

## STUDIES ON THE EGYPTIAN ALFALFA WEEVIL, *Hypera brunneipennis* (BOHEMAN) AND CERTAIN ASSOCIATED PREDATORS IN EGYPT (KAFR EL-SHEIKH) AND LIBYA (SEBHA)

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### ABSTRACT

This study was conducted at the farm of the Faculty of Agriculture, Sebha (Libya) and the experimental farm of Sakha, Research Station, Kafr El-Sheikh (Egypt) during 1998/1999 and 1999/2000 seasons, respectively. Results indicated that *Hypera brunneipennis* (Boh.) (adults) exhibited two peaks during March and May at Sebha, while they occurred in January and April at Kafr El-Sheikh. On the other hand, *H. brunneipennis* (larvae) peaked once in March in the two tested regions. *Coccinella* spp. reached its maximum in November, February and April at Sebha while it had only peak in April at Kafr El-Sheikh which associated with the highest peak of *H. brunneipennis* (adults). *Chrysoperla carnea* (Steph.) and *Scymnus* spp. had two peaks of abundance in November and May at Kafr El-Sheikh, while *Orius* spp. peaked once in May in the two tested regions. *Paederus alfieri* (Koch.) was not observed at Sebha. Statistical analysis indicates significant positive correlation ( $r = 0.416$ ) between each of *Coccinella* spp., *P. alfieri*, true spiders and *H. brunneipennis* (adults) at Kafr El-Sheikh, while it was highly significant positive between the same insect and *Orius* spp. ( $r = 0.473$ ) at Sebha. One field generation of *H. brunneipennis* (larvae) was detected during a period extended from the third week of February and the fourth week of May in both regions. Five generations for each *Coccinella* spp. and true spiders were recorded during a period elapsed from November and June, while they were one for *Orius* spp. in both regions and four generations of *P. alfieri* between November and May at Kafr El-Sheikh.

### INTRODUCTION

Egyptian clover, *Trifolium alexandrinum* L. in Egypt and alfalfa, *Medicago sativa* L. in Libya are subjected to the infestation of several insect pests. The Egyptian alfalfa weevil, *Hypera brunneipennis* (Boheman) is one of the most important insect pests of clover in Egypt (El-Sufty & Boraei, 1986). This insect pest heavily infested alfalfa fields during the seasons of spring and summer (Kotb *et al.*, 1995). In Libya, very few studies were reported with regard to this insect and its predators. Population fluctuations of this pest and the associated predators on clover and alfalfa plants were reported by Stern, 1961; Madubunyi, 1970; Van Den Bosch and Marble, 1971; Cothran *et al.*, 1972; Ali, 1980; Ali *et al.*, 1982; Ali, 1984; Ghanim and El-Adl, 1988; Kotb *et al.*, 1995; El-Mezayyen, 1998 and El-Mezayyen, 2001. On the other hand, the seasonal phenology of insect numbers, the number of generations and the level of insect abundance at any location are influenced by the environmental factors at that location (Dent, 1991).

The present investigation aims to study the population fluctuations of the Egyptian alfalfa weevil and the main associate predators in Sebha (Libya) and Kafr El-Sheikh (Egypt) during 1998/99 and 1999/2000 seasons. Also, the numbers of generations of that insect and main associated predators have been studied.

## **MATERIALS AND METHODS**

The experiments were conducted at the farm of the Faculty of Agriculture, Sebha (Libya) and the experimental farm of Sakha, Research Station, Kafr El-Sheikh (Egypt) during 1998/1999 and 1999/2000 seasons, respectively. *Medicago sativa* L. was planted since 1996 in Sebha, while *Trifolium alexandrinum* L. was cultivated on October, 1<sup>st</sup>, 1999 at Kafr El-Sheikh. One feddan was planted with alfalfa and Egyptian clover which were subjected to conventional agriculture practices with no pesticidal treatments during both growing seasons at the two study sites.

Weekly samples of 50 double sweeps were randomly taken at 11 a.m. from November, 1<sup>st</sup> 1998 until the end of May, 2000. Insect samples were treated with chloroform on spot then examined and counted. The numbers of the Egyptian alfalfa weevil generations and its predators were carried out by the methods suggested by Audemard and Milaire (1975) and Iacob (1977). The data were represented by regression lines. The simple correlation between that pest and its predators were calculated.

## **RESULTS AND DISCUSSION**

### **1. Population fluctuations of *Hypera brunneipennis* and its relation to certain predators in the two tested regions:**

The data presented in Tables (1, 2 & 3) show monthly changes in the population of *H. brunneipennis* and its relation to certain associated predators i.e. *Coccinella* spp., *C. carnea* (Steph.), *Metasyrphus corollae* (F.), *Orius* spp., *Scymnus* spp., *P. alfieri* (Koch) and true spiders on alfalfa and clover plants during 1998/99 in Sebha and 1999/2000 at Kafr El-Sheikh. *H. brunneipennis* (adults) exhibited two peaks in Sebha and Kafr El-Sheikh in the two seasons. Peaks occurred during March and May (0.03 & 1 indiv./50 double sweep) at Sebha while at Kafr El-Sheikh, they occurred in January and April (2.61 & 2.77 indiv./50 double sweep). *H. brunneipennis* (larvae) peaked once in March and was represented by 4.32 & 202.19 indiv./50 double sweep at Sebha and Kafr El-Sheikh, respectively (Table 1). Ali (1980) in Assiut found that larval populations of *H. brunneipennis* increased gradually and reached its maximum level on mid-March and the first week of March during 1978 and 1979 seasons. Also, Ali *et al.* (1982) indicated that the maximum abundance of *H. brunneipennis* adult occurred during January and February while the maximum abundance of the larvae took place toward the end of March. El-Mezayyen (1998) recorded only one peak of *H. brunneipennis* (larvae) on March 1<sup>st</sup> at Kafr El-Sheikh and Sebha.

Table (1): Monthly mean of the Egyptian alfalfa weevil in alfalfa and clover fields during 1998/1999 and 1999/2000 seasons of Sebha (Libya) and Kafr El-Sheikh (Egypt).

Month	<i>Hypera brunneipennis</i>			
	Adult		Larvae	
	1998/1999	1999/2000	1998/1999	1999/2000
	Sebha	Kafr El-Sheikh	Sebha	Kafr El-Sheikh
Nov.	0.0	0.67	0.03	0.0
Dec.	0.0	1.23	0.0	0.0
Jan.	0.0	2.61	0.0	0.0
Feb.	0.0	2.50	0.96	33.29
Mar.	0.03	1.84	4.32	202.19
Apr.	0.0	2.77	0.10	0.97
May	1.0	1.94	0.0	0.65
Total	1.03	13.56	5.41	237.10
Mean S ±	0.15 ± 0.38	1.94 ± 0.77	0.77 ± 1.60	33.87 ± 75.23

As clear indicated in Table (2), *Coccinella* spp. had three peaks in November, February and April in Sebha, while it had one peak of abundance during April which associated with the highest peak of *H. brunneipennis* (adults) at Kafr El-Sheikh. *C. carnea* and *Scymnus* spp. had two peaks of abundance during November and May at Kafr El-Sheikh. On the other hand, *Scymnus* spp. only peaked in May in Sebha and *C. carnea* had two peaks during November and February at the same region. *Orius* spp. had one peak of abundance during May in the two tested regions. *M. corollae* peaked in February and May in Sebha and during April at Kafr El-Sheikh since associated with the highest peak of *H. brunneipennis* (adults). *P. affierii* was not detected in Sebha and peaked during January and March in Kafr El-Sheikh which coincided with the highest peak of *H. brunneipennis* (larvae). True spiders had two peaks during November and April in Sebha while only one peak occurred during January at Kafr El-Sheikh since correlated with the first peak of *H. brunneipennis* (adults). Ali, et al. (1982) recorded three peaks of *C. carnea* in the third week of December at the middle of February and the end of March in clover fields. Also, Abdel-Galil (1983) indicated that *Coccinella undecimpunctata* reached its maximum during the second and third decades of April and during the second decade of May while *Scymnus interruptus* reached its maximum during the third decade of April, first and second decades of May in clover fields. El-Mezayyen (1998) found that *Coccinella* spp. had one peak of abundance on April 12<sup>th</sup> at Kafr El-Sheikh while it had three peaks on December 7<sup>th</sup>, February 15<sup>th</sup> and April 19<sup>th</sup> in Sebha during 1995/96 and 1996/97 seasons, respectively.

Statistical analysis in Table (3) indicate significant positive correlation ( $r = 0.416$ ) between each of *Coccinella* sp., *P. affierii*, true spiders and *H. brunneipennis* (adult) in Kafr El-Sheikh. Also, a highly significant positive correlation was found between the Egyptian alfalfa weevil populations and *Orius* spp. ( $r = 0.473$ ) in Sebha while it was insignificant between the same insect and other predators populations in both regions. Ali et al. (1982) and El-Mezayyen (1993) found that coccinellid population was correlated with the population of alfalfa weevil larvae in the new valley and Kafr El-Sheikh, Egypt, respectively. Such results are of great importance in developing an integrated crop management system (ICMS).

Table (2): Monthly mean of main certain species associated with Egyptian alfalfa weevil in alfalfa and clover during 1998/1999 and 1999/2000 seasons at Sebha (Libya) and Kafr El - Sheikh (Egypt).

Month	Coccinella spp.		C. carnea		M. ...		Urida spp.		Scymnus spp.		P. affieri		True spiders	
	1998/1999	1999/2000	1998/1999	1999/2000	1998/1999	1999/2000	1998/1999	1999/2000	1998/1999	1999/2000	1998/1999	1999/2000	1998/1999	1999/2000
	Sebha	Kafr El-heikh	Sebha	Kafr El-heikh	Sebha	Kafr El-heikh	Sebha	Kafr El-heikh	Sebha	Kafr El-heikh	Sebha	Kafr El-heikh	Sebha	Kafr El-heikh
Nov.	3.17	0.0	0.77	0.23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.47	0.43	0.10
Dec.	3.0	0.0	0.74	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.90	0.19	0.03
Jan.	1.84	0.0	0.58	0.0	0.10	0.0	0.0	0.0	0.0	0.0	0.0	10.97	0.10	0.81
Feb.	8.89	0.0	1.11	0.0	0.14	0.0	0.0	0.0	0.0	0.0	0.0	9.93	0.04	0.36
Mar.	7.90	0.0	0.87	0.0	0.10	0.0	0.0	0.0	0.0	0.0	0.0	10.48	0.19	0.29
Apr.	13.93	1.40	0.13	0.20	0.03	0.0	0.17	0.0	0.0	0.0	0.0	2.10	0.37	0.20
May	5.94	0.06	0.0	0.94	0.13	0.0	1.35	1.26	0.10	0.10	0.0	0.26	0.23	0.10
Total	44.67	1.46	4.20	1.37	0.50	0.03	1.55	1.26	0.13	0.13	0.0	35.11	1.55	1.89
Mean S $\pm$	6.38 $\pm$	0.21 $\pm$	0.60 $\pm$	0.20 $\pm$	0.07 $\pm$	0.02 $\pm$	0.22 $\pm$	0.18 $\pm$	0.02 $\pm$	0.07 $\pm$	0.0	5.02 $\pm$	0.22 $\pm$	0.27 $\pm$
	4.25	0.51	0.53	0.34	0.06	0.03	0.50	0.48	0.03	0.06		5.13	0.14	0.26

**Table (3): Simple correlation (r) between weekly populations of the Egyptian alfalfa weevil and both four species of associated predators and true spiders during 1998/1999 and 1999/2000 seasons at Sebha and Kafr El-Sheikh.**

Predator	<i>Hypera brunneipennis</i> (adult)	
	r	
	Sebha	Kafr El-Sheikh
	1998/1999	1999/2000
<i>Coccinella</i> spp.	0.033	0.416*
<i>Chrysoperla carena</i> (Steph.)	-0.256	-0.066
<i>Orius</i> spp.	0.473**	-0.014
<i>Paederus affierii</i> (Koch.)	-	0.406*
True spiders	0.224	0.364*

\* Significant (P < 0.05)

\*\* Highly significant (P < 0.01).

## II. Generations of *H. brunneipennis* and its predators:

The approximate number of generations of *H. brunneipennis* (larvae), *C. carnea*, *Coccinella* spp., *Orius* spp., *P. affierii* and true spiders was calculated by the weekly numbers of these insects in Sebha and Kafr El-Sheikh. Figure (1) indicates one field generation of *H. brunneipennis* during the third week of February until the third week of April in Sebha, while it lasted from the fourth week of February until the fourth week of May in Kafr El-Sheikh. The duration of generation varied from 8 and 13 weeks on alfalfa and clover in Sebha and Kafr El-Sheikh, respectively. This variation in the length of generation may be due to the differences of ecosystem in the two tested regions. Similar results were reported by Ali (1960) indicated that it seems that the dispersal of adult weevils, *H. brunneipennis* emerging from their pestivation sites as well as their subsequent activity depend mainly on climatic factors. Also, Ali (1984) recorded one annual generation with of *H. brunneipennis* larvae occurring in the field from early February to mid May. Also, Figure (1) shows four generations of *C. carnea* each of Sebha and Kafr El-Sheikh while four generations of *P. affierii* were recorded only in Kafr El-Sheikh between November and June. These generations lasted from 2 to 20 weeks in both regions. Five generations of each *Coccinella* spp. and true spiders were found between November and June since lasted 4 and 8 weeks. One generation of *Orius* spp. was found between April and June which lasted 5 and 10 weeks in Sebha and Kafr El-Sheikh. It is clear that the second generation of *C. carnea* was the largest one in both regions while the third and fourth generations were the largest ones of *Coccinella* spp. in Sebha and Kafr El-Sheikh, respectively. Also, the third and fifth generations were the largest of *P. affierii* and true spiders in Kafr El-Sheikh and Sebha, respectively. Wu *et al.* (1981) and Yan (1988) found 5 to 6 generations of *C. septempunctata* each year in Northern and Central China.

It could be concluded that largest generation of each *C. carnea*, *P. affierii* and *Coccinella* spp. were coincided with the only generation of *H. brunneipennis* during February, March, April and May in the two tested regions.

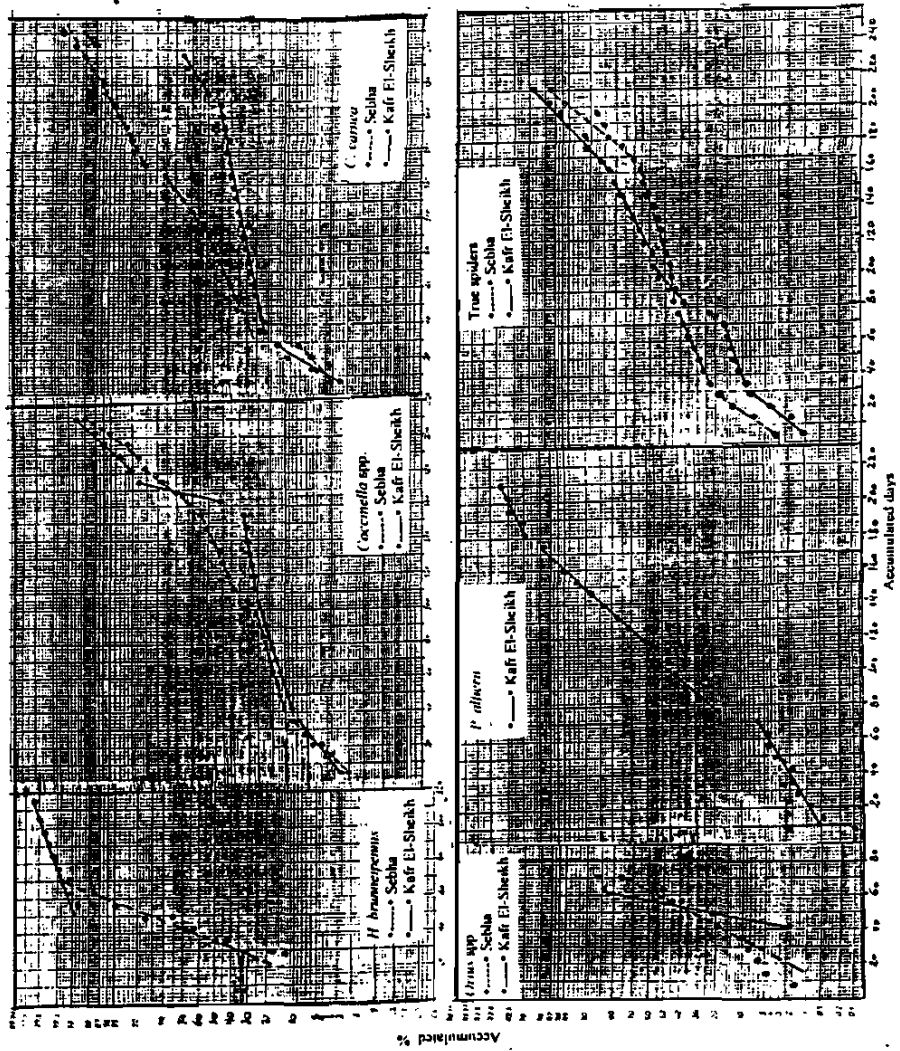


Fig. (1): The duration and number of generations of *H. brunneipennis* and five associated predators at Sebha and Kafr El-Sheikh region.

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دراسات على سوسة ورق البرسيم والمفترسات المصاحبة لها فى مصر  
(كفر الشيخ) وليبيا (سبها)  
جمال على المزين  
معهد بحوث وقاية النباتات - محطة البحوث الزراعية بسخا - مركز البحوث الزراعية

أجريت هذه الدراسة بمزرعة كلية الزراعة - جامعة سبها - ليبيا خلال موسم ١٩٩٩/١٩٩٨م على نباتات البرسيم الحجازى وكذلك فى مزرعة محطة البحوث الزراعية بسخا كفر الشيخ - مصر خلال موسم ١٩٩٩/٢٠٠٠م على البرسيم البلدى. أوضحت الدراسة أن سوسة ورق البرسيم (الحشرات الكاملة) لها ذروتين خلال مارس ومايو فى سبها بينما كانت فى يناير وابريل فى كفر الشيخ ومن ناحية أخرى كان ليرقات هذه الحشرة ذروة واحدة فى مارس فى كل من منطقتى الدراسة. بينت النتائج أيضا أن اعلى تعداد لخنفساء أبو العيد كان فى شهر نوفمبر وابريل فى سبها بينما كان خلال شهر ابريل فقط فى كفر الشيخ حيث تزامن مع أعلى تعداد لسوسة ورق البرسيم (الحشرة الكاملة) كذلك كانت هناك ذروتين لأسد المن وأبو العيد الاسكمنس فى نوفمبر ومايو فى كفر الشيخ بينما كان هناك ذروة واحدة لبقعة الأوريس فى مايو فى كل من منطقتى الدراسة كما لوحظ أن الحشرة الرواغة اختفت تماما فى سبها. تبين وجود ارتباط موجب معنوى بين كل من خنفساء أبو العيد ، الحشرة الرواغة ، العناكب الحقيقية وسوسة ورق البرسيم (الحشرة الكاملة) فى كفر الشيخ بينما كان هذا الارتباط موجب وعالى المعنوية بين نفس الحشرة وبقعة الأوريس فى سبها.

وجد جيل واحد ليرقات سوسة ورق البرسيم خلال الأسبوع الثالث من فبراير والأسبوع الرابع من مايو فى كل من منطقتى الدراسة أما خنفساء أبو العيد والعناكب الحقيقية فكل منها خمسة أجيال فى الفترة من نوفمبر الى يونيو بينما كان لبقعة الأوريس جيل واحد فى منطقتى الدراسة وخمسة أجيال للحشرة الرواغة فى الفترة من نوفمبر إلى مايو فى كفر الشيخ.