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Parasitoids and Predators of Egyptian Alfalfa Weevil *Hypera brunneipennis* (Boheman) at Kafr El-Sheik and Gharbia Regions

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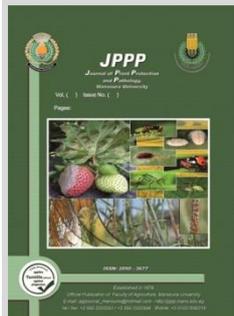
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ABSTRACT

The Egyptian clover, *Trifolium alexandrinum* L. occupies about three million feddans (1,260,000 hectares) of winter cultivated acreage the Arab Republic of Egypt (ARE). Farther, it acts as the major fodder crop and a soil reclaiming agent. The Egyptian alfalfa weevil (EAW), *Hypera brunneipennis* (Boheman) (Coleoptera: Curculionidae) is a damaging insect pest species to this important crop. Population fluctuations of both larvae and adults of EAW were monitored during 2019/2020 and 2020/2021 clover growing seasons at Sakha location (Kafr El- Sheikh) and Segeen El-Kom regions (Gharbia governorate). At each location, 3-4 peaks of the insect population densities were recorded annually. The parasitoids, emerging from EAW were identified, collected and their seasonal densities were recorded from the host adults. From the host adults, *Microctonus* sp (Hymenoptera: Braconidae) was recorded, while *Bathyplectes curculionis* (Hymenoptera: Ichneumonidae) emerged from the host larvae. Parasitism of *H. brunneipennis* adults ranged between 0.99 and 1.72%, while that of the host larvae ranged between 0.89 and 4.64%. The correlations between the number of host and number of parasitoid were highly significant positive (0.686-0.950) in case of adults and 0.739-0.949 in case of larvae. Two major predators were observed as related to larvae and adults of *Hypera brunneipennis*; *Chrysoperla carnea* Stepheus and spiders. Also, highly significant positive correlations were found between the number of *H. brunneipennis* larvae and each of *Ch. Carnea* larvae (0.680-0.860) as well as spider complex (0.730-0.860).

Keywords: Clover, Alfalfa weevil, *Chrysoperla carnea*, *Bathyplectes curculionis*, Delta, true spiders, Egypt



INTRODUCTION

The Egyptian clover, *Trifolium alexandrinum* L. occupies about three million feddans of winter cultivated acreage in Egypt (Moalr, 2022). It is the major fodder crop in Egypt, as well as it is an important soil enriching-nitrogen fixing bacteria. (Graves *et al.*, 1996).

The Egyptian alfalfa weevil (EAW), *Hypera brunneipennis* (Boheman) is one of the damaging insect pest species, particularly that clover, as an animal feed crop, does not receive any insecticidal treatments, with the exception of early crop cultivations that are treated against cotton leaf worms infestation (Gadallah *et al.*, 2014). Both larvae and adults of the weevil feed on clover foliage of clover, but most of damage is caused by the larvae, which prefer to feed upon leaves, while adults tend to attack the leaf margins, and in case of heavy infestation, the clover plants may be completely defoliated (Rakha 2008 and Baysal *et al.*, 2018).

The initiation of infestation appears at fields adjacent to eucalyptus and date palm trees (adult weevil aestivating sites) (El-Husseini 2019). Leguminous crops are its host plants (Awad *et al* 2012 and Awadalla *et al* 2014).

At Dakahlia Governorate, Awadalla *et al.*, (2014) recorded two peaks of *H. brunneipennis*, adults in January and April, with an insect preference of clover and kidney bean.

At El-Farafra Oasis, El-Sheikh (2019) reported that *Hypera brunneipennis* adults have two peaks of abundance that were recorded on March 3rd and on March 20th. Because of long daytime and higher temperature, the weevils are obliged to enter diapause, called as aestivation, with only

one generation a year. Due to the several problems of insecticide applications against insect pests, in general, and against clover insects in particular, it has become necessary to minimize such applications, and apply safe alternative methods. Kandil *et al.*, (2023) in the clover fields recommended optimum fertilizer treatments in clover fields to encourage clover plants to withstand the damage of *H. brunneipennis* and they concluded that balanced application of calcium superphosphate, potassium sulphate, micronutrients, as well as weed control has improved clover growth and reduced the activity of the weevil. However, biological control agents proved to have relative efficiencies against larvae and adults of the weevil (Alizadeh 2017).

The objectives of the current investigation were to monitor population fluctuations of the Egyptian alfalfa weevil, *Hypera brunneipennis* throughout clover growing season. Further, samples of larvae and adults of the weevil were incubated and examined to find out if they are harboring parasitoids. The predators associated with the weevil were identified and correlations were computed between numbers of weevil larvae and adults and each of parasitoids and predator species.

MATERIALS AND METHODS

Study area

This study was carried out at two locations; Sakha (Kafr El- Sheikh Governorate) and Segeen El-Kom regions (Gharbia Governorate). Sakha lies about 3km north of Kafr El- Sheikh city, with a clayey soil of 7.5-8 PH. It lies 31°

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60^{0N} latitudes and 30°56^{0E} longitudes. The common winter crops were clover, faba bean, wheat and few aceragae of legumes and vegetables. Segeen village lies about 14 km north of Tanta city, with a clayey soil of 6.5 -7, 0 pH. It lies 36.47 N latitude, and 31°0E longitude. The common winter crops were the same of Kafr El- Sheikh Location.

Population fluctuations of *Hypera brunneipennis*

During the duration from December 17th up to May 6th, weekly insect samples were collected from clover field at two locations; Sakha and Segeen El-Kom in 2019/2020 and 2020/2021 seasons. At each sampling date, 100 double strokes were randomly practiced. The catch was introduced into a glass jar, and moved to the laboratory for sorting, and counting larvae and adults of *H. brunneipennis*. Thus, the population fluctuations of the Egyptian alfalfa weevil was monitored.

Parasitism of *Hypera brunneipennis*

Parasitoids of larvae

Total catch of insects, collected by sweep net every week, was examined. *Hypera brunneipennis* larvae were separated and moved to glass jars (2-liter volume). The jars were furnished with filter paper, and with fine paper tissues to act as shelters for the weevil. The jars were closed by muslin cloth fixed with a rubber band. Larvae harbored in the jars were daily provided with fresh clover leaves as a substitution of previous leaves partially consumed by the larvae, and those leaves about to dry. Each jar had 50 larvae as maximum, and larvae in the jars were daily observed till they turn into pupae or death of larvae. The dead larvae were daily taken out, and examined to exclude the cocoons of the parasitoids if any.

The cocoons were kept in Petri dishes (10 cocoons per dish in most cases). The cocoons confined in petri dishes were continuously monitored and the emerging parasitoids were collected, sorted, counted and kept to be identified.

Parasitoids of adults

Hypera brunneipennis adults, captured by the 100 double strokes of the sweep net were kept in glass jars, and treated as the abovementioned technique of larvae. The adults confined in the jars were daily monitored, and dead ones were excluded from jars. These excluded adults were thoroughly examined, and those attached with cocoons were gently handled to separate the formed cocoons of the parasitoid. The cocoons were kept in Petri dish (10 cocoons each), and continuously monitored till the emergence of adult parasitoids if any.

Parasitoid identification

Specimens of parasitoids that emerged from larvae and adults of *Hypera brunneipennis* were individually kept in vials in 70% ethyl alcohol provided with drops of glycerin. The parasitoids were identified by aid of Insect Classification and Taxonomy Unit, Plant Protection Research Institute, Dokki, Giza, Egypt.

RESULTS AND DISCUSSION

Results

Population fluctuations of *Hypera brunneipennis* larvae and adults

Kafr El-Sheikh region

Numbers of *H. brunneipennis* adults that were collected in all samples collected by the sweep net (100 double strokes every week) from December 17th up to May

6th during in 2019/2020 and 2020 /2021 clover seasons are presented in (Table 1).

Adults of *H. brunneipennis* had three peaks in 2019 / 2020 season and four peaks in 2020/2021 season.

In the first season (Table 1), the infestation was low on December 17th (68 adults/100 double strokes), and reached the first peak by about mid-January (185 adults). The second peak was recorded on March 11th, while the third peak, that was the highest one, was detected on April 15th, with 392 and 860 *H. brunneipennis* adults /100 double strokes, respectively.

In 2020/2021 season (Table 2), the first peak of *H. brunneipennis* (90 adults/100 double strokes) was attained by the first week of January, and the population density of *H. brunneipennis* progressively increased to exhibit the second peak on February 11th with 142 adults / 100 double strokes. However, late in the season, two peaks were recorded; on April 8th and May 6th with population densities of 370 and 820 adults / 100 double strokes, respectively.

Table 1. Population fluctuations (per 100 double strokes) and parasitism of *Hypera brunneipennis* adults by *Microctonus* sp, at clover fields at Sakha Agricultural Research station, Kafr El-Sheikh during two clover growing seasons

Sampling date	2019-2020			2020-2021		
	No. host	No. parasitoid	Parasitism %	No. host	No. parasitoid	Parasitism %
Dec.17, 2017	68	1	1.47	53	1	1.89
24	70	1	1.43	68	1	1.47
Jan.7, 2018	173	2	1.16	90	1	1.11
14	185	3	1.62	78	0	0.00
21	136	2	1.47	70	1	1.43
28	0	0	0.00	157	2	1.27
Feb.4	110	1	0.91	193	2	1.04
11	142	2	1.41	142	1	0.70
18	231	3	1.30	96	2	2.08
25	263	2	0.76	110	1	0.91
Mar.4	343	2	0.58	137	1	0.73
11	392	3	0.77	186	2	1.08
18	135	1	0.74	223	2	0.90
25	484	4	0.83	256	3	1.17
Apr. 1	651	7	1.08	320	3	0.94
8	774	9	1.16	370	4	1.08
15	860	12	1.40	210	1	0.48
22	790	6	0.76	431	4	0.93
29	693	5	0.72	468	5	1.07
May.6	442	3	0.68	820	8	0.98
Total	6942	69	-	4478	45	-
Parasitism%	-	-	0.99	223.9	2.25	1.00
(r) Correlation	0.910**			0.935**		

** significant at 0.01 probability.

Segeen El-Kom region

The Egyptian alfalfa weevil, *Hypera brunneipennis* adults were found in clover fields at Segeen El-Kom region throughout the experimental period, beginning from December 17th and up to May 6th (Table 2). The insect adults exhibited four peaks of occurrence in both 2019/2020 and 2020/2021 seasons. Notably, the insect population was too much higher in the first season than in the second one. In 2019/ 2020 season (Table 2), the peaks of *Hypera brunneipennis* adults occurred on January 14th, February 4th,

April 1st and April 29th with population densities of 142, 210, 400 and 1038 adults/100 double strokes, respectively.

In 2020/2021 season (Table 2), the insect adults were, also, attained in four peaks. They were existed on January 21st, February 4th, March 11th and March 25th, with values of 207, 208, 132 and 133 *Hypera brunneipennis* adults, respectively.

Identification of parasitoids

Specimens of collected parasitoids emerging from *Hypera brunneipennis* larvae and adults were identified by the Insect Classification and Taxonomy Unit, Plant Protection Research Institute, Dokki, Giza, Egypt.

The parasitoid of *H. brunneipennis* adults were identified as *Microctonus* sp (Hymenoptera: Braconidae), while that of *H. brunneipennis* larvae was identified as *Bathyplectes curculionis* (Hymenoptera: Ichneumonidae).

Table 2. Population fluctuations (per 100 double strokes) and parasitism *Hypera brunneipennis* adults by *Microctonus* sp., at clover fields at Segeen El-kom region, Gharbia Governorate

Sampling date	2019-2020			2020-2021		
	No. host	No. parasitoid	Parasitism %	No. host	No. parasitoid	Parasitism %
Dec.17, 2017	21	1	4.76	19	0	0.00
24	112	1	0.89	41	1	2.44
Jan.7, 2018	96	1	1.04	98	2	2.04
14	142	1	0.70	104	1	0.96
21	71	1	1.41	207	4	1.93
28	44	0	0.00	170	1	0.59
Feb.4	207	1	0.48	208	2	0.96
11	210	2	0.95	55	1	1.82
18	0	0	0.00	27	0.00	0.00
25	21	0	0.00	48	0.00	0.00
Mar.4	38	1	2.63	81	1	1.23
11	66	2	3.03	132	1	0.76
18	87	1	1.15	58	3	5.17
25	155	1	0.65	133	3	2.26
Apr. 1	400	2	0.50	92	1	1.09
8	328	3	0.91	32	2	6.25
15	443	5	1.13	64	3	4.69
22	450	7	1.56	87	4	4.60
29	1038	10	0.96	136	2	1.47
May.6	887	8	0.90	128	1	0.78
Total	4813	51	-	1920	33	-
Parasitism%	-	-	1.06	-	-	1.72
(r)Correlation	0.950			0.686		

Parasitism rates of *Hypera brunneipennis*

On adults

Sakha location

In 2019/2020 season, very low numbers of the parasitoid, *Microctonus* sp (Hymenoptera: Braconidae) were obtained from *H. brunneipennis* adults (Table 3).

However, the relatively high numbers of the parasitoid were observed during April, with the highest number (12 parasitoids) on April 15th. Seasonal parasitism averaged 0.99% for the entire season.

Similar results were obtained in the second season (2020/2021), with the seasonal parasitism of 1.00%.

Correlations between number of *H. brunneipennis* and numbers of its parasitoid were calculated as highly significant positives; 0.910 and 0.935 in the first and second season, respectively.

Table 3. Parasitism of *Hypera brunneipennis* (Boheman) larvae by *Bathyplectes curculionis*, at clover fields at Sakha Agricultural Research station, Kafr El Sheikh, Egypt during two clover growing seasons

Sampling date	2019-2020			2020-2021		
	No. host	No. parasitoid	Parasitism %	No. host	No. parasitoid	Parasitism %
Dec.17, 2017	13	1	7.69	14	1	7.14
24	20	2	10.00	20	2	10.00
Jan.7, 2018	27	1	3.70	25	1	4.00
14	48	2	4.17	318	2	0.63
21	45	2	4.44	37	2	5.41
28	0	0	0.00	45	2	4.44
Feb.4	25	2	8.00	48	0	0.00
11	40	2	5.00	28	2	7.14
18	135	3	2.22	25	2	8.00
25	234	2	0.85	29	2	6.90
Mar.4	375	4	1.07	140	3	2.14
11	420	5	1.19	237	2	0.84
18	630	8	1.27	354	3	0.85
25	986	9	0.91	433	2	0.46
Apr. 1	1009	7	0.69	470	1	0.21
8	1525	10	0.66	518	2	0.39
15	1607	15	0.93	637	2	0.31
22	721	8	1.11	862	6	0.70
29	552	7	1.27	920	8	0.87
May.6	301	5	1.66	1217	12	0.99
Total	8713	95	-	6377	57	-
Parasitism%	-	-	1.09	-	-	0.89
(r) correlation	0.949**			0.865**		

** significant at 0.01 probability

Segeen El-Kom location

Data presented in Table (4) show *H. brunneipennis* parasitism by *Microctonus* sp during 2019/2020 and 2020/2021 seasons.

Similar to the parasitism performance of Sakha location, low parasitism was recorded, with relatively high numbers in April and early May in the first season. Seasonal parasitism averaged 1.06 and 1.72 % in 2019/2020 and 2020/2021 seasons, respectively.

On larvae

Sakha location

The larvae parasitism of *H. brunneipennis* by *B. curculionis* was low in both seasons (Table 3). Like the case of *Hypera brunneipennis* adult parasitism, the larval parasitism was only considerable during April and early May in 2019/2020 and 2020/2021 seasons.

Seasonal parasitisms of *Bathyplectes curculionis* averaged 1.09 and 0.89% in the first and second seasons, respectively. Highly positive correlations were calculated between numbers of the host, *Hypera brunneipennis* and the parasitoid *Bathyplectes curculionis* with the values of 0.949 and 0.865 in the first and second season, respectively.

Segeen El-Kom location

In 2019/2020 season (Table 4), the number of the parasitoid, *Bathyplectes curculionis* was found throughout both seasons; however, the numbers were relatively high during April and early May in the first season. Seasonal parasitisms averaged 1.34 and 4.64% in the first and second seasons, respectively.

Correlations between numbers of the host larvae and numbers of the parasitoid were highly significant positive, 0.7389 and 0.7019 in 2019/2020 and 2020/2021 seasons, respectively.

Table 4. Parasitism of *Hypera brunniipennis* (Boheman) larvae by *Bathyplectes curculionis*, at clover fields at Segeen El-Kom region, Gharbia Governorate during two clover cultivation seasons.

Sampling date	2019-2020			2020-2021		
	No. host	No. parasitoid	Parasitism %	No. host	No. parasitoid	Parasitism %
Dec.17, 2017	8	2	25.00	9	1	11.11
24	25	1	4.00	23	2	8.70
Jan.7, 2018	23	2	8.70	39	2	5.13
14	64	4	6.25	31	5	16.13
21	30	3	10.00	28	4	14.29
28	18	2	11.11	30	4	13.33
Feb.4	111	4	3.60	76	4	5.26
11	124	3	2.42	25	2	8.00
18	0	0	0.00	12	2	16.67
25	12	1	8.33	23	2	8.70
Mar.4	15	1	6.67	34	4	11.76
11	36	4	11.11	48	5	10.42
18	53	2	3.77	16	1	6.25
25	99	4	4.04	19	3	15.79
Apr. 1	800	4	0.50	27	0	0.00
8	998	3	0.30	15	1	6.67
15	1027	4	0.39	145	2	1.38
22	1098	6	0.55	162	3	1.85
29	1387	26	1.87	187	3	1.60
May.6	1109	19	1.71	215	4	1.86
Total	7037	95	-	1164	54	-
Parasitism%	-	-	1.34	-	-	4.64
(r) correlation	0.739			0.762		

Predators associated with *Hypera brunniipennis* larvae

Two types of predators were considered, insect predator, *Chrysoperla carnea* and true spiders (mainly individuals of 3 families being; Linyphiidae, Salticidae and Philodromidae) in 2019/2020 and 2020/2021 clover seasons (Table 5 &6).

Table 5. Population fluctuations of *Chrysoperla carnea* and spider complex as related to *Hypera brunniipennis* larvae in clover fields at Sakha; Kafr El-Sheikh (Numbers per 100 double strokes)

Sampling date	2019-2020			2020-2021		
	N. prey larvae	No. <i>Chrysoperla carnea</i> larvae	No. Spider complex	N. prey larvae	No. <i>Chrysoperla carnea</i> larvae	No. Spider complex(1)
Dec.17, 2017	13	3	10	14	3	7
24	20	0	7	20	2	9
Jan.7, 2018	27	3	21	25	1	17
14	48	2	18	318	2	17
21	45	1	11	37	0	9
28	0	0	0	45	1	5
Feb.4	25	1	10	48	2	3
11	40	4	4	28	2	11
18	135	3	14	25	1	6
25	234	6	24	29	3	9
Mar.4	375	10	14	140	4	17
11	420	8	14	237	3	19
18	630	2	3	354	5	12
25	986	16	15	433	9	19
Apr. 1	1009	56	27	470	10	10
8	1525	59	33	518	9	19
15	1607	87	69	637	4	8
22	721	80	47	862	4	30
29	552	27	21	920	8	36
May.6	301	5	11	1217	133	40
Total	8713	373	373	6377	206	303
Average	435.65	18.65	18.65	318.85	10.3	15.15
Correlation(r)	0.840**			0.730		
				0.680**		

(1) Spider complex :most common are : linyphiids, salticids and philodromids

Table 6. Population fluctuations of *Chrysoperla carnea* and spider complex as related to *Hypera brunniipennis* larvae in clover fields at Segeen El-Kom location (Numbers per 100 double strokes) during two growing seasons

Sampling date	2019-2020			2020-2021		
	N. prey larvae	No. <i>Chrysoperla carnea</i> larvae	No. Spider complex	N. prey larvae	No. <i>Chrysoperla carnea</i> larvae	No. Spider complex(1)
Dec.17, 2017	8	1	8	23	2	15
24	25	0	23	39	4	9
Jan.7, 2018	23	0	18	31	3	9
14	64	2	9	28	1	19
21	30	5	14	30	4	13
28	18	5	5	76	4	5
Feb.4	111	8	23	25	0	9
11	124	0	5	12	3	9
18	0	0	0	23	2	5
25	12	2	9	34	1	15
Mar.4	15	4	1	48	1	9
11	36	3	4	16	6	23
18	53	5	14	19	2	38
25	99	6	12	27	7	11
Apr. 1	800	1	41	15	3	22
8	998	5	44	145	5	18
15	1027	19	15	162	4	36
22	1098	36	24	187	29	31
29	1387	115	29	215	18	42
May.6	1109	44	38	509	38	60
Total	7037	261	336	1664	137	398
Average	351.85	13.05	16.8	83.2	6.85	19.9
(r)correlation	0.73		0.75	0.86		0.76

(1) Spider complex: most common are: linyphiids, salticids and philodromids

Sakha location

In both seasons, *Chrysoperla carnea* larvae were collected in few numbers during December, January and February. The populations density of the chrysopid increased relatively in March, but reached maximum values during April. Simple Correlation coefficient values (r) between population of *Hypera brunniipennis* and those of *Chrysoperla carnea* larvae had highly significant and positive values (0.840 and 0.680) in 2019/2020 and 2020/2021 seasons, respectively.

The spider population exhibited three peaks in the first season with population densities of 21, 24 and 69 spiderlings and adults / 100 double strokes on January 7th, February 25th and April 15th, respectively.

In the second season (2020/2021), the spiders had also three peaks. They were 17, 19 and 40 spider lings and adults / 100 double strokes on January 14th, March 25th and May 6th, respectively.

Correlation coefficient values were highly significant and positive; 0.730 and 0.860 in the first and second seasons, respectively.

Segeen El-Kom location

As at sakha location in both seasons, *Chrysoperla carnea* population was very low beginning from December 14th and continued till April 8th then, the predators, numbers increased gradually and reached maximum value from mid-April till May 6th. Correlations between *Hypera brunniipennis* larvae and *Chrysoperla carnea* larvae were highly significant positive with values of 0.73 and 0.86 in the first and second season, respectively.

Spider population density appeared in three peaks of occurrence in 2019/2020 season; 23, 23 and 44 spider lings and adults / 100 double strokes. On December 24th, February 23rd and April 8th, respectively. In 2020/2021, four peaks

were recorded; 19, 15, 38 and 60 spiderlings and adults / 100 double strokes on January 14th , February 15th , March 18th and May 6 th , respectively.

Correlations between *Hypera brunneipennis* larvae and spider population were highly significant and positive with values of 0.75 and 0.76 in the first and second seasons, respectively.

Discussion

In the current study, both larvae and adults of the Egyptian alfalfa weevil, *Hypera brunneipennis* (Boheman) were collected from clover fields in 2019/2020 and 2020/2021 seasons, using the seep net. Several authors recorded the insect pests in their samples from clover fields in Egypt. Among them are Rakha(2008) at KAfr El- sheikh, Awadalla *et al* (2014) at Dakahlia Governorate and Kandil *et al.*, (2023) at Nubaria, Beheira Governorate.

In the current study, 3-4 peaks of *Hypera brunneipennis* larvae and adults were recorded, either at Sakha or at Segeen El-Kom, coinciding in Jan, February (or March) and in April. Results of El- Sheikh (2019) revealed that the weevil exhibited two peaks of occurrence on March 3rd and March 20th. The incubated *H. brunneipennis* revealed the emergence of two parasitoids; *Microctonus* sp (Hymenoptera: Braconidae) from the weevil adults, and *Bathyplectes curculionis* (Hymenoptera: Ichneumonidae) as emerging from *H. brunneipennis* larvae. In other countries, where the weevil was *Hypera postica*, the same two parasitoid species were surveyed, as well as other species. In Virginia (USA), *Bathyplectes anurus* (Thomsom) was detected as a biological control agent against *Hypera postica*, and was able to reduce 36-92% of the weevil population. In Iran, Alizadeh (2017) surveyed three parasitoid species, attacking the weevil, *Hypera postica*. These were *Bathyplectes curculionis*, *Bathyplectes anurus* and *Oomyzus* (= *Tetrastichus*) *incertus* , with *Bathyplectes anurus* was the most dominant. In New Zealand, Barratt *et al* (2018) recorded *Microctonus aethiopoidea* emerging from *Sitona descoideus* . In Spain, Levi-Mourano (2021) reported that both *Bathyplectes anurus* and *Bathyplectes curculionis* parasitized *Hypera postica* larvae. However, Boraie (1993) reported the egg- parasitoid *Anaphes fuscipiens* (Hymenoptera: Mymaridae), as a first recored in Egypt. Also, Boraie (1994) reported *Microctonus* sp parasitizing *Hypera brunneipennis* adults.

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الطفيليات والمفترسات على سوسة اوراق البرسيم في محافظة كفر الشيخ والغربية

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المخلص

أجريت هذه الدراسة في المزرعة البحثية بسخا بمحافظة كفر الشيخ وقرية سجين الكوم بمحافظة الغربية خلال موسمي (٢٠٢٠/٢٠٢١) و (٢٠١٩/٢٠٢٠) على محصول البرسيم المصري *Trifolium alexandrinum* L. بهدف دراسة التقلبات العددية للحشرات الكاملة ويرقات سوسة ورق البرسيم *Hypera brunneipennis* (Boheman), أو وضحت النتائج أن وجود ٣ - ٤ ذرات عديدة للحشرة في كلا الموقعين خلال موسمي الدراسة تم تقدير الكثافة العددية لطفيل *Microctonus* sp على الحشرات الكاملة وكذلك طفيل *Bathyplectes curculionis* على اليرقات. أوضحت النتائج أن نسبة التطفل على الحشرات الكاملة تراوحت بين ٠,٩٩% و ١,٧٢% بينما تراوحت نسبة التطفل على اليرقات بين ٠,٨٩% و ٤,٦٤% وقد لوحظ أن الارتباط عالي المعنوية بين الطفيل والحشرة الكاملة (٠,٦٨٦ - ٠,٩٥٠) كما كان عالي المعنوية بين الطفيل واليرقات (٠,٧٣٩ - ٠,٩٤٩). كانت المفترسات *Chrysoperla carnea* and spider complex هي الأهم وقد لوحظ أن الارتباط عالي المعنوية بين أعداد الحشرات وأسد المن (٠,٦٨٠ - ٠,٨٦٠) وبين أعداد الحشرات والعناكب (٠,٧٣٠ - ٠,٨٦٠).