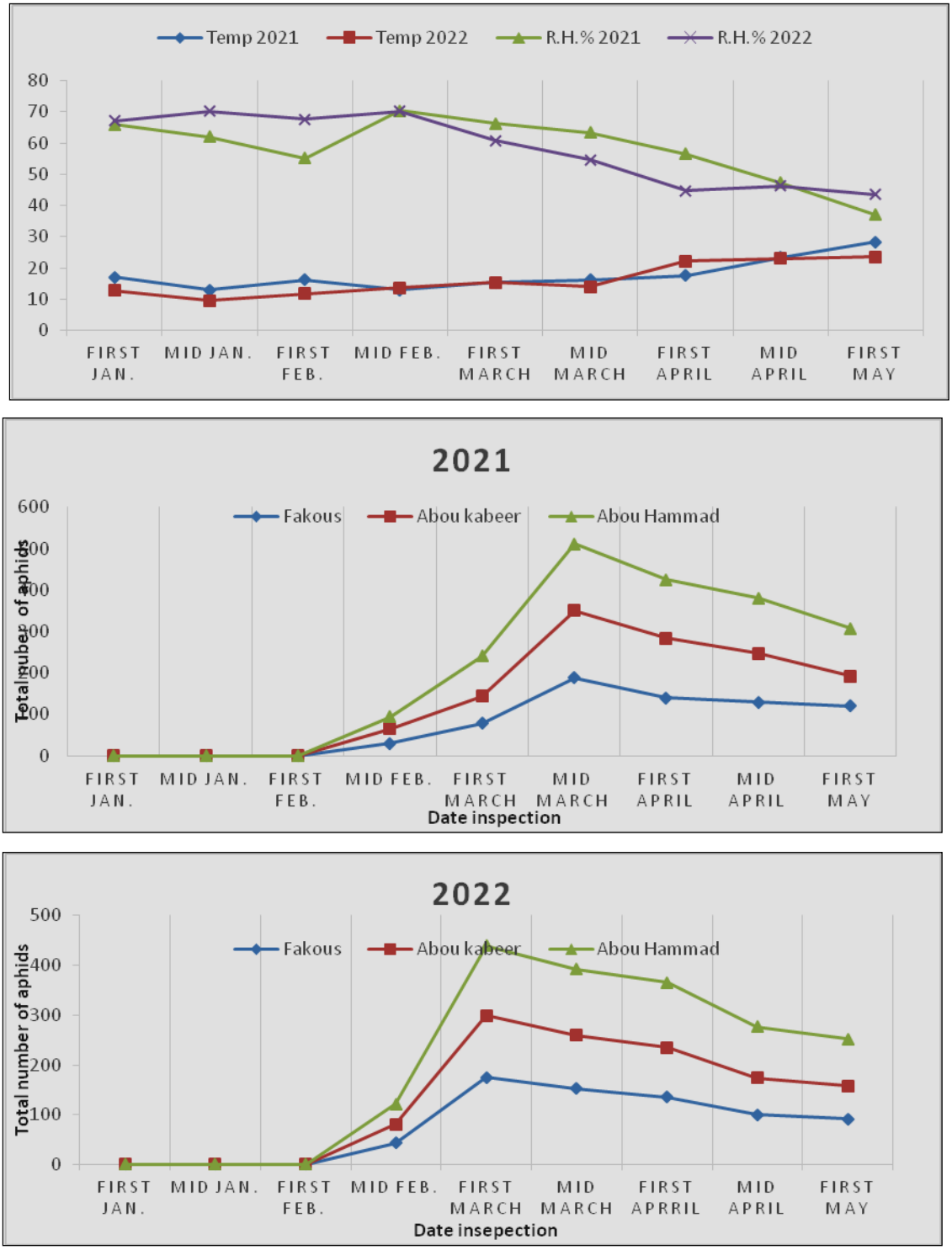


Fig (2): Population fluctuation of *Aphis gosspyii* infesting onion plants collected by plant samples at 3 districts, Sharkia Governorate during 2021 and 2022 season, respectively .

1.1.3 onion maggot (*Delia antique*)

The numbers of onion maggot collected from onions plants during 2020/2021 and 2021/2022 at Fakous, Abou-Kabeer and Abou Hammad districts, Sharkia Governorate are shown in Table(6) and illustrated graphically in Fig.(3).According to the obtained results it could be mentioned that the onion maggot were found under the field conditions of onion during the period from mid of Feb. to first of May. The numbers of initial occurrence were(20, 22 and 19) for Fakous, Abou kabeer and abou Hammad at 12.87°C at 70.32% R.H. in the first season 2020/2021 and (26, 24 and 40) for Fakous , Abou kabeer and Abou Hammad respectyively at13.52°C at 70.26 % in the second season 2021 /2022. The results presented in table(6) and Fig (3) showed that the highest population density of onion maggot individuals occurred in the mid of March with number of(63, 84 and 68) for Fakous , Abou kabeer and Abou Hammad respectyively in 2020/2021 at16.09 ºC and 63.35 R.H.% but the highest population density of onion maggot individuals occurred in the first of March with number of(58, 67 and 51) for Fakous , Abou kabeer and Abou Hammad respectyively in 2021/2022 at 15.35 ºC and 60.71 R.H.% The number of was few in the first of April with number (62, 78 and 49) for Fakous , Abou kabeer and Abou Hammad respectyively in 2020/2021 at 17.51ºC and 56.45 R.H.% and (48,57 and 40)) for Fakous , Abou kabeer and Abou Hammad respectyively in 2 March 2021/2022 at 13,95 ºC and 54.66 R.H.%. In the 1 May the minimum number of onion maggot (25, 49 and 24) for Fakous , Abou kabeer and Abou Hammad respectyively in 2020/2021 at 28.26ºC and 37.01 R.H.% while in the second season recorded (28 ,27, 29) at 32.60and 43.49 R.H.%. In Fig(3) data obtained show high peak of activity of onion maggot (*Delia antique*) on onion occurred in mid of April in the frist season 2020/2021 with a number 63 ,84 and 68 in Fakous , Abou kabeer and Abou Hammad while the high peak of activity of onion maggot (*Delia antique*) on onion occurred in first of March in the second season 2021/2022 with a number 58,67 and 51 in Fakous , Abou kabeer and Abou Hammad respectively.

This result showed that the number of The onion maggot, *D. antiqua* in season 2020/2021 more than the number of The onion maggot, *D. antiqua* in season 2021/2022.These results agreed with those of **Mlynarek (2020)** *Delia antiqua, Delia platura* and *Delia florilega* are three root maggot species commonly considered pests in Eastern Canadian onions. The onion maggot, *D. antiqua,* is considered the primary root maggot pest in onion but it remains unclear whether the other two species are also causing damage. *Delia* species oviposit readily on onion at the 5-7 true leaf growth stage but damage on onions is not statistically different between *Delia* species in our zero-inflated models. **Miyazaki *et al.* (2024)** recorded The onion fly, *Delia antiqua*, which pupates at a soil depth of 2-20 cm, advances the eclosion phase of its circadian clock as the temperature amplitude decreases. This "temperature-amplitude response" compensates for the depth-dependent phase delay of the temperature change and ensures eclosion in the early morning.

1.3. Effect of certain climatic factors on the population fluctuation of the dominant onion maggot (*Delia antique*) insects infesting onion crops.

The statistical ananlysis of correlation Table (7) cleared That there were insiginificant positive correlation with mean temperature (r_1 =0.227, 0.387 and 0.111) at Fakous , Abou kabeer and Abou Hammmad in 2020/2021 season, while it was positive and insignificant (r_1 =0.423, 0.431 and 0.570) at Fakous , Abou kabeer and Abou Hammmad in 2021/2022 season. The relationship between the numbers of onion maggot and mean relative humidity, it was negative and positave insignificant (r_2 =- 0.148,- 0.312 and 0.004) at Fakous , Abou kabeer and Abou Hammmad in 2020/2021 while it was insiginificant negative (r_2 = -0.493, -0.527and-0.590) at Fakous, Abou kabeer and Abou Hammmad in2221/2022 seasons,respectively.

The partial regression between onion maggot and mean temperature as positive and in significant (p_1= .556 ns , .303 ns and .774 ns) at Fakous , Abou kabeer and Abou Hammmad in season 2020/2021 and positive insignificant (p_1= .255 ns , .246 ns and .108 ns) at Fakous , Abou kabeer and Abou Hammmad) during 2021/2022 season. While partial regression between the numbers of onion maggot (*Delia antique*). and mean relative humidity was positive and insignificant (p_2=.703 ns , .412 ns and.990 ns) at Fakous , Abou kabeer and Abou Hammmad in season 2020/2021 and partial regression between the numbers of onion maggot and mean relative humidity was positive and insignificant (p_2= .177 ns, .144 ns and .094 ns) at Fakous , Abou kabeer and Abou Hammmad in 2021/2022 season, respectively.

Table(6): Total number of onion maggot (*Delia antique*)infesting of onion during 2021 and 2022 seasons .

District	Fakous		Abou kabeer		Abou Hammad		Temp.°C		R.H.%	
No. of week in Manth / Season	2021	2022	2021	2022	2021	2022	2021	2022	2021	2022
First Jan	0	0	0	0	0	0	17.08	12.76	65.91	67.04
Mid Jan	0	0	0	0	0	0	12.90	9.52	61.95	70.14
First Feb.	0	0	0	0	0	0	16.22	11.67	55.09	67.62
Mid Feb.	20	26	22	24	19	30	12.87	13.52	70.32	70.26
First March	30	58	30	67	47	51	15.36	15.35	66.27	60.71
Mid-March	63	48	84	57	68	40	16.09	13.95	63.35	54.66
First April	62	32	78	46	49	38	17.51	22.19	56.45	44.80
Mid April	45	30	60	34	33	36	23.41	23.01	47.25	46.26
First May	25	28	49	27	24	29	28.26	23.60	37.01	43.49
Total	245	222	323	255	240	224				

Table (7): Simple correlation coefficients and partial regression between mean temperature and mean relative humidity and total number of onion maggot infesting onion plants during 2020/2021 and 2021/2022.

Localities	Simple correlation coefficient				Partial regression			
	2020/2021		2021/2022		2020/2021		2021/2022	
	r_1	r_2	r_1	r_2	p_1	p_2	p_1	p_2
Fakous	**0.227**	**-0.148**	**0.423**	**-0.493**	**.556 ns**	**.703 ns**	**.255 ns**	**.177 ns**
Abou kabeer	**0.387**	**-0.312**	**0.431**	**-0.527**	**.303 ns**	**.412 ns**	**.246 ns**	**.144 ns**
Abou Hammad	**0.111**	**0.004**	**0.570**	**-0.590**	**.774 ns**	**.990 ns**	**.108 ns**	**.094 ns**

r_1= correlation coefficient between mean temp. and number of insects

r_2 = correlation coefficient between mean R.H. and number of insects

p 1= partial regression between mean temp. and number of insects

p 2= partial regression between mean R.H. and number of insects

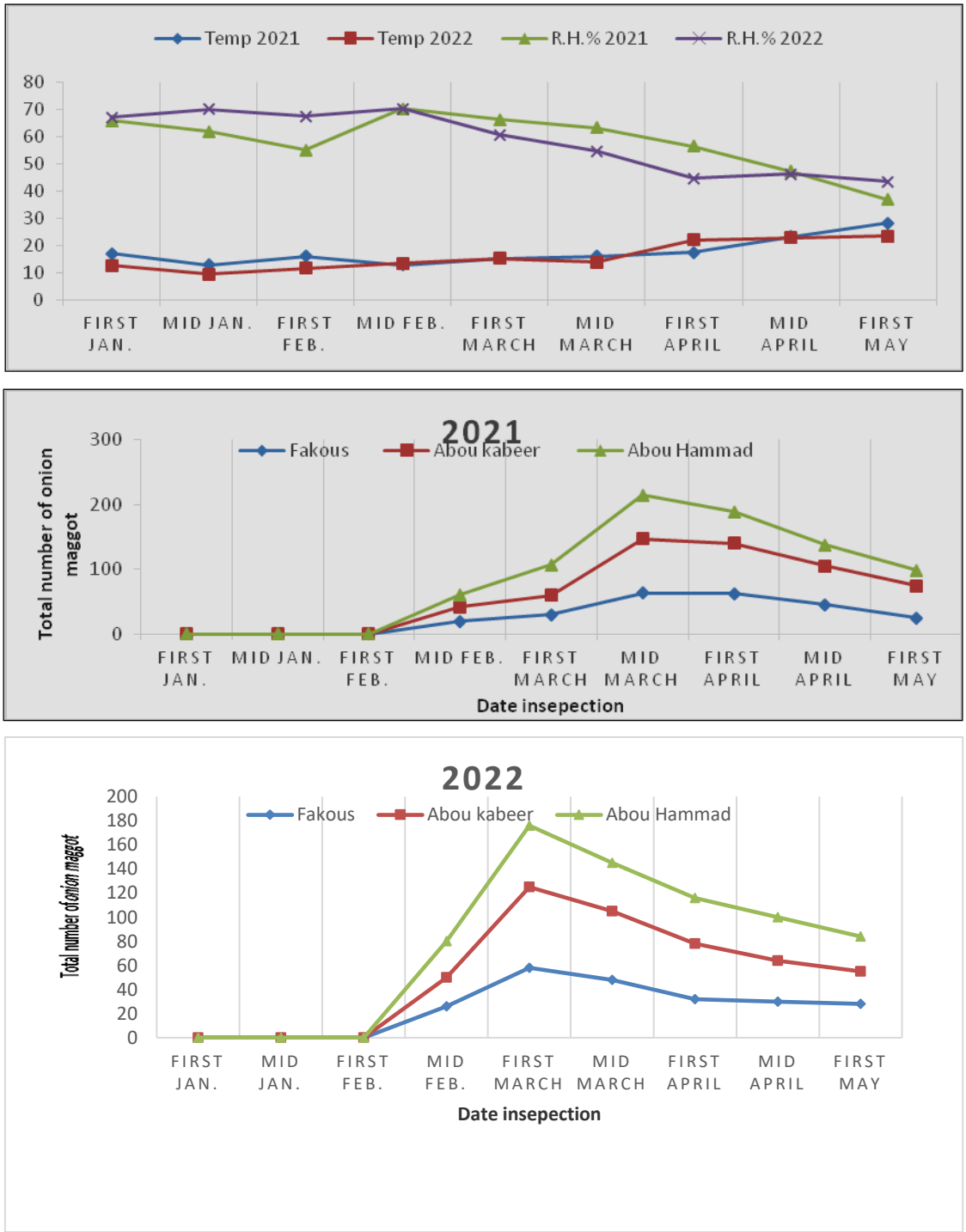


Fig (3): Population fluctuation of onion mag gat infesting onion plants collected by plant samples at 3 districts, Sharkia Governorate during 2021 and 2022 season, respectively .

2.Control of *Thrips tabaci* on Onions plants

Table (8): The influence of tested insecticides nano particals and extract on *thrips tabaci* under field conditions during season 2022

Compounds	Applied rate	Mean no/plants before	One day No.	One day Red.%	Three days No.	Three days Red.%	Seven days No.	Seven days Red.%	Ten days No.	Ten days Red.%	Initial effect	Residual effect
Chlorpyrifos	5ml/10L	107.5	41.25	65.8	25.25	79.3	15.0	88.6	38.75	69.6	65.8	79.1
ne 20% + Thiameth	8gm/10L	95.0	40.0	62.5	26.25	75.7	17.5	84.9	37.5	66.7	62.5	75.82
Methoxyfenozide	3.75ml/10L	105.0	42.5	63.9	27.5	76.9	17.5	86.4	40.0	67.9	63.9	77.12
Imidacloprid	6gm/10L	93.75	40.5	61.5	27.5	74.2	18.75	82.4	39.5	64.5	61.5	73.43
Control		102.5	115.0	nan	116.5	nan	125.5	nan	121.5	nan	nan	nan

Results presented in **Table (8)** indicated that the reduction percentage after one day was 65.8%, after three days was 79.3%, after seven days was 88.6% and after ten days was 69.6% while initial effect was 65.8 and residual effect recorded 79.1 of Chlorpyrifos , reduction percentage after one day was 62.5%, after three days was 75.7% , after seven days was 84.9% and after ten days was 66.7% while initial effect was 62.5% and residual effect recorded 75.82% of pymetrozine 20% +thiamethoxam15% , reduction percentage after one day was 63.9 %, after three days was 76.9 %, after seven days was 86.4% and after ten days was 67.9% while initial effect was 63.9% and residual effect recorded 77.12% of Methoxyfenozide, reduction percentage after one day was 61.5%, after three days was 74.2% , after seven days was 82.4% and after ten days was 64.5% while initial effect was 61.5% and residual effect recorded 73.43% of Imidacloprid ,. The obtained results agreement with **Zidan (2012)** found the imidacloprid (Gaucho) gave 100% reduction as seed treatment against the four sucking pests, *T.tabaci*, *A.gossypii*, *B.tabaci*, adult and immature. **Rathod *et al.*(2003)** determined the efficacy of imidacloprid against thrips (*T. tabaci*) infesting cotton. The lowest mean population of thrips (1.73) per 3 leaves were obtained with 10g imidacloprid/kg, 300g diafenthiuron/ha and 5g imidacloprid/kg, respectively. The highest cotton yield (826 kg/ha) was obtained with 5g imidacloprid/kg.

REFERENCES

1. **Gill, H.K.; H. Garg; A.K.Gill; J.L. Gillett-Kufman and B.A. Nault (2015):** Onion thrips (Thysanoptera: Thripidae) biology, ecology and management in onion production systems. J. Integ. Pest Management 6 (1) 1-9.
2. **Hamdy, A. S. and N. B. Aref (2019):** Integration between transplanting date and cultivar type in management population of onion Thrips (Thysanoptera: Thripidae) attacking onion plants in the field condations. Int J Agric FLife Sci 3(1): 121-130.
3. **Henderson, C. and W. F. Tilton (1955):** Tests with acaricides against the brown wheat mite.J.Econ.Entomol., 48: 157-161
4. **Jensen , S.E. (2011) :** Insectiside resistance in the western flower thrips , Frankhniella occidentalis. Integr pest Manag Rev. 131 – 146.
5. **Mahaffey, L.A; and W.S. Cranshaw (2010):** Thrips species associated with in Colorado. Southwestern Entomolo., 35:1,45-50.10 ref.
6. **Maher, A. M. and M. S. Ansari (2014):** Population Dynamics of Onion Thrips, *Thrips tabaci*, on Onion Cultivars. Volume 1, Number 3; 141-147.
7. **Mahmoud, H.H. (2008):** Ecological Studies on certain insect pests of onion with special emphasis on the onion bulb fly Eumerus anoenus. Loew. Ph.D. Thesis, Fac. Agric., Cairo Unvi., Egypt 125 pp.

8. **Miyazaki , Y.; K. Tanaka and Y. Watari (2024)** :Weak and strong phase response curves of the onion fly circadian clock at temperature changes of 1 °C and 4 °C. Journal of insect physiology. 154:10-1016
9. **Mlynarek, J. J.; M . MacDonald; K. Sim; K. Hiltz ; M.R. McDonald and S. Blatt (2020):** Oviposition, Feeding Preferences and Distribution of *Delia* Species (Diptera: Anthomyiidae) in Eastern Canadian Onions .11;11(11):780.
10. **Rathod, K.;R. Lavekar ;A. Pande ;N. Patange and O Sharma (2003):** Efficacy of imidachloprid against sucking pests of cotton. Annals of Plant Protection Sciences;11: 369-70.
11. **Sarwar, K.; Iqra , A.;W. Iqbal and A. Rashada (2014):** Cotton aphis gossyppii L.(Homoptera ; Aphididae); achallenging pest; biology and control strategies – arreview. International journal of applied biology and pharmaceutical technology. 5(1):290-294.
12. **Sathe, T.V.and M. Pranothi (2015):** Occurrence and hosts for a Destructive Thrip tabaci Lind. (Thysanoptera: Thripidae). International Journal of Recent Scientific Research. 6(4):2670-2672.
13. **Temerak , S.A.H.; M.A. A. Abo-Elmaged and S.M. Amro (2015):** population trends of onion thrips*Thripstabaci*L. infesting certain cultivars and its control in Assiut Governorate, Upper Egypt. Egypt. Agric Res. 93 (1A)169-178. Fifth Int. Conf. Plant protect. Res.Inst.
14. **Wang ,B.S;S.S. Lin ;W.C. Hsiao ;J.J. Fan ;L.F. Fuh and P.D. Duh (2006):** Protective effects of an aqueous extract of welsh onion green leaves on oxidative damage of reactive oxygen and nitrogen species. *Food chemistry*;98: 149-57.
15. **Zidan, L.T.M.(2012):**Bio-efficacy of three new neonicotinoid Insecticide As seed treatment against four early sucking pests of cotton. American – Eurasian J. Agric .&Environ. Sci.;12(4):535- 540.