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Ecological and biological studies on the main piercing-sucking insect pests infesting some leguminous crops and their associated predatory insects.

By

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Contents

Content	Page
1-INTRODUCTION.....	1
2-REVIEW OF LITERATURE.....	4
2.1. Effect of different faba bean varieties.....	4
2.1.1. On the infestation with the main piercing- sucking insect pests.....	4
2.1.2. The population density of the main piercing-sucking insect pests on faba bean plants.....	11
2.1.2.1. The cowpea aphid, <i>Aphis Craccivora</i> (Koch).....	11
2.1.2.2. The Green peach aphid, <i>Myzus persicae</i> (Sulzer).....	15
2.1.2.3. The leafhoppers, <i>Empoasca</i> spp.....	16
2.1.2.4. The green stink bug, <i>Nezara viridula</i> L.....	20
2.1.2.5. The cotton mealybug <i>Phenacoccus solenopsis</i> (Tinsely).....	21
2.1.3. On the main predatory insects.....	23
2.1.4. The population density of the main predators on faba bean plants.....	24
2.1.4.1. The Green lacewing, <i>Chrysoperla carnea</i> (Steph.).....	24
2.1.4. 2.The Flower bug, <i>Orius</i> spp.....	25
2.1.4.3.The eleven spotted lady bird beetle, <i>Coccinella undecimpunctata</i> L.....	27
2.1.4.4. The lady bird beetle, <i>Scymnus</i> spp.....	29
2.1.4.5.The Rove beetle, <i>Paederus alfieri</i> (Koch.).....	30
2.2. Effect of different plantation on on the population of the main piercing - sucking insect pests attacking faba bean plants.....	32
2.3. Effect of different soybean bean varieties.....	35
2.3.1. On the infestation with the main piercing- sucking insect pests.....	35

Content

Content	Page
2.3.2. The population density of the main piercing sucking insect pests on different soybean plants.....	40
2.3.2.1. The cotton aphid, <i>Aphis gossypii</i> Glove.....	40
2.3.2.2. The Whitefly, <i>Bemisi atabaci</i> (Gennadius).....	42
2.3.2.3. The leafhoppers, <i>Empoasca</i> spp.....	45
2.3.2.4. The green stink bug, <i>Nezara viridula</i> L.....	47
2.3.3. On the main predatory insects.....	49
2.3.4. The population density of the main predators on soybean plants.....	51
2.3.4.1. The Green lacewing, <i>Chrysoperla carnea</i> (Steph.).....	51
2.3.4.2 The Flower bug, <i>Orius</i> spp.....	52
2.3.4.3. The Eleven spotted lady bird beetle <i>Coccinella undecimpunctata</i> L.....	53
2.3.4.4. The Lady Bird beetle, <i>Scymnus</i> spp.....	56
2.3.4.5. The Rove beetle, <i>Paederus alfieri</i> (Koch.)	57
2.4. Effect of different plantations on the population of main piercing - sucking insect pests attacking soybean plants.....	58
2.5. Laboratory studies on the predatory insect <i>Chrysoperla carnea</i>	60
3- MATERIALS AND METHODS.....	63
3.1. Effect of some leguminous crops on the population of the population of main piercing- sucking insect pests and insect predators activity on certain leguminous crops.....	63
3.1.1. On faba bean crop	63
3.1.2. On soybean crop.....	64
3.2. Effect of sowing dates on the population of the main piercing-sucking insect pests and insect predators activity on certain leguminous crops	65

Content	Page
3.2.1. On faba bean crop	65
3.2.2. On soybean crop	65
3.3. Laboratory study on the Green lacewings, <i>Chrysoperla carnea</i>	66
3.3.1. Rearing of immature stages.....	66
3.3.2. Rearing of adult stage.....	67
3.4. Statistical analysis.....	67
4. RESULTS AND DISCUSSION.....	68
4.1. Effect of different faba bean varieties.....	68
4.1.1 On the population of the main piercing- sucking insect pests.....	68
4.1.2. The population density of the main piercing- sucking insect pests on different faba bean varieties.....	73
4.1.2.1. The cowpea aphid, <i>Aphis Craccivora</i> (Koch).....	73
4.1.2.2. The Green peach aphid, <i>Myzus persicae</i> (Sulzer).....	79
4.1.2.3. The leafhoppers, <i>Empoasca</i> spp.....	84
4.1.2.4. The green stink bug, <i>Nezara viridula</i> L.....	89
4.1.2.5. The cotton mealybug <i>Phenacoccus solenopsis</i> (Tinsely).....	94
4.1.3. On the main predatory insects.....	100
4.1.4. The population density of the main predators on different faba bean varieties.....	103
4.1.4.1. The Green lacewing, <i>Chrysoperla carnea</i> (Steph.).....	103
4.1.4.2. The Flower bug, <i>Orius</i> spp.	106

Content	Page
4.1.4.3. The eleven spotted lady bird beetle, <i>Coccinella undecimpunctat</i> L.....	110
4.1.1.4. The average number of the lady bird beetle, <i>Scymnus</i> spp.....	114
4.1.4.5. The Rove beetle, <i>Paederus alfieri</i> (Koch.).....	118
4.1.5. The relationship between the main pests attacking different faba bean varieties and their associated predators.....	122
4.2. Effect of different plantations on the population of the main piercing - sucking insect pests attacking sakha 4 faba bean variety and the associated insect predators.....	128
4.2.1. On the main piercing -sucking insect pests.....	128
4.2.2. On the main associated predators.....	133
4.3. Effect of different soybean bean varieties.....	136
4.3.1. On the population of main piercing- sucking insect pests.....	136
4.3.2. The population density of the main piercing sucking insect pests on different soybean varieties.....	139
4.3.2.1. The cotton aphid, <i>Aphis gossypii</i> Glove.....	139
4.3.2.2. The Whitefly, <i>Bemisia tabaci</i> (Gennadius).....	144
4.3.2.3. The leafhoppers, <i>Empoasca</i> spp.....	149
4.3.2.4. The green stink bug, <i>Nezara viridula</i> L.....	153
4.3.3. On the main associated predators.....	159
4.3.4. The population density of the main predators on different soybean varieties.....	161
4.3.4.1. The Green lacewing, <i>Chrysoperla carnea</i>	161
4.3.4.2. The Flower bug, <i>Orius</i> spp.....	165
4.3.4.3. The Eleven spotted lady bird beetle, <i>Coccinella undecimpunctata</i>	169
4.3.4.4. The Lady bird beetle, <i>Scymnus</i> spp.....	173

Content

Content	Page
4.3.4.5. The Rove beetle, <i>Paederus alfieri</i>	177
4.3.5. The relationship between the main pests attacking different soybean varieties and their associated predators.....	181
4.4. Effect of different plantations on the population of main piercing - sucking insect pests attacking Giza 111 soybean variety and the associated insect predators.....	187
4.4.1. On the main piercing -sucking insect pests.....	187
4.4.2. On the main associated predators.....	191
4.5. Laboratory studies on the predatory insect <i>Chrysoperla carnea</i>	194
4.5.1. Developmental times of immature stages.....	194
4.5.2. Survival percentage.....	195
4.5.3. Longevity and fecundity of adult stage.....	197
5. SUMMARY	201
6- CONCLUSION	218
7-References	220

List of tables

No.	List of Tables	Page
1	Table (1): Total number and relative density of the main piercing-sucking insect pests on sakha 1 faba bean variety during the two successive seasons 2015/16 and 2016/17.	69
2	Table (2): Total number and relative density of the main piercing-sucking insect pests on sakha 4 faba bean variety during the two successive seasons 2015/16 and 2016/17.	70
3	Table (3): Total number and relative density of the main piercing-sucking insect pests on Giza 843 faba bean variety during the two successive seasons 2015/16 and 2016/17.	71
4	Table (4): Total number and relative density of the main piercing-sucking insect pests on Misr1 faba bean variety during the two successive seasons 2015/16 and 2016/17.	72
5	Table (5) Seasonal average number of the cowpea aphid, <i>Aphis craccoivora</i> on the different faba bean varieties during the first season 2015/16.	76
6	Table (6): Monthly average numbers of <i>S. lividipes</i> collected by two methods during the two successive seasons; 2011/12 and 2012/13.	79
7	Table (7): Seasonal average number of the Green peach aphid, <i>Myzus persicae</i> on the different faba bean varieties during the first season 2015/16.	81
8	Table (8) Seasonal average number of the Green peach aphid, <i>Myzus persicae</i> on the different faba bean varieties during the second season 2016/17.	84
9	Table (9) Seasonal average number of the leafhoppers, <i>Empoasca spp</i>	86

List of tables

	on the different faba bean varieties during the first season 2015/16.	
10	Table (10) Seasonal average number of the leafhoppers, <i>Empoasca spp</i> on the different faba bean varieties during the second season 2016/17.	89
11	Table (11): Seasonal average number of the green stink bug, <i>Nezara viridula</i> on the different faba bean varieties during the first season 2015/16.	91
12	Table (12): Seasonal average number of the green stink bug, <i>Nezara viridula</i> on the different faba bean varieties during the second season 2016/17.	94
13	Table (13): Seasonal average number of the cotton mealybug, <i>Phenacoccus solenopsis</i> on the different faba bean varieties during the first season 2015/16.	97
14	Table (14): Seasonal average number of the cotton mealybug <i>Phenacoccus solenopsis</i> on the different faba bean varieties during the second season 2016/17.	100
15	Table (15): Total number and relative density of the main associated insect predators on the different faba bean varieties during season 2015/16.	101
16	Table (16): Total number and relative density of the main associated insect predators on the different faba bean varieties during season 2016/17.	102
17	Table (17): The seasonal average number of the green lacewing, <i>Chrysoperla carnea</i> on the different faba bean varieties during the two successive seasons; 2015/16 and 2016/17.	106
18	Table (18): The average number of the Flower bug, <i>Ouris spp.</i> on the	110

List of tables

	different faba bean varieties during the two successive seasons; 2015/16 and 2016/17.	
19	Table (19): The average number of the seven spotted lady bird beetle, <i>Coccinella undecimpunctata</i> on the different faba bean varieties during the two successive seasons; 2015/16 and 2016/17.	114
20	Table (20): The average number of the Lady bird beetle, <i>Scymnus</i> spp. on the different faba bean varieties during the two successive seasons; 2015/16 and 2016/17.	118
21	Table (21): The average number of the Rove beetle, <i>Paederus alferii</i> on the different faba bean varieties during the two successive seasons; 2015/16 and 2016/17.	122
22	Table (22): Simple correlation coefficients between the main piercing-sucking insect pests and their associated predators in the four faba bean varieties during the first season 2015/16.	124
23	Table (23): Simple correlation coefficients between the main piercing-sucking insect pests and their associated predators in the four faba bean varieties during the second season 2016/17.	126
24	Table (24): The relationship between the total piercing-sucking insect pests and their associated predatory insects as predator-prey ratio (p-p ratio) on different faba bean varieties during the first season 2015/16.	127
25	Table (25): The relationship between the total piercing-sucking insect pests and their associated predatory insects as predator-prey ratio (p-p ratio) on different faba bean varieties during the second season 2016/17.	127
26	Table (26): Total number and relative density of the main piercing –	129

List of tables

	insect pests on sakha 4 faba bean variety at the three plantations during the first season 2015/16.	
27	Table (27): Total number and relative density of the main piercing - sucking insect pests on sakha 4 faba bean variety at the three plantations during the second season 2016/17.	130
28	Table (28): Effect of planting dates on the average numbers of the main piercing -sucking insect pests attacking sakha 4 faba bean variety during the first season 2015/16.	131
29	Table (29): Effect of planting dates on the average numbers of the main piercing -sucking insect pests attacking sakha 4 faba bean variety during the second season 2016/17.	131
30	Table (30): Total number and relative abundances of the main Predators inhibiting sakha 4 faba bean variety at different Planting dates during the first season 2015/16.	133
31	Table (31): Total number and relative abundances of the main predators inhibiting sakha 4 faba bean variety at different planting dates during the second season 2016/17.	134
32	Table (32): Effect of planting dates on the average numbers of the main Predators inhibiting sakha 4 faba bean variety during the first season 2015/16.	135
33	Table (33): Effect of planting dates on the average numbers of the main Predators inhibiting sakha 4 faba bean variety during the second season 2016/17.	135
34	Table (34): Total number and relative density of piercing- sucking insect pests on different soybean varieties during the first season 2016.	137
35	Table (35): Total number and relative density of piercing- sucking	138

List of tables

	insect pests on different soybean varieties during the second season 2017.	
36	Table (36): Seasonal average number of the cotton aphid, <i>Aphis gossypii</i> on the different soybean varieties during the first season 2016.	141
37	Table (37): Seasonal average number of the cotton aphid, <i>Aphis gossypii</i> on the different soybean varieties during the second season 2017.	143
38	Table (38): Seasonal average number of the Whitefly, <i>Bemisia tabaci</i> on the different soybean varieties during the first season 2016.	146
39	Table (39): Seasonal average number of the Whitefly, <i>Bemisia tabaci</i> on the different soybean varieties during the second season 2017.	148
40	Table (40): Seasonal average number of the leafhoppers, <i>Empoasca</i> spp. on the different soybean varieties during the first season 2016.	151
41	Table (41): Seasonal average number of the leafhoppers, <i>Empoasca</i> spp. on the different soybean varieties during the second season 2017.	153
42	Table (42): Seasonal average number of the green stink bug, <i>Nezara viridula</i> on the different soybean varieties during the first season 2016.	156
43	Table (43): Seasonal average number of the green stink bug, <i>Nezara viridula</i> on the different soybean varieties during the second season 2017.	158
44	Table (44): Total number and relative density of the main associated	159

List of tables

	insect predators on different varieties of soybean during season 2016.	
45	Table (45): Total number and relative density of the main associated insect predators on different varieties of soybean during season 2017.	160
46	Table (46): The average number of the Green lacewing, <i>Chrysoperla carnea</i> on the different soybean varieties during the two successive seasons; 2016 and 2017.	165
47	Table (47): The average number of the Flower bug, <i>Ouris spp.</i> on the different soybean varieties during the two successive seasons; 2016 and 2017.	169
48	Table (48): The average number of the Seven spotted lady bird beetle <i>Coccinella undecimpunctata</i> on the different soybean varieties during the two successive seasons; 2016 and 2017.	173
49	Table (49): The average number of the Lady bird beetle, <i>Scymnus spp.</i> on the different soybean varieties during the two successive seasons; 2016 and 2017.	177
50	Table (50): The average number of the Rove beetle, <i>Paederus alfieri</i> on the different soybean varieties during the two successive seasons; 2016 and 2017.	181
51	Table (51): Simple correlation coefficients between the main piercing -sucking insect pests and their associated predators in the four soybean varieties during the first season2016.	183
52	Table (52): Simple correlation coefficients between the main piercing - sucking insect pests and their associated predators in the four soybean varieties during the second season2017.	185
53	Table (53): The relationship between the total piercing-sucking insect pests and their associated predatory insects as predator-prey	186

List of tables

	ratio (p-p ratio) on different soybean varieties during the first season 2016.	
54	Table (54): The relationship between the total main piercing-sucking pests and their associated predatory insects as predator-prey ratio (p-p ratio) on different soybean varieties during the second season 2017.	186
55	Table (55): Total number and relative abundances of the main piercing-sucking insect pests on Giza111soybean variety at the three plantations during the first season 2016.	187
56	Table (56): Total number and relative abundances of the main piercing- sucking insect pests on Giza111soybean variety at the three plantations during the second season 2017.	188
57	Table: (57): Effect of planting dates on the average numbers of the main piercing -sucking insect pests attacking Giza111 soybean variety during the first season 2016.	189
58	Table: (58): Effect of planting dates on the average numbers of the main piercing -sucking insect pests attacking Giza111 soybean variety during the second season 2017.	190
59	Table (59): Total number and relative abundances of the main Predators inhibiting Giza111soybean variety at different Planting dates during the first season 2016.	191
60	Table (60): Total number and relative abundances of the main Predators inhibiting Giza111 soybean variety at different Planting dates during the second season 2017.	192
61	Table (61): Effect of planting dates on the average numbers of the main Predators inhibiting Giza 111soybean variety during the first season 2016.	193

List of tables

62	Table (62): Effect of planting dates on the average numbers of the main Predators inhibiting Giza 111 soybean variety during the second season 2017.	193
63	Table (63): Influence of the green peach aphid, <i>M. persicae</i> as preys reared on different host plants on the immature stages of the green lacewing <i>C. carnea</i> under laboratory conditions (23±3.2°c and 60± 5.0% R.H.).	195
64	Table (64): Influence of the green peach aphid, <i>M. persicae</i> as preys reared on different host plants on the survival percentages of the green lacewing <i>C. carnea</i> under laboratory conditions (23±3.2°c and 60± 5.0% R.H.).	196
65	Table (65): Influence of the green peach aphid, <i>M. persicae</i> as preys reared on different host plants on the ovipositional periods, adult longevity and fecundity of the green lacewing, <i>C. carnea</i> under laboratory conditions (23±3.2°c and 60± 5.0% R.H.).	198

List of figures

No	Figure	Page
1	Fig. (1): Population density of <i>Aphis craccoivora</i> on the different faba bean varieties during the first season,2015/16.	75
2	Fig. (2): Population density of <i>Aphis craccoivora</i> on the different faba bean varieties during the second season, 2016/17.	78
3	Fig.(3): Population density of <i>Myzus persicae</i> on the different faba bean varieties during the first season, 2015/16.	80
4	Fig.(4): Population density of <i>Myzus persicae</i> on the different faba bean varieties during the second season,2016/17.	83
5	Fig. (5): Population density of <i>Emposca</i> spp. on the different faba bean varieties during the first season,2015/16.	85
6	Fig. (6): Population density of <i>Emposca</i> spp. on the different faba bean varieties during the first season,2016/17.	88
7	Fig. (7): Population density of <i>Nezara viridula</i> on the different of faba bean varieties during the first season,2015/16.	90
8	Fig. (8): Population density of <i>Nezara viridula</i> on the different faba bean varieties during the second season, 2016/17.	93
9	Fig. (9): Population density of <i>Phenacoccus solenopsis</i> on the different faba bean varieties during the second season,2015/16.	96
10	Fig. (10): Population density of <i>Phenacoccus solenopsis</i> on the different faba bean varieties during the second season,2016/17.	99
11	Fig. (11) Population density of <i>Chrysoperla carnae</i> on the different faba bean varieties during the first season,2015/16.	104
12	Fig. (12): Population density of <i>Chrysoperla carnae</i> on the different faba bean varieties during the second season,2016/17.	105

List of Figures

13	Fig. (13): Population density of <i>Ouris</i> spp. on the different faba bean varieties during the first season, 2015/16.	108
14	Fig. (14): Population density of <i>Ouris</i> spp. on the different faba bean varieties during the second season, 2016/17.	109
15	Fig. (15) Population density of <i>Coccinella undecimpunctata</i> on the different faba bean varieties during the first season,2015/16.	112
16	Fig. (16) Population density of <i>Coccinella undecimpunctata</i> on the different faba bean varieties during the second season,2016/17.	113
17	Fig. (17): Population density of <i>Scymnus</i> spp. on the different faba bean varieties during the first season,2015/16.	116
18	Fig. (18): Population density of <i>Scymnus</i> spp. on the different faba bean varieties during the second season,2016/17.	117
19	Fig.(19): Population density of <i>Paederus alferii</i> on the different faba bean varieties during the first season,2015/16.	120
20	Fig. (20): Population density of <i>Paederus alferii</i> on the different faba bean varieties during the second season,2016/17.	121
21	Fig. (21): Population density of <i>Aphis gossypii</i> on the different soybean varieties during the first season,2016.	140
22	Fig. (22): Population density of <i>Aphis gossypii</i> on the different soybean varieties during the second season,2017.	142
23	Fig. (23): Population density of <i>Bemisia tabaci</i> on the different soybean varieties during the first season,2016.	145
24	Fig. (24): Population density of <i>Bemisia tabaci</i> on the different soybean varieties during the second season, 2017.	147
25	Fig. (25): Population density of <i>Empoasca</i> spp. on the different soybean varieties during the first season, 2016.	150
26	Fig. (26): Population density of <i>Empoasca</i> spp. on the different soybean varieties during the second season, 2017.	152

List of Figures

27	Fig. (27): Population density of <i>Nezara viridula</i> on the different soybean varieties during the first season, 2016.	155
28	Fig. (28): Population density of <i>Nezara viridula</i> the different soybean varieties during the second season, 2017.	157
29	Fig. (29) Population density of <i>chrysoperla carnae</i> on the different soybean varieties during the first season, 2016.	163
30	Fig. (30) Population density of <i>chrysoperla carnae</i> on the different soybean varieties during the second season, 2017.	163
31	Fig. (31) Population density of <i>Ouris spp.</i> on the different soybean varieties during the first season, 2016.	167
32	Fig. (32) Population density of <i>Ouris spp.</i> on the different soybean varieties during the second season, 2017.	168
33	Fig. (33) Population density of <i>Coccinella undecimpunctata.</i> on the different soybean varieties during the first season, 2016.	171
34	Fig. (34) Population density of <i>Coccinella undecimpunctata</i> on the different soybean varieties during the second season, 2017.	172
35	Fig. (35): Population density of <i>Scymnus spp.</i> on the different soybean varieties during the first season, 2016.	175
36	Fig. (36): Population density of <i>Scymnus spp.</i> on the different soybean varieties during the second season, 2017.	176
37	Fig. (37) Population density of <i>Paederus alferii</i> on the different soybean varieties during the first season, 2016.	179
38	Fig. (38) Population density of <i>Paederus alferii</i> on the different soybean varieties the second season, 2017.	180
39	Fig. (39) Simple linear regression between female age (X) and fecundity rate (Y) of <i>C. carnea</i> fed on <i>M. persicae</i> which reared on host plants under laboratory conditions ($23 \pm 3.2^\circ\text{c}$ and $60 \pm 5.0\% \text{R.H.}$).	200

4, Giza 843 and Misr 1, respectively. While, the leafhoppers species *Empoasca* spp. came in the second category and represented by 20.7, 16.2, 16.2 and 25.9 % on the four faba bean varieties, respectively. Meanwhile, the cotton mealybug, *P. solenopsis* came in the last ranking and represented by 0.5, 0.6, 0.4 and 0.6 % on the four fabe bean varieties, respectively.

5.1.2. The population density of the main piercing-sucking insect pests on different faba bean varieties.

5.1.2.1. The cowpea aphid, *Aphis craccoivora* (Koch):

The highest peak of abundance on the four faba bean varieties were recorded in December 2015 during the first season 2015/16 and Sakha 4 variety attracted the highest peak of abundance (452 indiv./sample). The highest seasonal average number of *A. craccivora* recorded in Sakha 4 variety (62.6 ± 35.9 indiv.) followed by Sakha 1 (62.1 ± 34.5 indiv.), Giza 843 (59.9 ± 40.1 indiv.) and Misr 1 (53.4 ± 29.7 indiv.).

The highest peak of abundance on the four faba bean varieties were recorded in December 2016 during the second season 2016/17 and Sakha 4 variety attracted the highest peak of abundance (1177 indiv./sample). The highest seasonal average number of *A. craccivora* recorded in Sakha4 variety (229.6 ± 148.9 indiv.) followed by Giza 843 (215.0 ± 145.8 indiv.), Sakha 1 (177.8 ± 118.6 indiv.) and Misr 1 (105.7 ± 98.3 indiv.). Statistical analysis showed a significantly differences between the different faba bean varieties in the two successive seasons according to the seasonal average number of *A. craccivora*.

5.1.2.2. The Green peach aphid, *Myzus persicae* (Sulzer)

The highest peak of abundance on the four faba bean varieties were recorded in March 2016 during the first season 2015/16 and Sakha 1 variety attracted the highest peak of abundance (294 indiv./sample). The highest seasonal average number of *M. persicae* recorded in Sakha1 variety (56.2 ± 30.4

indiv.) followed by Sakha 4(36.1 ± 18.1 indiv.), Giza 843(27.2 ± 14.4 indiv.) and Misr 1(25.6 ± 8.6 indiv.).

The highest peak of abundance on the four faba bean varieties were recorded in March 2017 during the second season 2016/17 and Sakha 1 variety attracted the highest peak of abundance (408 indiv./sample). The highest seasonal average number of *M. persicae* recorded in Sakha 1 variety (91.4 ± 46.1 indiv.) followed by Giza 843(68.7 ± 29.1 indiv.), Sakha 4 (60.0 ± 25.3 indiv.) and Misr 1(59.5 ± 27.3 indiv.). Statistical analysis showed a significantly differences between the different faba bean varieties in the two successive seasons according to the seasonal average number of *M. persicae*.

5.1.2.3. The leafhoppers, *Empoasca* spp.

The highest peak of abundance on the four faba bean varieties were recorded in March 2016 during the first season 2015/16 and Giza 843 variety attracted the highest peak of abundance (86.8 indiv./sample). The highest seasonal average number of *Empoasca* spp recorded in Sakha1 variety (53.0 ± 8.9 indiv.) followed by Misr 1 (51.4 ± 9.5 indiv.), Giza 843(47.1 ± 11.9 indiv.) and Sakha 4 (47.0 ± 12.5 indiv.).

The highest peak of abundance on the four faba bean varieties were recorded in March 2017 during the second season 2016/17 and Misr 1 variety attracted the highest peak of abundance (302 indiv./sample). The highest seasonal average number of *Empoasca* spp recorded in Sakha1 variety (87.5 ± 24.3 indiv.) followed by Giza 843(64.8 ± 15.5 indiv.), Misr 1 (63.0 ± 20.9 indiv.) and Sakha 4 (62.2 ± 23.7 indiv.). Statistical analysis showed a significantly differences between the different faba bean varieties according to the seasonal average number of *Empoasca* spp., while the first season did not.

5.1.2.4. The green stink bug, *Nezara viridula* L.

The highest peak of abundance on the four faba bean varieties were recorded in March 2016 during the first season 2015/16 and Giza 843 variety

attracted the highest peak of abundance (43.2 indiv./sample). The highest seasonal average number of *N. viridula* recorded in Sakha1 variety (10.4 ± 3.8 indiv.) followed by Sakha 4 (18.4 ± 4.5 indiv.), Giza 843 (20.7 ± 6.3 indiv.) and Misr 1 (15.4 ± 6.1 indiv.).

The highest peak of abundance on the four faba bean varieties were recorded in March 2017 during the second season 2016/17 and Sakha 4 variety attracted the highest peak of abundance (68 indiv./sample). The highest seasonal average number of *N. viridula* recorded in Sakha 4 variety (20.4 ± 7.2 indiv.) followed by Sakha1 (17.7 ± 5.4 indiv.), Giza 843 (17.5 ± 5.9 indiv.) and Masr1 (5.8 ± 2.3 indiv.). Statistical analysis showed a significantly differences between the different faba bean varieties during the two successive seasons according to the seasonal average number of *N. viridula*.

5.1.2.5. The cotton mealybug *Phenacoccus solenopsis* (Tinsely)

The highest peak of abundance on the four faba bean varieties were recorded in December 2015 and January 2016 during the first season 2015/16 and Sakha1 variety attracted the highest peak of abundance (9 indiv./sample). The highest seasonal average number of *P. solenopsis* recorded in Sakha 4 variety (1.4 ± 0.8 indiv.) followed by Sakha1 (1.3 ± 0.7 indiv.), Misr1 (1.0 ± 1.2 indiv.) and Giza 843 (0.9 ± 0.4 indiv.).

The highest peak of abundance on the four faba bean varieties were recorded in December 2016 and January 2017 during the first season 2016/17 and Sakha 4 variety attracted the highest peak of abundance (12 indiv./sample). The highest seasonal average number of *P. solenopsis* recorded in Sakha 4 variety (2.2 ± 1.1 indiv.) followed by Sakha1 (1.7 ± 0.9 indiv.), Giza 843 (1.6 ± 0.8 indiv.) and Misr1 (1.5 ± 0.9 indiv.). Statistical analysis showed there are no significant differences between the different faba bean varieties according to the seasonal average number of *P. solenopsis*. While, the first season did not.

5.1.3. On the main predatory insects:

During the first season 2015/16, Sakha4 attracted the highest total number of the main associated insect predators (508 indiv.) followed by Misr1 (453 indiv.), Sakha 1 (434 indiv.) and Giza 843 variety attracted the total number and presented by (421 indiv.). Meanwhile, during the second season 2016/17. Sakha 1 attracted the highest total number of the main associated insect predators (651 indiv.) followed by Sakha 4 (596 indiv.), Giza 843 (514 indiv.) and Misr 1 variety attracted the lowest total number and presented by (398 indiv.). Moreover, *C. carnea* recorded the dominant predators followed by *C. undecimpunctata* and *Orius* spp. on the different faba bean varieties during the two successive seasons 2015/2016 and 2016/2017.

5.1.4. The population density of the main predators on different faba bean varieties.

5.1.4.1. The Green lacewing, *Chrysoperla carnea* (Stephens):

Sakha 4 variety attracted the highest seasonal average number of *C. carnea* during the first seasons followed by Sakha 1, Misr 1 and Giza 843. Moreover, during the second season Sakha 4 variety attracted the highest seasonal average number of *C. carnea* followed by Sakha 1, Giza 843 and Misr 1. Statistical analysis revealed that, a significant difference between the different faba bean varieties during the two seasons for *C. carnea*.

5.1.4.2: The Flower bug, *Orius* spp.

Misr1 variety attracted the highest seasonal average number of *Orius* spp. during the first season followed by Giza 843, Sakha 4 and Sakha1. While, during the second season, Sakha1 variety attracted the highest seasonal average number of *Orius* spp. followed by Sakha 4, Giza 843, and Misr 1. Statistical analysis revealed that, there were not significant differences between the different faba bean varieties during the two seasons for *Orius* spp.

5.1.4.3-The eleven spotted lady bird beetle, *Coccinella undecimpunctata* L.

Sakha 4 variety attracted the highest seasonal average number of *C. undecimpunctata* during the first season followed by Sakha1 and Misr 1. While, during the second season Sakha 1 variety attracted the highest seasonal average number of *C. undecimpunctata* followed by Sakha 4, Giza 843, and Misr 1. Statistical analysis revealed that, there were significant differences between the different faba bean varieties during the two successive seasons for *C. undecimpunctata*.

5.1.1.4 The lady bird beetle, *Scymnus* spp.

Misr 1 variety attracted the highest seasonal average number of *Scymnus* spp. during the first season followed by Sakha 4, Sakha1 and Giza 843. While, during the second season Sakha 1 variety attracted the highest seasonal average number of *Scymnus* spp. followed by Giza 843, Sakha 4 and Masr 1. Statistical analysis revealed that, there were significant differences between the different faba bean varieties during the two successive seasons for *Scymnus* spp.

5.1.4.5. The Rove beetle, *Paederus Alfierii* (Koch.)

Giza 843 variety attracted the highest seasonal average number of *P. alferii* during the first season followed by Sakha 4, Sakha 1 and Misr1. While, during the second season Giza 843 variety attracted the highest seasonal average number of *P. alferii* followed by Sakha 1, Sakha 4 and Misr 1. Statistical analysis revealed that, there were not significant differences between the different faba bean varieties during the two successive seasons for *P. alferii*.

5.1.5. The relationship between the main pests attacking different faba bean varieties and their associated predators:

According to simple correlation coefficient between the insect predators and the main piercing-sucking insect pests infesting the four faba bean varieties during the two seasons. on faba bean Sakha 1 and Sakha 4 varieties *Empoasca*

spp. and *N.viridula* recorded a highly positive significant effect between *C.carnea* and *C. undecimpunctata*. On the other hand, there were a highly positively significant effect between the insect pests *N.viridula* and *P.solenopsis* and all associated predators except *P.alferii* on Misr1 variety.

5.2. Effect of different plantations on the population of the main piercing - sucking insect pests attacking sakha 4 faba bean variety and the associated insect predators: 5.2.1. On the main piercing -sucking insect pests:

Empoasca spp. came in the first category and recorded the highest average number in October plantation (60.35 ± 12.08 and 89.55 ± 11.29 indiv.) followed by *M. persicae* (37.30 ± 12.08 and 61.85 ± 12.74 indiv.) during the two successive seasons, respectively. Meanwhile, in November plantation *A. craccoivora* came in the first category and recorded the highest average number (72.85 ± 23.86 and 270.45 ± 80.49 indiv.) followed by *Empoasca* spp. (51.15 ± 7.76 and 69.25 ± 12.73 indiv.) during the two successive seasons, respectively. While, in December plantation *Empoasca* spp. came in the first category (53.30 ± 10.90 indiv.) during the first season and *M. persicae* recorded the first category (63.35 ± 10.95 indiv.) during the second season. On the other hand, *p. solenopsis* came in the last category and recorded the lowest average number in the different planting dates during the two successive seasons. Statistical analysis revealed that there were significant differences between the different sowing dates during the two successive seasons.

5.2.2. On the main associated predators:

November plantation attracted the highest total number of the main predators inhibiting sakha 4 faba bean variety followed by October plantation and December plantation during the two successive seasons.

C. carnea was the dominant predator species and recorded the highest average number in the October, November and December plantations during the

two seasons of investigations, followed by *C. undecimpunctata* and *Orius spp.* There were significant differences between the three planting dates for the main predators inhibiting sakha 4 faba bean variety during the two successive seasons.

5.3. Effect of different soybean bean varieties:

5.3.1. On the population of the main piercing- sucking insect pests:

The cotton aphid, *Aphis gossypii* was the most abundant insect pest during the first season 2016 and represented by a relative density 50.4, 49.3, 40.2 and 54.3% on soybean varieties Crawford, Giza111, Giza 21 and Giza 35, respectively while, the whitefly, *Bemisia tabaci* came in the second category on Crawford, Giza111, Giza 21 and Giza 35 soybean varieties and represented by 29.2, 26.5, 34.6 and 25.1%., respectively. On the other hand the Green stink bug, *Nezara viridula* ranked the last category on the soybean varieties and represented by 8.2, 5.9, 7.0 and 8.3 %, respectively during the first season. While, during the second season, *A. gossypii* was the most abundant insect pest and represented by a relative density 58.0, 54.2, 52.0 and 62.0 % on soybean varieties Crawford, Giza111, Giza 21 and Giza 35, respectively while, *B. tabaci* came in the second category on Crawford, Giza111, Giza 21 and Giza 35 soybean varieties and represented by 27.2, 28.2, 35.1and 26.0%., respectively. On the other hand the Green stink bug, *Nezara viridula* ranked the last category on the soybean varieties and represented by 7.1, 5.3, 4.8 and 3.1 %, respectively.

5.3.2. The population density of the main piercing sucking insect pests on different soybean varieties.

5.3.2.1. The cotton aphid, *Aphis gossypii* Glove:

The highest peak of abundance on the four soybean varieties were recorded in August and September during the first season 2016 and Giza 111 variety attracted the highest peak of abundance (363 indiv./sample). The highest seasonal average number of *A. gossypii* recorded in Giza 111 variety (109.5 ± 49.0 indiv.) followed by Crawford (94.5 ± 35.4 indiv.), Giza 21 (84.1 ±

37.7 indiv.) and Giza 35 (78.8 ± 35.7 indiv.). Statistical analysis showed a significantly differences between the different soybean varieties according to the seasonal average number of *A. gossypii*.

The highest peak of abundance on the four soybean varieties were recorded in August during the second season 2017 and Giza 111 variety attracted the highest peak of abundance (596 indiv./sample). The highest seasonal average number of *A. gossypii* recorded in Crawford (131.0 ± 63.6 indiv.) followed by Giza 111 variety (151.7 ± 60.9 indiv.), Giza 21 (130.3 ± 67.1 indiv.) and Giza 35 (119.1 ± 63.8 indiv.). Statistical analysis showed that there are not a significantly differences between the different soybean varieties according to the seasonal average number of *A. gossypii*.

5.3.2.2. The Whitefly, *Bemisia tabaci* (Gennadius):

The highest peak of abundance on the four soybean varieties were recorded in August during the first season 2016 and Giza 21 variety attracted the highest peak of abundance (268 indiv./sample). The highest seasonal average number of *B. tabaci* recorded in Crawford (54.2 ± 20.7 indiv.) followed by Giza 111 variety (55.7 ± 26.6 indiv.), Giza 21 (71.9 ± 29.4 indiv.) and Giza 35 (73.1 ± 13.2 indiv.). Statistical analysis showed a significantly differences between the different soybean varieties according to the seasonal average number of *B. tabaci*.

The highest peak of abundance on the four soybean varieties were recorded in August during the second season 2017 and Crawford variety attracted the highest peak of abundance (279 indiv./sample). The highest seasonal average number of *B. tabaci* recorded in Crawford (60.0 ± 33.4 indiv.) followed by Giza111 variety (77.0 ± 37.3 indiv.), Giza21 (89.2 ± 34.3 indiv.) and Giza35 (51.3 ± 18.5 indiv.). Statistical analysis showed a significantly differences between the different soybean varieties according to the seasonal average number of *B. tabaci*.

5.3.2.3. The leafhoppers, *Empoasca* spp.

The highest peak of abundance on the four soybean varieties were recorded in August during the first season 2016 and Giza111 variety attracted the highest peak of abundance (130 indiv./sample). The highest seasonal average number of *Empoasca* spp. recorded in Crawford (22.5 ± 10.3 indiv.) followed by Giza 111 variety (39.0 ± 15.7 indiv.), Giza 21 (39.1 ± 13.0 indiv.) and Giza 35 (17.5 ± 8.2 indiv.). Statistical analysis showed a significantly differences between the different soybean varieties according to the seasonal average number of *Empoasca* spp.

The highest peak of abundance on the four soybean varieties were recorded in August during the second season 2017 and Giza111 variety attracted the highest peak of abundance (111 indiv./sample). The highest seasonal average number of *Empoasca* spp. recorded in Crawford (18.0 ± 7.1 indiv.) followed by Giza 111 variety (34.9 ± 12.1 indiv.), Giza 21 (20.2 ± 9.6 indiv.) and Giza 35 (15.6 ± 4.7 indiv.). Statistical analysis showed a significantly differences between the different soybean varieties according to the seasonal average number of *Empoasca* spp.

5.3.2.4. The green stink bug, *Nezara viridula* L.

The highest peak of abundance on the four soybean varieties were recorded in August during the first season 2016 and Giza 21 variety attracted the highest peak of abundance (60 indiv./sample). The highest seasonal average number of *N. viridula* recorded in Crawford (15.2 ± 6.2 indiv.) followed by Giza 111 variety (12.7 ± 5.9 indiv.), Giza21 (14.7 ± 6.2 indiv.) and Giza 35 (12.0 ± 5.1 indiv.). Statistical analysis showed that, there are not a significantly differences among the different soybean varieties according to the seasonal average number of *N. viridula*.

The highest peak of abundance on the four soybean varieties were recorded in August during the second season 2017 and Giza 111 variety attracted the highest peak of abundance (53 indiv./sample). The highest seasonal average number of *N. viridula* was recorded in Crawford (16.3 ± 6.5 indiv.) followed by Giza111 variety (14.7 ± 6.3 indiv.), Giza 21 (12.0 ± 5.8 indiv.) and Giza 35 (6.2 ± 1.7 indiv.). Statistical analysis showed that, there are not a significantly differences among the different soybean varieties according to the seasonal average number of *N. viridula*.

4.3.3. On the main associated predators

During the first season 2016, Giza 21 variety attracted the highest total number of the main associated insect predators (652 indiv.) followed by Giza111 (641 indiv.), Crawford (628 indiv.) and Giza 35 (573 indiv.). Meanwhile, during the second season 2017. Giza21 attracted the highest total number of the main associated insect predators (731 indiv.) followed by Giza111 (669 indiv.), Giza 35 (660 indiv.) and Crawford variety attracted the total number and presented by (643 indiv.). Moreover, during the first season, *Scymnus* spp. recorded the dominant predators and *C. carnea* came in the second category on the three soybean varieties (Crawford, Giza111 and Giza35), respectively. While, during the second season *C. carnea* recorded the dominant predators and *Scymnus spp* came in the second category on the four soybean varieties (Crawford, Giza 111, Giza 21 and Giza 35), respectively. Moreover, *C. carnea* recorded the dominant predators followed by *Scymnus* spp. and *C. undecimpunctata* on the different soybean varieties during the two successive seasons 2016 and 2017.

5.3.4. The population density of the main predators on different soybean varieties.

5.3.4.1. The Green lacewing, *Chrysoperla carnea* (Steph.):

Giza111 variety had the highest peak of abundance for the Green lacewings, *Chrysoperla carnea* followed by Giza 21, Crawford and Giza 35

varieties, respectively during the first season 2016. While, Giza 35 variety had the highest peak of abundance for *C. carnea* followed by Giza 21 then Crawford and Giza 111 together varieties during the second season 2017. Giza 111 variety attracted the highest seasonal average number of *C. carnea* during the first season followed by Giza 21, Crawford and Giza 35 varieties. While, during the second season Giza 35 variety attracted the highest seasonal average number of *C. carnea* followed by Giza 21, Giza 111 and Crawford varieties. Statistical analysis revealed that, there were significant differences between the different soybean varieties during the first season for *C. carnea*. While, the second season did not.

4.3.4.2. The Flower bug, *Orius* spp.

Giza 21 had the highest seasonal average number of the Flower bug, *Orius* spp. followed by Crawford then Giza 111 and Giza 35 varieties together during the first season 2016. While, Crawford variety had the highest peak of abundance for *Orius* spp. followed by Giza 21 then Giza 111 and Giza 35 varieties together during the second season 2017. Crawford variety attracted the highest seasonal average number of *Orius* spp during the first season followed by Giza 35, Giza 21 and Giza 111. While, during the second season Crawford variety attracted the highest seasonal average number of *Orius* spp followed by Giza 21, Giza 111 and Giza 35 varieties. Statistical analysis revealed that, there were significant differences between the different soybean varieties during the first season for *Orius* spp. while the second season did not.

5.3.4.3. The eleven spotted lady bird beetle *Coccinella undecimpunctata* L.

Giza 111 had the highest peak of abundance for the eleven spotted lady bird beetle, *Coccinella undecimpunctata* followed by Giza 21 Crawford and Giza 35 varieties, respectively during the first season 2016. While, Giza 111 variety had the highest peak of abundance for *C. undecimpunctata* followed by Giza 21, Crawford and Giza 35 varieties during the second season

2017. Giza 111 variety attracted the highest seasonal average number of *C. undecimpunctata* during the first season followed by Giza 21, Crawford and Giza 35 varieties. While, during the second season Giza 21 variety attracted the highest seasonal average number of *C. undecimpunctata* followed by Giza 111, Crawford and Giza 35 varieties. Statistical analysis revealed that, there were not significant differences between the different soybean varieties in the two successive seasons for *C. undecimpunctata*.

5.3.4.4. The Lady Bird beetle, *Scymnus* spp:

Giza 111 had the highest peak of abundance for the Lady bird beetle, *Scymnus* spp. followed by Giza 21, Crawford and Giza 35 varieties, respectively during the first season 2016. While, Giza 21 variety had the highest peak of abundance for *Scymnus* spp. followed by Giza 111 then Crawford and Giza 35 together varieties during the second season 2017. Giza 111 variety attracted the highest seasonal average number of *Scymnus* spp. during the first season followed by Giza 21, Crawford and Giza 35 varieties. While, during the second season Giza 21 variety attracted the highest seasonal average number of *Scymnus* spp. followed by Giza 111, Crawford and Giza 35 varieties. Statistical analysis revealed that, there were not significant differences among the different soybean varieties in the two successive seasons for *Scymnus* spp.

4.3.4.5. The Rove beetle, *Paederus alfieri* (Koch.)

Crawford had the highest peak of abundance for the rove beetle, *Paederus alfieri* followed by Giza 21, Giza 35 and Giza 111 varieties, respectively during the first season 2016. While, Crawford variety had the highest peak of abundance for *P. alfieri* followed by Giza 21 and Crawford together then Giza 111 varieties during the second season 2017. Crawford variety attracted the highest seasonal average number of *P. alfieri* during the first season followed by Giza 35, Giza 21 and Giza 111 varieties. While, during the second season Crawford variety attracted the highest seasonal average number of *P. alfieri*

followed by Giza 21, Giza 35 and Giza 111 varieties .Statistical analysis revealed that, there were significant differences between the different soybean varieties during the first season while the second sesason did not.

5.3.5. The relationship between the main pests attacking different soybean varieties and their associated predators:

According to simple correlation coefficient between the insect predators and the the main piercing-sucking insect pests infesting the four soybean varieties during the two season. on soybean Crawford variety *A.gossypii*, *Empoasca* spp. and *N.viridula* as insect pests recorded a highly positive significant effect with *C.carnea*. There were a highly positive significant effect between *B.tabaci* and *N.viridula* as insect pests and predator *Orius* spp. beside, the insect pests *A.gossypii*, *B.tabaci* and *N.viridula* as insect pests recorded a highly positive significant effect with *P.alferii*. on Giza111 variety there were a highly positive significantly effect between *A.gossypii* and *Empoasca* spp. and *N.viridula* as insect pests and predator *C.carnea*. there were a highly positive significantly effect between *A.gossypii* and *Empoasca* spp. as insect pests and *C. undecimpunctata* and *Scymnus* spp. as predatory insects. On Giza 21 and Giza 35 varieties there were a highly positive significantly effect between all insect pests and predator *C. undecimpunctata*.

5.4. Effect of different plantation on the population of the main piercing - sucking insect pests attacking Giza 111 soybean variety and the associated insect predators:

5.4.1. On the main piercing -sucking insect pests:

June plantation during the two seasons 2016 and 2017 attracted the highest total number of *A. gossypii* 4976 indiv.(48.4 %) and 6649 indiv. (54.9%) followed by *B. tabaci* 4330 indiv. (42.1 %) and 4650 indiv. (38.3%), respectively. Meanwhile, May plantation during the two seasons 2016 and 2017 attracted the highest total number of *Empoasca* spp. 869 indiv. (18.3 %) and

762 indiv. (12.3 %) followed by *N. viridula* 283 indiv. (5.9 %) and 327 indiv. (5.3%), respectively. Generally, June plantation attracted the highest total number of the piercing-sucking insect pests followed by April plantation and May plantation during the two successive seasons.

A. gossypii came in the first category and recorded the highest average number in the June plantation and represented by (248.80 ± 48.58 indiv. and 332.45 ± 67.77 indiv.) followed by April plantation (149.05 ± 36.08 and 172.10 ± 38.93 indiv.) and May plantation (117.35 ± 26.67 and 167.4 ± 34.44) during the two successive seasons, respectively. While, *B. tabaci* came in the second category category and recorded the highest average number in the June plantation and represented by (216.50 ± 45.11 and 232.5 ± 53.36) followed by April plantation (143.85 ± 30.77 and 172.00 ± 32.97) and May plantation (63.05 ± 15.69 and 87.05 ± 19.10) during the two successive seasons, respectively. Statistical analysis revealed that there were significant differences among the different sowing dates during the two successive seasons.

A. gossypii came in the first category and recorded the highest average number in the June plantation and represented by (248.80 ± 48.58 indiv. and 332.45 ± 67.77 indiv.) followed by April plantation (149.05 ± 36.08 and 172.10 ± 38.93 indiv.) and May plantation (117.35 ± 26.67 and 167.4 ± 34.44 indiv.) during the two successive seasons, respectively. While, *B. tabaci* came in the second category and recorded the highest average number in the June plantation and represented by (216.50 ± 45.11 and 232.5 ± 53.36 indiv.) followed by April plantation (143.85 ± 30.77 and 172.00 ± 32.97) and May plantation (63.05 ± 15.69 and 87.05 ± 19.10 indiv.) during the two successive seasons, respectively. Statistical analysis revealed that there were significant differences among the different sowing dates during the two successive seasons.

5.2.2. On the main associated predators:

June plantation attracted the highest total number of the main predators inhibiting Giza111 soybean variety in the two successive seasons. followed by May plantation and April plantation during the first season. While, during the second season, April plantation came in the second category followed by May plantation.

C. carnea was the dominant predators species and recorded the highest average number in the April and June plantations during the first season of investigations, followed by *Scymnus* spp. on the other hand, *C. carnea* was the dominant predators species and recorded the highest average number in the April, May and June plantations during the two seasons of investigations, followed by *Scymnus* spp and *C. undecimpunctata*. There were significant differences between the three planting dates for the main predators inhibiting Giza 111 soybean variety during the two successive seasons.

4.5. Laboratory studies on the predatory insect *Chrysoperla carnea*:-

4.5.1. Developmental times of immature stages.

There was no significant different in the incubation periods for *C. carnea* when the predator fed on *M. persicae* as preys reared on different host plants (faba bean, kidney bean and cowpea). The shortest developmental time of the three larval instars for *C. carnea* recorded on *M. persicae* which reared on faba bean were 3.3, 4.6 and 4.9 days, respectively. Meanwhile, the longest developmental time of the three larval instars for *C. carnea* recorded on *M. persicae* which reared on cowpea were 4.0, 5.4 and 5.7 days, respectively. The total developmental time of immature stages was 23.1, 25.4 and 26.3 days on the three tested host plants (faba bean, kidney bean and cowpea) with significant differences.

4.5.2. Survival percentage:

The survival percentages of immature stages when *C. carnea* fed on *M. persicae* was reared on faba bean and kidney bean were higher than when *C. carnea* fed on *M. persicae* was reared on Cowpea.

4.5.3. Longevity and fecundity of adult stage:

There were significant differences in pre-oviposition, oviposition, inter-oviposition and total longevity periods. Male Longevity was 26.09, 21.63 and 20.18 days with significant differences among *C. carnea* which fed on *M. persicae* was reared on the three leguminous plants. Fecundity of females was 109.20, 97.42 and 94.42 eggs/ female with significant differences among *C. carnea* which fed on *M. persicae* was reared on the three leguminous plants. There was a negative relationship between female age and female fecundity rate which means that fecundity rate gradually decreased as the age of female increased the age.