IMPACT OF COMPLEMENTED FERTILIZER AS A FOLIAR SPRAY, ON OKRA MAJOR SUCKING PESTS AND ASSOCIATED PREDATORS AND Okra Crop YIELD

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Abstract

A field experiment was carried out at Qaha experimental station, Qalubia Governorate to study effect of complementary fertilizer (Stimufol Amino) of Okra on sap sucking pests Aphids (*Aphis gossypii),*Whitefly, (*Bemisia tabaci Genn.*), Jassid (*Empoasca decipiens (*paoli) and red spider mite, (*Tetranychus urticae* koch) in addition to the associated predators Coccinellidae family and *Chrysoperlla carnea* , with Okra yield during 2013 & 2014 seasons. The obtained results recorded that, a relationship between incident of these pests in control and complemented fertilizer (Total N 24%, P 16%, K 12%, Cu 0.08%, Iron 0.17%, Ma 0.08%, Zn 0.05% and Amino acid (lycin) 2%) by a rate of 15, 25 and 35 %. The population abundance of these pests and predators increase by decreasing rate of complemented fertilizer, on the other hand, the crop yield of Okra increases by increasing the rate of complemented fertilizer.

Key words: complemented fertilizer, Whitefly, jassid, Aphis, red spider mite Coccinellidae, *Chrysoperlla carnea*, Okra. Crop yield and climatic factors.

INTRODUCTION

Okra (*Abelmoschus esculentus* L.) belongs to family *Malvaceae*. It is a warm-season is an annual vegetable crop, grown from seed and it is widely cultivated in the tropics of the fruits which are used as vegetable both in the green and dried state.

The origin of this vegetable is considered as Africa and Asia. Okra is a good source of vitamins, minerals and has a good caloric value. It is main kharif vegetable and the cash crop. The loamy soil and warm climate is favorable for cultivation of

Okra crops. Okra crop is infested by many insect pests that suffer to economic loss to the marketable yield. The most destructive pests are whitefly, *Bemisia tabaci* (Gennadius) , yellow flower Thrips, *Thrips tabaci* Lind, jassid *Empoasca decipiens* (paoli) Aphids, *Aphis grossypii* Glover ,*Tetranychus arabicus* Attiah. The most widely predators spread were true spiders and Coccinalidae family. Predatory spiders were the most abundant and important insect's predators in natural agro ecosystem.

They suppress the population of these pests which attack okra from sowing till harvest. The overuse of synthetic insecticides has been placed on ban in developed countries. This might have been in connection with development of insect resistance, environmental pollution, carcinogenic effect and destruction of beneficiary insects (These problems emanated from synthetic chemicals, necessitated the idea of developing effective, cheap and easily biodegradable alternative products. In recent years, kaolin, botanical insecticides and organic composts have received a greater attention as promising alternative methods). Apart from the fact that composts can be used to combat the problems of soil fertility, it has made an impact in the pest management thereby decrease herbivorous insect populations. It has also been noted that, the critical period of weed competition in Okra occurred between 3 and 7 weeks after sowing, so keeping the crop weed free until 3 weeks after sowing Okra varieties are sensitive to environmental changes, Gruhn, 2000, Ijoyah *et al.,* 2012 noted that NHAe47-4 provided a better yield during the wet season than in the dry season.

Amino acids compositions in plant sap play critical role in determining susceptibility to sap sucking pests Tsumuki*et et.al.,* 1987. Rice plants with less asparagine content which resistance against brown planthopper Sogawa and Pathak 1970.

Some microelements (trace elements) have toxic effect for pests Tomlin,1994 by losing a part of their body water content as a result of osmotic force (Steward, 1958) and indirect mechanism due to that foliar fertilizer increase, also, the natural plant immunity through improving the plant nutritional status Nowosielski *et al.*, 1988.

Therefore, this study was conducted to evaluate effect of three levels of complemented fertilizer as a foliar spray on sap sucking pests and associated predators of Okra plants under climatic factors ..

MATERIALS AND METHODS

Material used:

The Complemented fertilizer (Stimufol Amino): contains of: Total N 24%, P 16%, K 12%, Cu 0.08%, Iron 0.17%, Ma 0.08%, Zn 0.05% and Amino acid (lycin) 2%, **From :** Marshal Marten – Gan, Aspan..

Method applied:

To test this material an area of four kerats was chosen at Qaha, Qalubia Governorate and planted with Okra plant on March 23rd in 2013 and 2014 seasons. The space between rows was 100 cm. and that between plants was 40 cm. Each kerate represented one treatment was divided into three equal replicates. The treatment was sprayed four sprays, 15 days intervals begging from 8th May, 23rd May, 6th June and 21th June during 2013 & 2014 seasons. Three treatments were sprayed by different rates of the fertilizer (3, 5 and 7 gm /L. / treatment)., while the last treatment was sprayed by tap water only as a control. The plants in each replicate were examined weekly (25 plants / treatment). The Aphids population (*Aphis gossypii),* whitefly, (*Bemisia tabaci Genn.*), Jassid (*Empoasca decipiens (*paoli) and red spider mite, (*Tetranychus arabicus* Attiah) were recorded. In the same time, the natural enemies (Coccinellidae family and *Chrysoperlla carnea*) were also recorded.

Statistical analysis:

The analysis of variance was adopted and the L.S.D. values were used to determine the significance between means of treatments. The data obtained for each season were subjected to analysis of variance Gomez and Gomez, 1984 .

RESULTS AND DISCUSSION

Population abundance of 2013 season:

Data presented in Table (1 &2) showed population of different pests and associated predators under effect of the complemented fertilizer and weather factors of 2013 season.

1- Population abundance of some pests during 2013:-

A- Aphids (*A. gossypii),* Glover:-

Data in Table (1) indicated that the highest numbers obtained at control (856 adults), followed by Complemented fertilizer 15% (92 adults), followed by Complemented fertilizer 25% (68 adults), followed by Complemented fertilizer 35% (42 adults). There were significant differences between the untreated treatment (check) and the other three treatments.

Effect of different Complemented fertilizer on sucking pests associated predators and different temperature & Relative Humidity during season 2013.but there were non significant differences between the other three rates of Complemented fertilizer. Then this infestation disappeared, this occur in the first season 2013with average of R. H. & Max. and Min. Temperature was (54.1 % & 32.6 and 22.2°C), respectively.

B- Jassid (*Empoasca decipiens* (paoli):-

The highest numbers obtained of Jassid (Ampoasca decipiens (paoli) at control (858 adults), followed by Complemented fertilizer 15% (75 adults), Complemented fertilizer 25% (89 adults), and Complemented fertilizer 35% (50 adults). There were significant differences between the untreated treatment (check) and the other three treatments, but there were no significant differences between the other three rates of Complemented fertilizer.

C- White fly, (*Bemisia tabaci Genn.*):

The highest numbers of White fly,(*Bemisia tabaci Genn.*) occurred on check treatment (302 adults), followed by Complemented fertilizer 15% (89 adults), 25 % Complemented fertilizer (18 adults), and finally Complemented fertilizer 35% (8 adults). There were significant differences between the untreated treatment (check) and the other three treatments, but there were non significant differences between three rates of Complemented fertilizer.

D- *Tetranychus arabicus* Attiah:-

From Table (1) the highest numbers of Tetranychus arabicus Koch were (607 adults) in control treatment, followed by Complemented fertilizers 15% (47 adults) in Complemented fertilizer 25%, (30 adults) and in complemented fertilizer 35 %.(16 adults). There are significant differences between control treatment and the other three treatments, but there were no significant differences between 15, 25 and 35% Complemented fertilizer.

2-Population abundance of some pests during 2014 season :-

A- Aphids *A. gossypii,* (Glover):-

Data in Table (3) recorded that the highest numbers obtained at control (857 adults), followed by Complemented fertilizer 15% (172 adults), Complemented fertilizer 25% (112 adults), Complemented fertilizer 35% (71 adults). There were significant differences between the untreated treatment (check) and the other three treatments, but there were no significant differences between the three rates of Complemented fertilizer.

Effect of different Complemented fertilizer on sucking pests associated predators and different temperature &Relative Humidity Then this infestation disappeared this occur in the second season 2014 with average of R. H. & Max. and Min. Temperature was (57.7 % & 32.5 and 21.9°C), respectively, during season 2014.

B- Jassid *Empoasca decipiens* (paoli):-

The highest numbers obtained of Jassid (*Empoasca decipiens (*paoli) at control (235 adults), followed by Complemented fertilizer 15% (119 adults), followed by Complemented fertilizer 25% (54 adults), followed by Complemented fertilizer 35% (13 adults). There were significant differences between the untreated treatment

(check) and the other three treatments, but there were no significant differences between three rates of Complemented fertilizer.

C- White fly, (*Bemisia tabaci* (*Genn.*) :

The highest numbers of White fly,(Bemisia tabaci Genn.) occurred on check treatment (233 adults), followed by Complemented fertilizer 15% (61 adults), 25 % Complemented fertilizer (46 adults), and finally Complemented fertilizer 35% (30 adults). There were significant differences between the untreated treatment (check) and the other three treatments, but there were non significant differences between the three rates of Complemented fertilizer.

***D- Tetranychus arabicus* (Koch):-**

From Table (3) the highest numbers of Tetranychus arabicus Attiah were (385 adults) in total control treatment, followed by Complemented fertilizers 15% (86 adults) in Complemented fertilizer 25%, (62 adults) and in Complemented fertilizer 35 %.(15 adults). There were significant differences between control treatment and the other three treatments, but there were no significant differences between 15, 25 and 35% Complemented fertilizer.

3-Relationship between the environmental resistance factors and ccomplimented fertilizer as a foliar spray on Okra pests during 2013 & 2014 seasons :-

A- Aphids (*Aphis gossypii),*Glover:-

Data in Tables (1, 2, 3 and 4) indicated the population dynamics for different insects that the highest rate of Aphids infestation in control was (193 adults) on the 13rd June, followed by 15 %, 25% and finally 35% (29, 18 and 10), respectively, Then this infestation disappeared this occur in the first season 2013 with average of R.H. (54.1%) & Max. and Min. Temperature was(32.6 and 22.2°C), respectively. While, in the second season 2014 the peak was(1083), on the 13rd June in the control followed by 15 %, 25% and finally 35% (172, 112 and 71), respectively with average of RH% (57.7) & Max .and Min. temperature was (32.5 and 21.9°C), respectively.

B- Jassid (*Empoasca decipiens* (paoli):-:-

Data in Tables (1,2,3 and 4) indicated the population dynamics in the first season 2013on the 13rd June the peak of population dynamic was (200 adults) in

untreated control, followed by 15 %, 25% and finally 35% (5, 2 and 3), with average of R.H (54.06%) and Max. & Min. temperature was (32.57 and 22.15°C), respectively. While, in the second season 2014 the peak on the 6th June was in the control (253adults), followed by 15 %, 25% and finally 35% (119, 54 and 13), respectively with average of R.H. (57.7%) & Max. and Min. temperature was 32.5 and 21.9°C, respectively.

C- White fly,(*Bemisia tabaci Genn.*):

Data in Tables (1,2,3 and 4) indicated the population dynamics that the highest rate of infestation in untreated control was (77 adults) on the 13rd June, followed by 15%, 25% and finally 35% (10, 9 and 5), respectively, Then this infestation disappeared this occur in the first season 2013 with average of R.H. (54.1%) & Max. and Min. temperature was (32.6 and 22.2°C), respectively. While, in the second season 2014 the peak on the 13rd June was in the control (77), followed by 25 %, 15% and finally 35% (19, 20 and 16), respectively, with average of R.H. (57.7%) & Max. and Min. temperature was (32.5 and 21.9°C), respectively.

D-Red spider mite *(Tetranychus arabicus* Attiah):-

Data in Tables (1,2,3 and 4) The highest rate of infestation in untreated control was (93 adults) on the 27th June this occur in the first season 2013 with average of R.H. (54.1%) & Max. and Min. temperature was 32.6and 22.2°C, respectively. While, in the second season 2014 the peak on the 13rd June was in the control (51), followed by 25 %, 15% and finally 35% (11, 10 and 7), and respectively with average of R.H. (57.7%) & Max. and Min. temperature was (32.5 and 21.9°C), respectively.

These results were agreement with. Watson *et al.,* (2003, and GHOSH (2014,who reported that *Bemisia tabaci* was active throughout the growing period with a peak population (3.98 white fly /leaf) and (4.33 /leaf) during 20rd SMW (middle of May) in the pre-kharif and during 42nd- , 43rd SMW (middle of October) in the post kharif crop respectively. White fly showed insignificant positive correlation (p=0.05) with maximum temperature, minimum relative humidity (R.H.) whereas insignificant negative correlation with maximum R.H. and significant negative correlation. The population of white fly had a tendency to increase with the decrease of relative humidity and with increase of maximum temperature.

4- Population abundance of major predators in 2013 and 2014 seasons:

A- *Chrysoperlla carnea (Stephens):*

Data in Tables (2 & 4) indicated that the peak of the *C. carnea* take place on 11th July where Control treatment harbored the highest numbers (29 adults), followed by 15% complemented fertilizer (26 adults), 25% complemented fertilizer (22 adults) and 35 % complemented fertilizer (19 adults)this occur in the first season 2013 with average of R.H. (54.1) & Max .and Mini. temperature was (32.6 and 22.2°C), respectively. While, in the second season 2014 the peak on the 25th July was in the control (27 adults), followed by 15 %, 25% and finally 35% (24, 22 and 21 adults), respectively with average of R.H. (57.7) & Max. and Mini. temperature was (32.5 and 21.9°C), respectively.

B- *Coccinadadae* family

Also data in tables (2 & 4) indicated that the peak of the generation take place on 25th July where Control treatment harbored the highest numbers (30 adults), followed by 15% Complemented fertilizer (29 adults), 25% Complemented fertilizer (25 adults) and 35 % Complemented fertilizer (22 adults) this occur in the first season 2013 with average of RH (54.1%) & Max. and Min. temperature was (32.6 and 22.2°C), respectively. While, in the second season 2014 the peak on the 25rd July was in the control (25 adults), followed by 15, 25 and finally 35% (23, 22 and 20 adults), respectively with average of R.H. (57.7%) & Max .and Min . temperature were (32.5 and 21.9°C), respectively.

These findings were full agreement with Arshad and Parvez, 2012 in India, who stated that the maximum temperature and maximum relative humidity are the key factors responsible in reducing the Aphid *L .erysimi* of population 3.06 and 5. 00 %, respectively, they found that the biotic factors, Aphid *L .erysimi* population exhibited a positive correlation with *C.septempunctata* ،*C .transversalis* ،*M . sexmaculatus* and the Syrphid *I. scutellaris* .Also،found that the maximum and minimum temperature acted upon in reducing Aphid *L .erysimi* population to an extent of 35.63, 15.14 %, respectively. And added that the abiotic and biotic factors showed a significant impact on the population dynamics of Aphid *L .erysimi* ،it was negatively correlated with maximum relative humidity. Nevertheless, with biotic factors, it showed positive correlation with *C. septempunctata, C. transversalis, M.*

sexmaculatus and also with *I. scutellaris* with impact on the population dynamics of Aphid *L. erysimi.*

5-Yield obtained:-

Data presented in Table (5) showed that the highest yield was obtained in 35% complemented fertilizer was 92.0Kg. /rep., followed by 83.6 Kg. /rep. in 25% treatment ,and 75.1 Kg. /rep. in 15%, finally was 65.1 /rep. in control treatment in season2013, causing increase than control 41.32 , 28.42 and 15.36 in 35% ,25% , 15% Complemented fertilizer respectively. While in 2014 season in the same Table Explained that the highest yield was obtained in 35% complemented fertilizer was 84.67 Kg. /rep, followed by 78.87Kg. /rep. in 25% treatment, and 74.17 Kg. /rep. in 15%, finally was 68.73 /rep. in control treatment in season2014, causing increase than control 23.19 , 14.75 and 7.92 in 35% ,25% , 15% Complemented fertilizer These results in full agreement with **Lere *et al.*, 2015** who mentioned that, 200 kg NP Kha^{-1} of NPK (15: 15: 15) produced significantly the highest fruit yield. This could be due to the significant role that fertilizer played in the physico-chemical processes of the plants, for example, phosphorus enhanced water and nutrients up take by facilitating better roots development while nitrogen was involved in the formation of chlorophyll which resulted to effective photosynthesis process. Okra yield and yield components were least without application of N, P and K nutrients. This confirms findings from earlier studies in Nigeria which showed that application of these nutrients are important for enhanced yield of Okra Adediran and, panjoko, 2003, noted that there was substantial depletion of nutrients when no NPK fertilizer was applied and that nitrates and available phosphorus were substantially reduced with cropping. Also,Balanced fertilizer before planting will produce a good yields. One of the limiting factors to the profitable production of okra is damage by insect pests Praveen and Dhan dapani 2002 artificial fertilizer and organic manure as soil amendments will improve the yield of Okra. Omotoso and Shittu 2007 indicated that the fertilizer Complemented fertilizer significantly increase growth parameters yield and yield components with optimum yield of Okra obtained at 150 complemented fertilizer kg ha^{-1}, also, showed significant ($p > 0.05$ response to different rates of application complemented fertilizer . Babatola *et al.,* 2002 reported that increasing level of Complemented fertilizer 20:10:10 was observed to increase growth and yield

of Okra. Also, Lere *et al.*, 2015 who mentioned that, 200 kg NPK ha^{-1} (15: 15: 15) produced significantly the highest fruit yield. This could be due to the significant role that fertilizer played in the physico-chemical processes of the plants, for example, phosphorus enhanced water and nutrients up take by facilitating better roots development while nitrogen was involved in the formation of chlorophyll which resulted to effective photosynthesis process.

It be concluded that using complemented fertilizer reduce population of pests and increase crop yield of okra.

RECOMMENDATION

This study recommends that using complemented fertilizer to decrease pests damage and increase crop yield.

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Table 1. Effect of fertilizer at different three rates on some sucking pests throughout 2013 season in okra fields .

Inspection date	Insect																RH (%)	Temperature	
	A. gossypii				*E. decipiens* (paoli)				*B. tabaci* Genn.)				*T. urticae* koch					Max	Mani
	3 g./L	5g./L	7g./L	Control	3 g./L	5g./L	7g./L	Control	3 g./L	5g./L	7g./L	Control	3 g./L	5g./L	7g./L	Control			
30/5/2013	12	6	6	86	5	3	3	83	4	2	1	49	6	5	1	30	39	36.7	22.6
6 / 6 2013	12	5	0	165	3	2	2	161	3	2	0	65	2	3	0	51	40	32.3	22.6
13/6/2013	29	18	10	193	5	2	3	200	10	9	5	77	12	6	7	63	40	31.4	20.7
20/6/2013	0	0	0	106	2	0	0	101	0	0	0	33	7	2	1	90	40	31.1	17.4
27/6/2013	0	0	0	100	0	0	0	95	0	0	0	20	0	0	0	93	57	32.3	22.4
4 /7 /2013	0	0	0	30	0	0	0	37	0	0	0	11	0	0	0	77	59	32.3	22.0
11/7/2013	0	0	0	27	0	0	0	30	0	0	0	3	0	0	0	47	61	32.7	22.0
18/7/2013	0	0	0	0	0	0	0	10	0	0	0	1	0	0	0	41	61	32.9	22.4
25/7/2013	0	0	0	10	0	0	0	0	6	0	0	1	0	0	0	39	61	32.9	22.9
1/8/2013	0	0	0	6	6	0	2	5	7	0	0	17	0	0	0	29	61	31.7	22.7
8/8/2013	0	3	2	0	7	3	3	3	10	1	1	12	0	0	0	17	60	31.3	22.7
15/8/2013	5	7	3	13	10	7	3	9	11	0	1	5	8	3	1	15	60	32.0	23.3
23/8/2013	10	9	5	13	11	8	3	17	12	1	0	3	0	0	0	0	58	32.7	23.0
30/8/2013	11	10	7	36	12	9	4	42	12	2	0	3	6	5	2	12	58	33.6	22.7
6/9/2013	13	10	9	71	14	55	27	65	14	1	0	2	6	6	4	3	56	32.7	22.9
Total	92	68	42	856	75	89	50	858	89	18	8	302	47	30	16	607	811	488.6	332.3
Mean	6.13	4.03	2.80	57.06	5.00	0.93	3.33	57.06	5.93	1.20	0.53	20.13	3.13	2.00	1.06	40.47	54.06	32.57	22.15
LSD	11.9				20.66				5.62				8.96						

Table 2. Effect of fertilizer at different three rates on two predators throughout 2013 season in okra fields.

Inspection date	Predators								RH (%)	Temperature	
	Chrysoperlla carnea				Coccinellidae family						
	3 g./L	5g./L	7g./L	Control	3 g./L	5g./L	7g./L	Control		Max	Mani
30/5/2013	5	5	3	7	6	4	5	7	39	36.7	22.6
6 / 6 2013	6	5	3	9	7	5	5	7	40	32.3	22.6
13/6/2013	9	7	4	12	7	7	5	10	40	31.4	20.7
20/6/2013	11	7	7	12	11	7	6	13	40	31.1	17.4
27/6/2013	22	19	16	24	14	9	8	15	57	32.3	22.4
4 /7 /2013	22	19	16	25	15	12	9	16	59	32.3	22.0
11/7/2013	26	22	19	29	20	16	13	20	61	32.7	22.0
18/7/2013	24	19	19	24	26	21	19	26	61	32.9	22.4
25/7/2013	19	15	14	23	29	25	22	30	61	32.9	22.9
1/8/2013	17	14	11	21	19	16	12	20	61	31.7	22.7
8/8/2013	11	9	8	11	11	7	3	15	60	31.3	22.7
15/8/2013	9	7	5	10	9	4	2	13	60	32.0	23.3
23/8/2013	4	3	3	6	4	2	1	5	58	32.7	23.0
30/8/2013	4	2	1	6	2	1	0	5	58	33.6	22.7
6/9/2013	2	1	1	4	1	0	0	3	56	32.7	22.9
Total	191	154	130	223	181	136	110	205	811	488.6	332.3
Mean	12.37	10.27	8.66	14.86	12.06	9.06	7.33	13.66	54.07	32.57	22.15
LSD	0.26				0.41						

Table 3. Effect of fertilizer at different three rates on some sucking pests throughout 2014 season in okra fields.

Inspection date	Insect																RH (%)	Temperature	
	A. gossypii				*A.decipiens* (paoli)				*B. tabaci* Genn.)				*T. urticae* koch						
	3 g./L	5g./L	7g./L	Control	3 g./L	5g./L	7g./L	Control	3 g./L	5g./L	7g./L	Control	3 g./L	5g./L	7g./L	Control		Max	Mani
30/5//2014	4	3	3	91	3	2	2	42	2	2	2	23	5	2	0	16	44	31	20
6 / 6 /2014	13	10	5	122	10	9	6	46	10	9	5	31	7	4	3	46	49	31	20
13 /6/2014	33	30	15	201	7	20	3	27	19	20	16	77	11	10	7	51	50	31	21
20/6/2014	21	12	10	166	3	9	1	20	10	9	6	50	5	4	1	36	41	32	22
27/6/2014	17	12	6	100	0	6	0	13	6	6	0	20	5	1	0	17	51	32	22
4/ 7/ 2014	15	10	3	36	0	0	0	9	0	0	0	7	0	1	0	29	56	32	22
11/7/2014	10	7	3	33	0	0	0	7	0	0	0	7	0	0	0	27	59	33	20
18/7/2014	7	7	0	31	0	0	0	7	0	0	0	3	0	0	0	21	61	33	20
25/7/2014	3	3	0	23	0	0	0	4	0	0	0	3	0	0	0	20	64	34	21
1/8 /2014	12	0	0	20	0	0	0	4	0	0	0	3	0	0	0	17	63	32	22
8/8/2014	9	0	0	15	0	0	0	4	2	0	0	1	0	0	0	15	67	31	23
15/8/2014	6	0	0	33	16	0	0	6	3	0	0	1	6	3	0	15	67	32	23
23/8/2014	3	0	0	49	22	0	0	9	3	0	0	0	12	10	0	22	66	33	23
30/8/2014	3	6	10	52	29	4	0	15	3	0	0	0	16	11	3	24	64	35	24
6/9/2014	16	12	16	66	29	4	1	22	3	0	1	7	19	16	1	29	63	36	25
Total	172	112	71	857	119	54	13	235	61	46	30	233	86	62	15	385	865	488	328
Mean	11.46	7.46	4.73	69.20	7.93	3.6	0.86	15.66	4.06	3.06	2.00	15.53	5.73	4.13	1.00	25.66	57.66	32.53	21.86
LSD	16.12				4.61				22.06										

Table 4. Effect of fertilizer at different three rates on two predators throughout 2014 season in okra fields.

Inspection date	Predators								RH (%)	Temperature	
	Chrysoperlla carnea				Coccinellidae family						
	3 g./L	5g./L	7g./L	Control	3 g./L	5g./L	7g./L	Control		Max	Mani
30/5//2014	15	1	2	3	4	2	1	7	44	31	20
6 / 6 /2014	4	4	2	7	4	3	2	7	49	31	20
13 /6/2014	6	4	2	7	5	5	3	9	50	31	21
20/6/2014	7	6	4	10	9	8	4	10	41	32	22
27/6/2014	9	6	4	12	10	8	5	11	51	32	22
4/ 7/ 2014	19	16	14	21	16	13	9	16	56	32	22
11/7/2014	24	17	17	24	17	14	11	18	59	33	20
18/7/2014	27	19	17	26	20	18	18	22	61	33	20
25/7/2014	24	22	21	27	23	22	20	25	64	34	21
1/8 /2014	21	20	17	26	14	11	10	14	63	32	22
8/8/2014	15	17	14	22	9	6	6	10	67	31	23
15/8/2014	6	12	9	15	7	5	4	9	67	32	23
23/8/2014	6	5	5	11	5	3	2	7	66	33	23
30/8/2014	4	5	4	9	2	1	1	7	64	35	24
6/9/2014	2	1	1	7	2	1	0	3	63	36	25
Total	189	155	133	227	147	120	96	175	865	488	328
Mean	12.60	10.33	8.86	15.13	9.80	8.00	6.40	11.66	57.66	32.53	21.86
LSD					1.16						

Table 5. Effect of different rates of complemented fertilizer on Okra plant crop in 2013 and 2014 seasons

2013								2014							
Wt. (Kg.)								W t. (Kg.)							
	R1	R2	R3	□	$\bar{X}$	LSD	Incor. Over cont.		R1	R2	R3	□	$\bar{X}$	LSD	Incor. Over cont.
Control	65.4	70.1	60	195.3	65.1 [a]		-----	Control	69.4	64.5	72.3	206.2	68.73 [a]		------
3g./L	80.0	75.2	70.1	225.3	75.1 [a]	11.49	15.36	15%	70.8	72.3	79.4	222.5	74.17 [ab]	8.77	7.92
5g./L	77.7	83.3	89.9	250.9	83.6 [ab]		28.42	25%	79.2	81.5	75.9	236.6	78.87 [bc]		14.75
7 g./L	86.6	93.3	95.5	276	92.0 [abc]		41.32	35%	88.8	84.4	80.8	254	84.67 [bc]		23.19
□	308.5	321.5	314.5	947.5				□	308.2	302.7	308.4	919.3			

تأثير السماد الورقى المتكامل على أهم أفات البامیه والمفترسات المصاحبة لها وأثر ذلك على المحصول تحت الظروف الحقلية

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معهد بحوث وقاية النباتات – مركز البحوث الزراعية – الدقى – جيزة

أجريت هذه الدراسة في محطة البحوث الزراعية بقها محافظة القليوبية خلال موسمى زراعة البامية ٢٠١٣ &٢٠١٤ لتقييم تأثير السماد المتكامـــــــــــــــل (استيموفول أمينو) -- الذى يحتوى على ٢٦% نيتروجين كلي وفسفور ١٦% و بوتاسيوم ١٢% ونحاس ٠.٠٨ % وحديد ٠.١٧% وماغنزيوم 0.08 % وزنك 0.05 % والحمض الامينى (لايسين) ٢ % -- على الافات الثاقبة الماصة للعصارة النباتيى لاوراق البامية (المن الجاسيد الدبابة البيضاء والعنكبوت الاحمر ذو البقعتين) وكذلك على المفترسات المصاحبة لها (عائلة ابو العيد واسد المن) وكذلك تاثير الرطوبة النسبية ودرجات الجرارة القصوى والصغرى على تعداد الافات والمفترسات واثر ذلك على المحصول النهائى للبامية .

اوضحت الدراسة الاتى :

١. اعلى تعداد للافات فى معاملة الكنترول يليه معاملة ١٥% للاستيمو فول ثم ٢٥% واقلهم فى ٣٥% .فى موسمى الدراسة ٢٠١٣ & ٢٠١٤ هناك فروق معنوية بين الكنترول وباقى المعاملات.
٢. اعلى تعداد للمفترسات كان فى معاملة الكنترول يليه ال ١٥% ثم ال٢٥% واقلهم فى معاملة ال٣٥% اثبت التحليل الاحصائى ان هناك فرق معننويه بين معاملة الكنترول وباقى المعاملات .
٣. قمة جيل المن كانت (١٩٣) بينما كانت ٨٥٧ فى ١٣ يونيو ٢٠١٣ و٢٠١٤ على التوالى .
٤. قمة جيل الجاسيد كانت (٢٠٠) فى ١٣ يونيو ٢٠١٣ بينما كانت (٢٥٣) قمة جيل.
٥. قمة جيل الذبابه البيضاء (٧٧) فى ١٣ يونيو ٢٠١٣ بينما كانت (٧٧) ايضا فى ١٣ يونيو ٢٠١٤.
٦. قمة جيل العنكبوت الاحمر (٩٣) فى ٢٧ يونيو ٢٠١٣ بينما كانت (٥١) فى ١٣ يونيو ٢٠١٤.
٧. اعلى تعداد لاسد المن (٢٩) فى ١١ يوليو ٢٠١٣ بينما كانت (٢٩) فى ٢٥ يوليو ٢٠١٤ .
٨. اعلى تعداد لعائلة ابي العيد كانت (٣٠) فى ٢٥ يوليو ٢٠١٣ بينما كانت (٢٥) فى ٢٥ يوليو ٢٠١٤ .
٩. اعلي الاصابة لبعض الافات الثاقبه الماصة وكذلك المفترسات المصاحبة لها علي محصول البامية وكذلك دراسه تأثير العوامل الجوية من حرارة ورطوبة علي التعداد وأثر ذلك علي محصول البامية وأظهرت النتائج أن الاصابة تزداد بزيادة معدلل السماد المتكامل (٣ ، ٥%) عن المعدل الأكبر (٧%) وكذلك المفترسات تزداد بتواجد الآفات و كانت أعلي إنتاج لأعلي معدل من السماد المتكامل استيموفول أمينو(٧%) يليها 5٥ ثم ٣% وكانت الزيادة عن الكنترول في المعدل الأعلي ٣٥% ، (٣٣.٨٨& ٤٢.٨٨) في موسمى ٢٠١٣& ٢٠١٤على التوالى.