EFFECT OF DIFFERENT STAGES OF REDUVIID PREDATOR *CORANS AFRICANA* EL-SEBAEY (HEMIPTERA: HETEROPTERA) ON THE POPULATION OF *BEMISIA TABACI* GENN IN TOMATO FIELD AT QALUBIA AND BANI-SWIF GOVERNORATES

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Abstract

The of effect different stages of predator *Coranus africana* EL-Sebaey was evaluated in suppression for different populations of the white fly *Bemisia tabaci* Genn. In tomato field at Qalubia and Bani-Swif Governerates during two successive years 2007 & 2008, different stages of the predator *C. africana* were released by one predator/plant against *B. tabaci* infestation. Reduction percentage of *B. tabaci* infestation differed according to the release of predator in each treatment. In case of release of the adult stage, the reduction in the second week of release was 93.4% & 100%) for adult and immature stage respectively at Qalubia during the first year. On the other hand this reduction was (94.8% & 97.1%) during the second year. However the percentage reduction at Bani-Swif was (97.4% & 92.7%) and (99.2% & 91.2%) during two years respectively. The basic yield parameters expressed as weight of fruit and number of fruits/plant during the two years of the investigation at Qalubia and Bani-Swif in the crop.

INTRODUCTION

The reduviids are the assassin bug in different habitat of Egyptian fauna. They are predaceous upon various insect pests with different economic plants by (Afifi *et al.*, 1994, El-Sebaey 1996, 1997 and 2001).

The predator *Coranus africana* El-Sebaey (Reduviidae-Hemiptera) is described for the first time from Egypt (El-Sebaey 2002). Biological aspects and predation rates of different stages on the laboratory preys *Anagasta Kuehniella* and *Corcyra cephalonica* are investigated by El-Sebaey & El-Bishry 2001. Also biological studies of this predator on the cotton pests *Spodoptera littoralis* Bosid and *Agrotis ypsilon* Rott are recorded by (El-Sebaey 2001). The effect of containers size on the development and mass rearing are studied by El-Sebaey & El-Shazly 2002). The effect of the prevailing physical environmental factors on the population density and life table parameters are given by El-Sebaey *et al.,* 2002a). This predator is considered a very important bio-agent in biological control programs (EL-Sebaey *et al.,* 2002b, 2004 and El-Sebaey & Abd EL-Wahab 2003& 2007.

The present work was conducted to evaluate the role of different stages of the predator *C. africana* in the suppression of *Bemisia tabaci* Genn. population in Qalubia (Delta) comparatively with Bani-Swif (Upper Egypt.)

MATERIALS AND METHODS

The assassin bug, *Coranus africana* El-Sebeay (Heterptera: Reduviidae) was collected from clover, tomato, egg plant and some wild plants, as *Echinochloa colonum* and *Cyndom doctylon* in wadi El-Natroun district in the western desert of Egypt. Laboratory mass rearing was conducted at $30_{+2}C^{\circ}$ & $70_{+5}\%$ R.H) in plastic troughs on larvae of *Anagasta kuehniella* Zell as reported by EL-Sebaey 2001b, EL Sebaey & EL-Bishry 2001 and EL-Sebaey & EL-Shazly 2002).

Experiments were conducted at Qalubia and Bani-Swif Governorates, Egypt in field area ($3180m^2$ divided to six treatments), each treatment was $500m^2$ and surrounded by $30m^2$ as a border of maize to create barrier and reduce movement of pests and predators, the area of each treatment divided into three replicates ($145m^2$ for each) and surrounded by $21.7m^2$ as a border. Each of the six treatments mentioned was randomly replicated three times for experiment and other three, for control (replicate = $40m^2$), each replicate separated from other by $5m^2$ (EL-Sebaey *et al.*, 2004 & EL-Sebaey and Abd El -wahab 2007). The tomato plants (Kasl Rock variety) were transferred after 45 days of planting to experimental replicates. The following treatments were evaluated at separate replicates (EL-Sebaey & Abd EL-Whab 2003).

Control (A, B, C, D, E, F): Tomato plants infested with *B. tabaci* (3 replicates), respectively.

Experiments (A, B, C, D, E, F) tomato plants infested with *B. tabaci* and suppressed by one stage of the predator *C. africana* /plant, (3plots), respectively.

On the other hand, the previous mentioned design was done at Bani-Swif in the field of tomato ($3180m^2$).

The infestation levels of *B. tabaci.* before and through the experimental period were estimated according to the procedure adopted by EL-Sebaey & Abd EL-Wahab. 2003 and EL-Sebaey *et al.*, 2004.

The different stages of predator, *C. africana* were released manually between the rows (1 predator/plant). After release the plants checked and counts of alive *B. tabaci* were recorded weekly as reported by EL-Sebaey & Abd EL-Wahab 2003 and EL-Sebaey *et al.*, 2004.

A comparison between the yield in the experimental and control plots was determined as reported by EL-Sebaey & Abd EL-Wahab 2004 and EL-Sebaey *et al.*, 2004.

The statistical equation of Henderson & Tilton (1955) was applied to calculate the reduction by different stages of predator in the population of *B. tabaci.*

RESULTS AND DISCUSSION

In different treatments, of the assassin bug, *Coranus africana* EL-Sebaey were significantly suppressed the population of white fly *Bemisa tabaci* (Genn.) in tomato plants at Qalubia and Bani-Swif Governorates during the two years of release (2007-2008).

At Qalubia, in the different treatments of reduviid predator, *C. africana* were significantly (P>0.05) suppressed of *B. tabaci* population of release (2007-2008).Considering the first year the suppression percentage of *B. tabaci* (adult and immature stages) when released first instar of the predator was (63.4% and 81.5% respectively) in the first week and increased to reach (89.1% and 93.7%) in the fourth week. However, these values were (47.6% and 83.4%) in the first week and (89.9% and 93.7%) in the fourth week in the second year (Fig 1&2 and Table 1&2). The reduction percentage increased in other treatments to reach the highest percentage when released adult stage of predator (85.3% & 88.5%) and (92.4% & 100%) in first and second week respectively in first year and 90.2% 91.5%) and (94.8% & 97.01%) in first and second week respectively in for the second year.

The release of *C. africana* adult and immature stage reduced the damage caused by *B. tabaci* in the total yield and it was highly significant reduced (P>0.001), (Tables 1,3). In the presence of the predator stages respectively, the total yield was increased (from 13.73 to 20.13, 21.52, 25.01, 29.85, 31.74 and 39.01 Ton/feddan during the first year, opposed (from 14.31 to 22.12, 23.21, 27.26, 32.77, 35.42 and 40.19 Ton/feddan during the second year. The percentages (%) yield increase over control in the presence of the predator stages were 46.6; 57.1; 82.1; 117.4;131.2&184.1% and 54.57;62.19;90.49;129.0;147.5&180.85% during the two years(2007-2008) (Tables 3 & 4).

Table 1. Suppression of white fly *B. tabaci* by *Coranus africana* El-Sebaey on tomato plant at Qalubia Governorate in 2007

Release / Treatment	No. of *B. tabaci*/plant before release		No. *B. tabaci*/plant after release							
	Adult	Imm.	7 days		15 days		21 days		30 days	
			Adult	Imm.	Adult	Imm.	Adult	Imm.	Adult	Imm.
First instar	112	396	45 (63.4%)	89 (81.5%)	34 (72.9%)	73 (86.9%)	23 (83.7%)	51 (91.5%)	16 (89.1%)	43 (93.7%)
Second instar	103	391	41 (63.7%)	87 (81.7%)	30 (74.2%)	69 (87.4%)	19 (85.4%)	47 (92.01%)	11 (91.8%)	41 (93.9%)
Third instar	118	402	36 (72.21%)	82 (83.2)	27 (79.6%)	66 (88.3%)	12 (91.9%)	42 (93.1%)	7 (95.4%)	39 (94.3%)
Fourth instar	125	388	23 (82.2%)	79 (83.3%)	13 (90.7%)	56 (89.71%)	5 (96.8%)	31 (94.7%)	--	28 (95.8%)
Fifth instar	147	353	21 (87.01%)	70 (83.7%)	13 (92.1%)	49 (90.1%)	4 (97.8%)	25 (95.3%)	--	10 (96.8%)
Adult	107	380	17 ± (85.3%)	55 (88.5%)	9± (92.4%)	--	--	--	--	--
Control	139	408	152	496	156	573	174	612	186	702

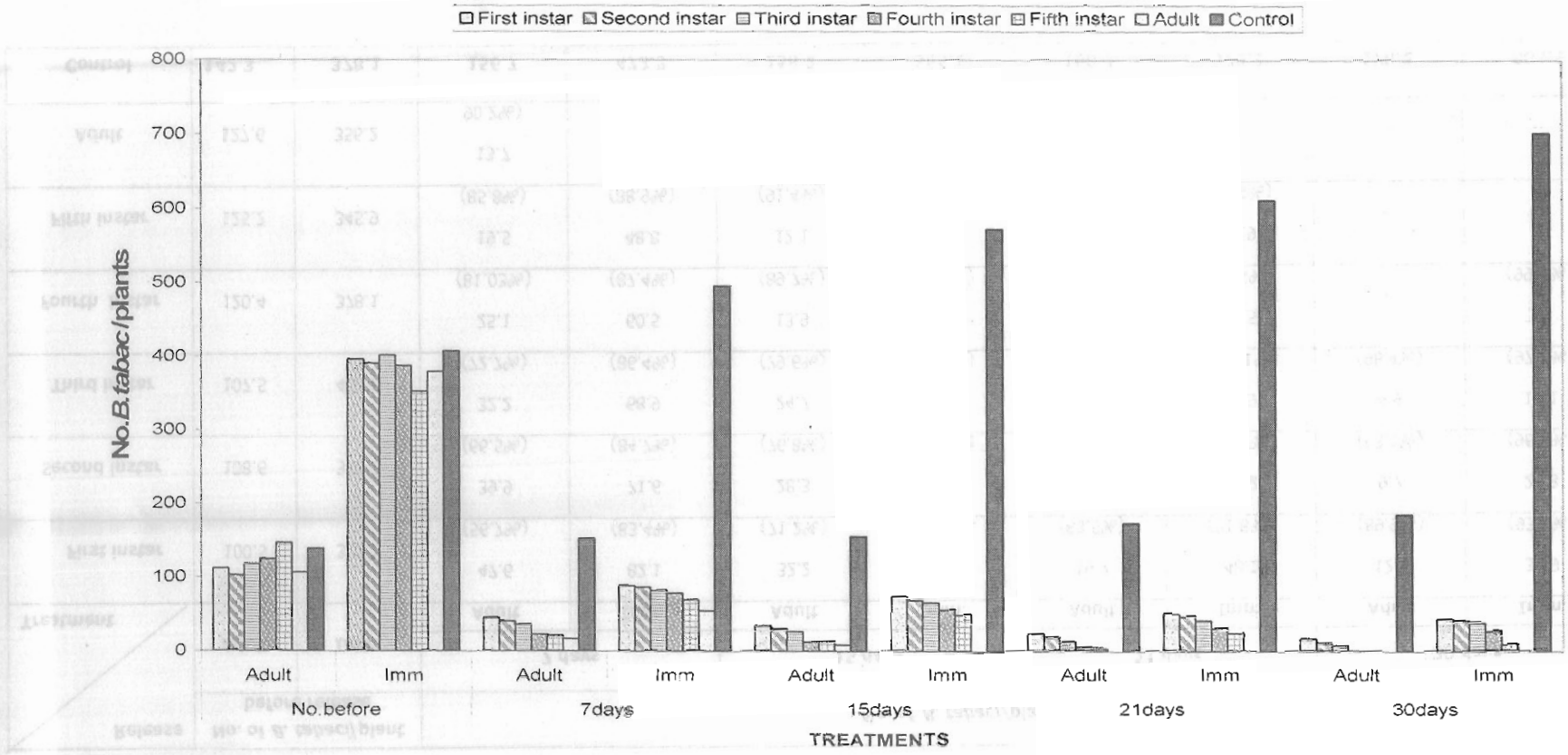

Fig 1. Suppression of white fly *B.tabaci* by C.*africana* El- Sebaey on tomato plant at Qalubia Governorate in 2007 season.

Table 2. Suppression of white fly *B. tabaci* by *Coranus africana* on tomato plant at Qalubia Governorate in 2008

Release / Treatment	No. of *B. tabaci*/plant before release		No. of *B. tabaci*/plant after release							
	Adult	Imm.	7 days		15 days		21 days		30 days	
			Adult	Imm.	Adult	Imm.	Adult	Imm.	Adult	Imm.
First instar	100.5	382.1	47.6 (56.7%)	82.1 (83.4%)	32.2 (71.2%)	71.2 (87.5%)	19.7 (83.5%)	48.1 (91.8%)	12.9 (89.9%)	38.9 (93.7%)
Second instar	108.6	370.2	39.9 (66.5%)	71.6 (84.7%)	28.3 (76.8%)	56.9 (89.7%)	15.1 (88.3%)	43.2 (92.4%)	9.7 (93.1%)	21.8 (96.5%)
Third instar	107.5	400.6	32.2 (72.7%)	68.9 (86.4%)	24.7 (79.6%)	51.7 (91.4%)	9.2 (92.8%)	36.9 (94.01%)	4.9 (96.4%)	15.1 (97.6%)
Fourth instar	120.4	378.1	25.1 (81.03%)	60.5 (87.4%)	13.9 (89.7%)	46.9 (91.7%)	2.8 (98.1)	20.5 (96.5%)	--	3.3 (99.5%)
Fifth instar	125.2	345.9	19.5 (85.8%)	48.8 (88.9%)	12.1 (91.4%)	35.8 (93.1%)	1.2 (99.2%)	13.9 (97.4%)	--	--
Adult	127.6	356.2	13.7 90.2%)	38.4 (91.5%)	7.5 (94.8%)	15.9 (97.01%)	--	--	--	--
Control	**142.3**	**378.1**	**156.7**	**473.3**	**158.2**	**565.1**	**168.7**	**573.3**	**178.2**	**604.5**

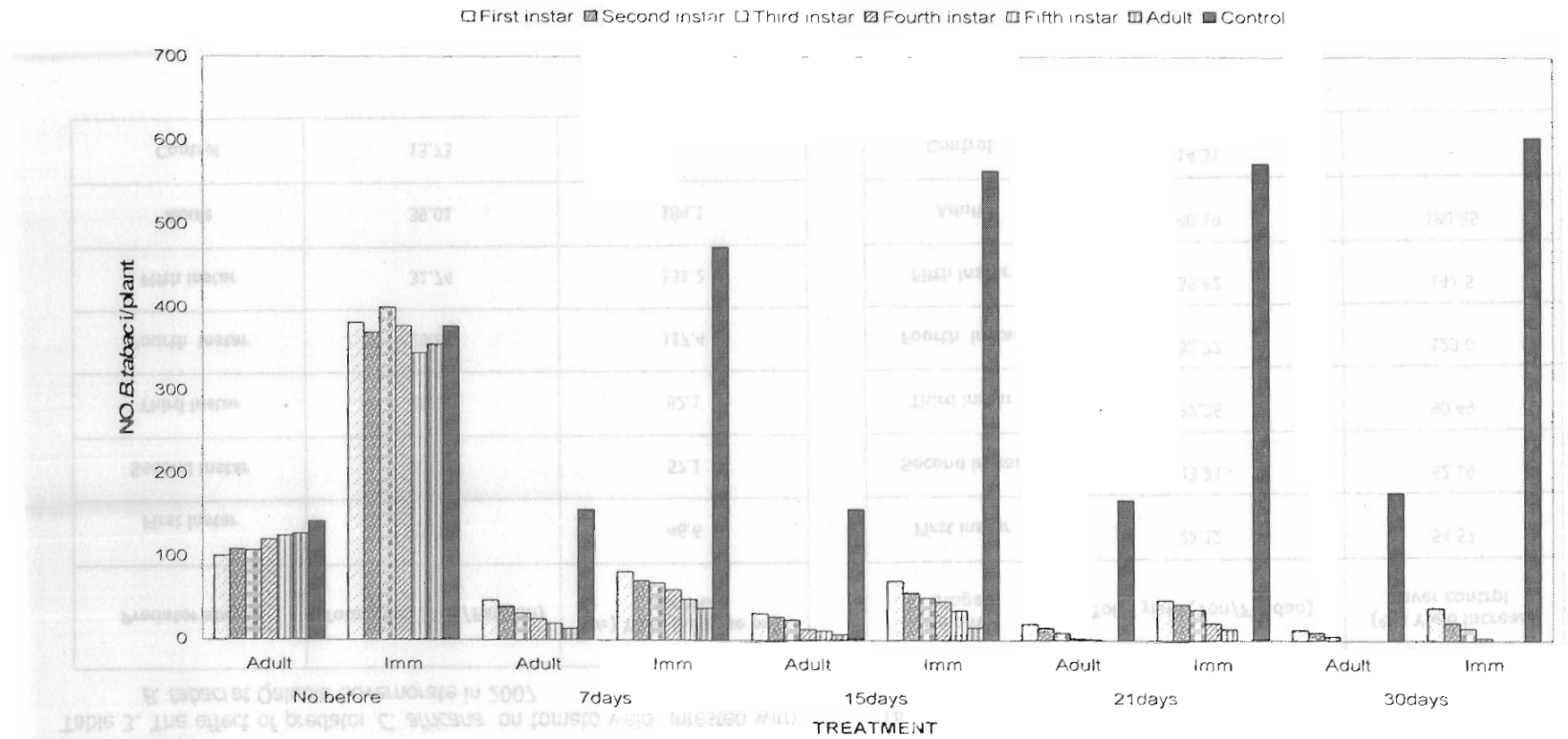

Fig. 2. Suppression of white fly *B.tabaci* by C.*africana* El-Sebacy on tomato plant at Qalubia Governorate in 2008 season.

Table 3. The effect of predator *C. africana* on tomato yield infested with *B. tabaci* at Qalubia Governorate in 2007

Predator stages	Total yield (Ton/Feddan)	(%) Yield increase over control
First instar	20.13	46.6
Second instar	21.52	57.1
Third instar	25.01	82.1
Fourth instar	29.85	117.4
Fifth instar	31.74	131.2
Adult	39.01	184.1
Control	13.73	-

Table 4. The effect of predator *C. africana* on tomato yield infested with *B. tabaci* at Qalubia Governorate in 2008

Predator stages	Total yield (Ton/Feddan)	(%) Yield increase over control
First instar	22.12	54.57
Second instar	23.21	62.19
Third instar	27.26	90.49
Fourth instar	32.77	129.0
Fifth instar	35.42	147.5
Adult	40.19	180.85
Control	14.31	-

At Bani-Swif, the suppression percentage of *B. tabaci,* (adult and immature stages where released first instar was 77.4% and 68.2%) in first week and reach to (93.06 % and 87.5%) in fourth week, during the first year (Fig 3 & Table 5). On the other hand, these values were (76.2% and 54.6%) in the first week and reach to (91.6% and 88.4%) in fourth week during the second year (Fig. 4 & Table 6). The reduction percentage increased in other treatment to reach the highest percentage when released the adult stage,(95.3% & 84.6%) and (97.4% 92.7%) during first and second week respectively in the first year. These reduction were (94.4% 81.8%) and 99.2% & 91.2%) respectively in the second year. The pest was completely eradication from third week in two years.

The release of *C. africana* treatments reduced the damage in the total yield and it was highly significant reduced (P >0.001), (Table 3 &4). The total yield was increased in the six treatments (from 22.6 to 25.1, 25.8, 27.0, 29.0, 29.9 and 31.1 ton/feddan respectively) during the first year opposed (from 22.6 to 25.7, 25.9, 26.7, 28.6, 30.1 and 31.4 ton/feddan respectively) during the second year. The percentages (%) yield increase over control in the presence of the predator stages were 46.6; 57.1; 82.1; 117.4;131.2&184.1% and 58.72; 64.71; 84.59; 105.7; 135.8&174.9% during the two years(2007-2008) (Tables 7 & 8).

El-Sebaey & Abd EL-Wahab (2003) reported that *C. africana* suppressed *B. tabaci, A. gossypii* and *Spodoptera littoralis* in tomato fields at Fayoum with increasing the obtained yield. The reduction rates of *B. tabaci* infestation levels differed according to the numbers of predator, also the parameters of yield EL-Sebaey *et al.*, 2004).

On the other hand (EL-Sebaey *el al.,* (2002 b) mentioned that *C. africana* reduced the level of infestation of *Bemisia tabaci* in cucrumber green house with increasing of early and total yield. Also the reduction rates of *Aphis gossypii* Glov. infestation according to the release of adult predator in each level in cucumber and squash fields with increasing the total yield at Fayoum governorate (EL-Sebaey & Abd EL-Wahab 2007).

Table 5. Suppression of white fly *B. tabaci* by *C. africana* on tomato plant at Bani-Swif Governorate in 2007

Release / Treatment	No. of *B. tabaci*/plant before release		No. of *B. tabaci*/plant after release							
			7 days		15 days		21 days		30 days	
	Adult	Imm.	Adult	Imm.	Adult	Imm.	Adult	Imm.	Adult	Imm.
First instar	198	512	49 (77.4%)	206 (68.2%)	37 (84.1%)	117 (83.7%)	25 (89.7%)	105 (86.06%)	18 (93.01%)	98 (87.5%)
Second instar	202	508	46 (79.2%)	197 (69.3%)	33 (86.1%)	108 (84.9%)	22 (91.1%)	99 (86.7%)	15 (94.2%)	91 (88.3%)
Third instar	205	499	39 (82.6%)	178 (71.8%)	29 (87.9%)	96 (86.3%)	18 (92.8%)	89 (87.8%)	11 (95.8%)	72 (90.6%)
Fourth instar	182	511	25 (87.5%)	139 (78.5%)	19 (91.1%)	83 (88.4%)	9 (95.9%)	61 (91.8%)	--	42 (94.6%)
Fifth instar	196	506	22 (98.7%)	101 (84.2%)	14 (93.9%)	66 (90.7%)	7 (97.1%)	45 (93.9%)	--	38 (95.1%)
Adult	201.1	516	11 (95.3%)	62 (89.6%)	6 (97.4%)	28 (92.7%)	--	13 (97.4%)	--	5 (99.3%)
Control	194	501	209	628	223	69.7	235	732	246	76.5

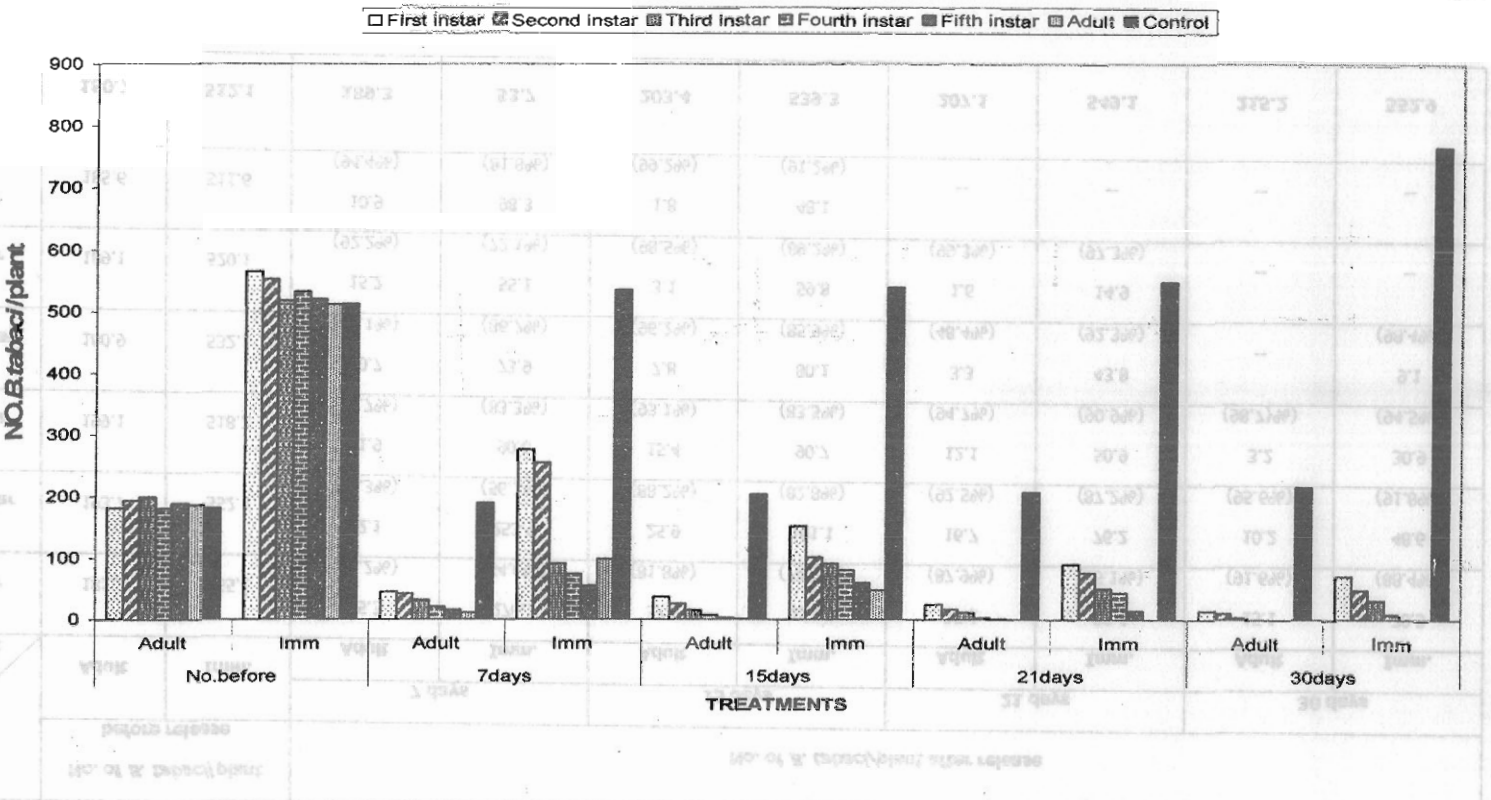

Fig. 3. Suppression of white fly *B.tabaci* by *C.africana* El-Sebaey on tomato plant at Bani Swif Governorate in 2007 season.

Table 6. Suppression of white fly *B. tabaci* by *C. africana* on tomato plant at Bani-Swif Governorate in 2008

Release / Treatment	No. of *B. tabaci*/plant before release		No. of *B. tabaci*/plant after release							
			7 days		15 days		21 days		30 days	
	Adult	Imm.	Adult	Imm.	Adult	Imm.	Adult	Imm.	Adult	Imm.
First instar	181.2	565.1	45.3 (76.2%)	276.1 (54.6%)	37.3 (81.8%)	151.3 (74.8%)	25.1 (87.9%)	90.6 (85.1%)	15.1 (91.6%)	70.3 (88.4%)
Second instar	193.7	552.1	42.1 (79.3%)	253.9 (56.3%)	25.9 (88.2%)	101.1 (82.8%)	16.7 (92.5%)	76.2 (87.2%)	10.2 (95.6%)	48.6 (91.8%)
Third instar	199.1	518.2	31.9 (84.7%)	90.6 (83.3%)	15.4 (93.1%)	90.7 (83.5%)	12.1 (94.7%)	50.9 (90.9%)	3.2 (98.7)%)	30.9 (94.5%)
Fourth instar	180.9	532.1	20.7 (89.1%)	73.9 (86.7%)	7.8 (96.2%)	80.1 (85.9%)	3.3 (48.4%)	43.8 (92.3%)	–	9.1 (98.4%)
Fifth instar	189.1	520.1	15.2 (92.2%)	55.1 (72.1%)	3.1 (98.5%)	59.8 (89.2%)	1.6 (99.3%)	14.9 (97.3%)	–	–
Adult	185.6	511.6	10.9 (94.4%)	98.3 (81.8%)	1.8 (99.2%)	48.1 (91.2%)	--	--	--	--
Control	**180.7**	**512.1**	**189.3**	**53.7**	**203.4**	**539.3**	**207.1**	**549.1**	**215.2**	**552.9**

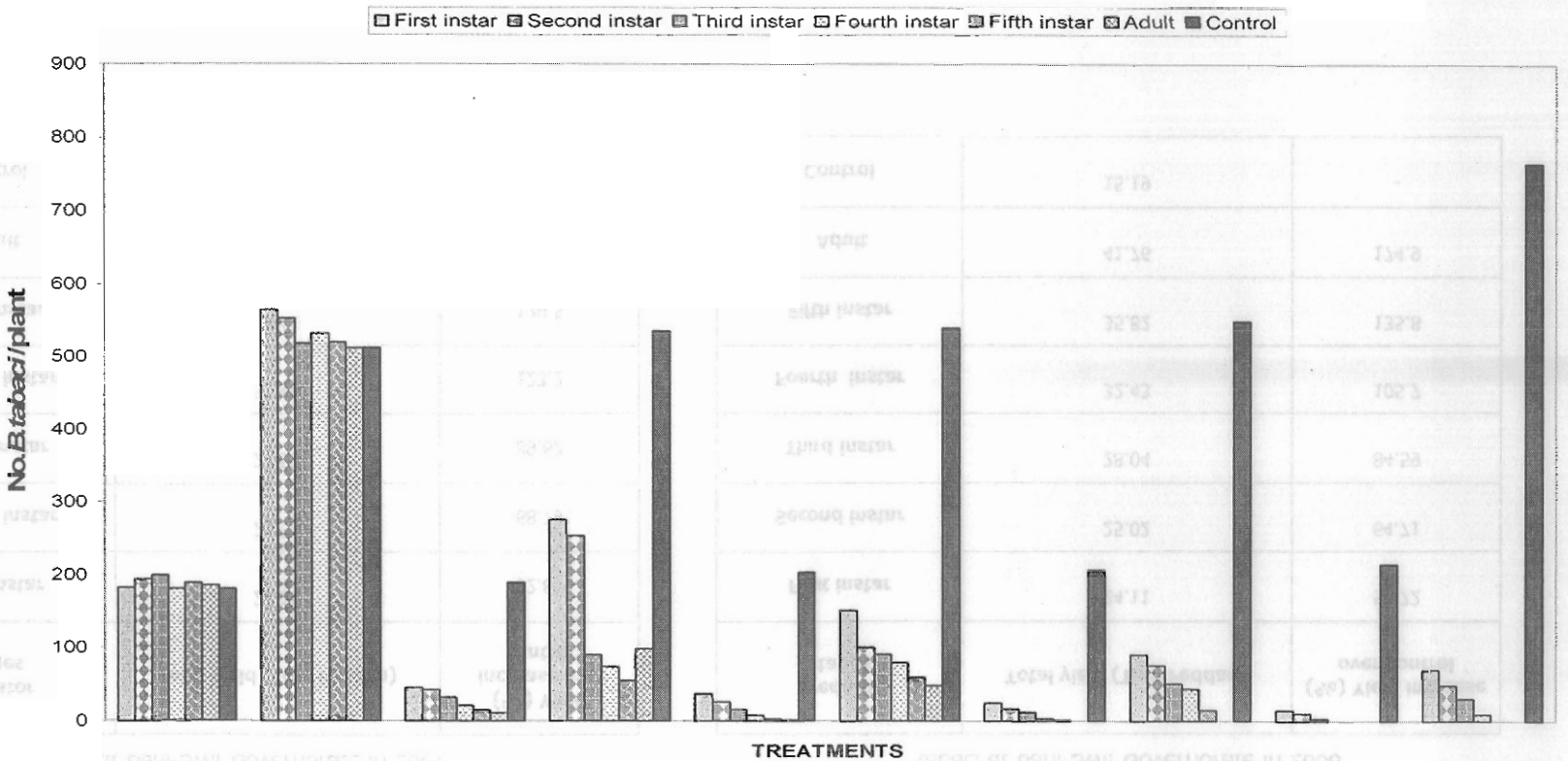

Fig. 4. Suppression of white fly *B.tabaci* by *C.africana* El-Sebaey on tomato plant at Bani Swif Governorate in 2008 season.

Table 7. The effect of predator C. africana on tomato yield infested with B. tabaci at Bani-Swif Governorate in 2007

Predator stages	Total yield (Ton/Feddan)	(%) Yield increase over control
First instar	22.24	52.85
Second instar	24.56	68.79
Third instar	27.59	89.62
Fourth instar	32.48	123.2
Fifth instar	33.40	129.5
Adult	40	174.9
Control	14.55	-

Table 8. The effect of predator C. africana on tomato yield infested with B. tabaci at Bani-Swif Governorate in 2008

Predator stages	Total yield (Ton/Feddan)	(%) Yield increase over control
First instar	24.11	58.72
Second instar	25.02	64.71
Third instar	28.04	84.59
Fourth instar	32.43	105.7
Fifth instar	35.82	135.8
Adult	41.76	174.9
Control	15.19	-

REFERENCES

1. Afifi, A. I., K. T. Awadalla, M. F. S. Tawfik and I. I. A. El-Sebaey. 1994. A survey of Egyptian reduviids. Egypt J. Biol. Pest. Cont.
2. El-Sebaey, I. I. A. 1996. Description and biological studies on different developmental stages of *Vachiria natolica* stal (Hemiptera-Heteroptera-Reduviidae). Egypt. J. Biol. Pest. Cont. 6 (2): 177-184.
3. El-Sebaey, I. I. A. 1997. Biological and morphological studies on *Coranus aegyptius* (F.) (Hemiptera: Reduviidae). Egypt. J. Agric. Res. 76(3): 933-945.
4. El- Sebaey, I. I. A. 2001a. Biology and predation rates of certain adult Reduviids (Heteroptera: Reduviidae). Egypt J. Biol. Pest Cont., 11 (1): 15-23.
5. El- Sebaey, I. I. A. 2001b). Biology and predation rates of the, assassin bug, *Coranus africana* El-Sebaey (Heteroptera: Reduviidae) on the cotton pests, *Spodoptera littoralis* (Bosid.) and *Agrotis ypsilon* Rott. Bull. Fac. Agric., Cairo. Univ., 52: 655-668.
6. El- Sebaey, I. I. A. 2002. *Coranus africana* sp. Nov., A new harpactorin (Reduviidae: Hemiptera) from Egypt. Egypt. J. Agric Res., 80 (1) : 211-217.
7. El- Sebaey, I. I. A. and M. H. El-Bishry. 2001. Biological aspects and predation of *Coranus africana* El-Sebaey on the Laboratory preys *Anagasta kuehniella* and *Corcyra cephalonica*. Egypt. Jou. Bio. Pest. Cont., 11(2): 57-62.
8. El- Sebaey, I. I. A. and M. M. El-Shazly. 2002. Effect of containers size on the development and Mass rearing of the predatory bug, *Coranus africana* (Hemiptera: Reduviidae). Proc. of the 2nd conf. of Ent., March 27, 2002, pp, 133-145.
9. El- Sebaey, I. I. A, M. M. El-Shazly and H. A. Abd El-Wahab. 2002a. Seasonal changes in the population density of *Coranus africana* El-Sebaey in Egypt as indicated by life table parameters. Egypt. J. Agric. Res., 80 (2): 631-645.
10. El- Sebaey, I. I. A, H. A. Abd El-Wahab and S. A. Ibrahim. 2002b. Suppression of white fly *Bemisia* tabaci (Genn.) with Augmentative release of assassin bug, *Coranus africana* El-Sebaey (Het; Reduviidae) in cucumber green house. j. Unio. Arab Biol. Cairo; Voll. 17 (A): 197-205.
11. El- Sebaey, I. I. A and H. A. Abd. El- Wahab. 2003. Suppression of *Bemisia tabaci* (Genn), *Aphis gossypii* Glov. and *Spodoptera littoralis* (Bosid) by *coranus africana* El-Sebaey (Het.: Reduviidae) in tomato field. Bull. Fac. Agric. Cairo Univ., 54 (1) 141-150.

12. El- Sebaey, I. I. A and H. A. Abd El-Wahab. 2007. Evaluation the role of the assassin bug, *Coranus africana* El-Sebaey (Heteroptera: Reduviidae) in the suppression of different infestation levels of *Aphis gossypii* Glov. in Cucumber and squash fields. Egypt. J. Agric. Res., 85 (2): 489-496.
13. El- Sebaey, I. I. A, H. A. Abd El-Wahab and S. A. Ibrahim. 2004. Evaluation of the role of the predatory bug *Coranus africana* El-Sebaey (Heteroptera: Reduviidae) in the suppression of different infestation levels of the white fly *Bemisia tabaci* in tomato field. Al- Azhar J. Agric. Res. 39:31-44.
14. Henderson C. F. and E. W. Tilton. 1955. Test with acaricides against the brown wheat mite. J. Econ. Entomol., 48: 157-161.

تأثير الأطوار المختلفة للمفترس *Coranus africana* El-Sebaey (فصيلة البق السفاح –رتبة نصفية الأجنحة) فى خفض تعداد الذبابة البيضاء *Bemisia tabaci* Genn. بحقول الطماطم فى محافظتى القليوبية وبنى سويف

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

تم اكثار الأطوار المختلفة للمفترس *Africana Coranus* وإطلاقها لمكافحة الذبابة البيضاء ***B. tabaci*** فى حقول الطماطم بمحافظة القليوبية (الدلتا) مقارنة بمحافظة بنى سويف (وجه قبلى) وأوضحت النتائج أن نسبة انخفاض الاصابة تختلف تبعا لعمر المفترس فى كل معاملة حيث حقق أسرع معدل خفض فى الاسبوع الثانى من اطلاق الأطوار الكاملة للمفترس (٩٤,١٪ & ١٠٠٪) للأطوار الكاملة وغير الكاملة للذبابة البيضاء على التوالى فى العام الأول بينما كانت فى العام الثانى (٩٤,٨٪ & ٩٧,٠١٪) للأطوار الكاملة وغير الكاملة للذبابة البضاء على التوالى بمحافظة القليوبية ، بينما كان معدل الخفض فى محافظة بنى سويف (٩٢,٧٪ & ٩٧,٤٪) للأطوار الكاملة وغير الكاملة على التوالى فى العام الأول بينما كانت (٩١,٢٪ & ٩٩,٢٪) على التوالى فى كل عام بكل من محافظة القليوبية وبنى سويف.