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THE EGYPTIAN ALFALFA WEEVIL *Hypera brunneipennis* (BOHEMAN) AS INSECT PEST INFESTING SOME LEGUMINOUS CROPS.

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ABSTRACT

The present experiments was carried out in both experimental farm and laboratory of Plant Protection Research Institute, Sakha, Kafr El-Sheikh Governorate to study the population abundance of the Egyptian alfalfa weevil (EAW) and find out the influence of host plants on some biological aspects of *Hypera brunneipennis* (Boh.). Results indicated that by sweep net this insect adults had two peaks in January and April, while by photoelector recorded one peak in Apr. the larvae of EAW peaked once in March by the two methods during the two successive seasons.

The average number of the insect adults were 2.3±1.1 and 2.2±0.9 indiv./50 double strokes by the two methods sweep net and photoelector during the first season 2011/12, respectively. While, The average number were 5.9±3.2 and 5.7±2.7 indiv./50 double strokes during the second season 2012/13, respectively. The average number of the insect larvae were 11.6±6.8 and 11.9±7.3 indiv./50 double strokes by the two methods sweep net and photoelector during the first season 2011/12, respectively. While, The average number were 76.3±54.7 and 61.3±46.6 indiv./50 double strokes during the second season 2012/13, respectively.

The total period from the larval stage until the adult stage were the shortest (26±0.6 days) when the EAW was reared on Egyptian clover and the longest periods (34.8±0.5 days) were recorded on kidney bean with Significant differences according to different host plants.The adult longevity was the longest when the EAW was reared on Egyptian clover followed by fenugreek and Kidney bean with significant differences according to different host plants. The survival percentages of the larval stage and pupal stage were the highest (94.0% and 94.1%) when reared on Egyptian clover and the lowest percentages (65.0% and 83.3%) were recorded when the EAW reared on Kidney bean, respectively.

INTRODUCTION

The Egyptian alfalfa weevil *H. brunneipennis* is the most dangerous and important economic insect pest infecting the Egyptian clover in Egypt (El sufty and Boraei 1986, El Sufty *et al*. 1993, El- Hawary *et al*. 1995, El-Mezayyen 2003 and Rakha 2008). Larvae and adults of this insect are equally harmful for the green parts of the plant, especially the leaves. (Rakha 2008). The study of population abundance of this insect occurring in clover field, have been reported by many authors, El-Mezayyen 1998 and 2001 and Rakha 2008 who found that the EAW recorded all over the season beginning in Dec. to May. *Hypera* sp. was observed causing damage to a wide range of leguminous and non-leguminous plants during spring **(**Summers *et al*., 1975) and these hosts can be arranged descendingly to orders as highly preferable group that it contains one host (alfalfa plants). Follows, preferable group that

it included two hosts (clover and fenugreek plants). Least preferable group that it included two hosts (lentil and broad bean plants). Tolerant group: this group included two hosts (chick pea and Lupine plants). (Fouad *et al*., 2012). The objective of this present investigation is to study the population abundance of the Egyptian alfalfa weevil and find out the influence of host plants (Egyptian clover, fenugreek and kidney bean) on some biological aspects of this insect pest.

MATERIAL AND METHODS

Field studies:-

Sweep net method:-

Samples were collected weekly at 10-11 a.m, by the aid of sweeping net (of muslin, 30 cm in diameter and 55 cm depth with wooden hand, 70 cm long) .Catch of each sample (50 double strokes) and replicated four times then, transferred to the laboratory in a plastic bag, where anaesthetized with a piece of cotton saturated with chloroform for about 15 min before counting and identification.

Photoelector method:-

Weekly, the insects were sampled gently just over plants using fine sweep net (50 double strokes which replicated four times per sample) but without sweeping or touching plants. The collected insects were transferred into Photoelector, a device designed for seperating and discrimination fine insects away from larger ones. Photoelector is a fine technique designed and used by Csaba (2000) in Hungary to separate minute specimens - mainly parasitoids by an excellent manner, highly suitable for identification purpose, also used by Rakha (2008). The Photoelector contains three parts; the first part is metal, conic (90 mm length x 130 mm diameter), the second part is a metal, slender (70 mm length x 130 mm diameter) and the third part made is a sac of dark blue cloth, (200 mm length x 130 mm width), attached to the first part, leading to two glass jars. The small one (50 mm length x 30 mm diameter) is separated from the metal conic by a fine screen, to allow for collecting minute insects only. Thus large insects move to the second larger jar The photoelectors were left in the field in sunny place to help in separating live insects which move towards the source of light. Then, catch was transferred to the laboratory, emptied in a glass jar for anesthetizing insects by chloroform, kept into vials containing 75% ethyl alcohol for examining, sorting, identifying and counting.

Laboratory studies:-

The experiment was carried out in the laboratory , Plant Protection Research Institute, Sakha, Kafr El-Sheikh Governorate during season 2012/13 to find out the influence of host plants (Egyptain clover, fenugreek and kidney bean) on some biological aspects of the Egyptian alfalfa weevil.

To obtain a culture from the Egyptian alfalfa weevil *H. brunneipennis* a large number of the insect pest in the pupal stage were collected from Egyptian clover then transferred to the laboratory until emergence of adults. Newly emerged females and males kept in cages (60 length, 40 Width and 60 high) until mating and female egg-laying on the different host plants until

hatching. Twenty newly hatched larvae were reared individually in Petri dishes (9-cm diameter) on different host plants and each larva was considered as a replicate for each host plant. The duration of the immature stages (larval stage and pupal stage), the survival percentage as well as the adult longevity for females and males on different host plants were calculated. Statistical analysis was carried out by using one way ANOVA.

RESULTS AND DISCUSSION

Field studies on the Egyptian alfalfa weevil (EAW):-

The population abundance of the insect adults:-

In the first season, 2011/12 data represented in Fig. (1) show the population abundance of the insect adults. The adult of EAW recorded from mid-December to May in both sampling methods. By sweep net, the average number showed two peaks. The first peak was 4.6 indiv. /50 double strokes on January 10th, 2012 and the second peak was 15 indiv./50 double strokes on April 11th, 2012. While by photoelector only one peak was recorded on April 25th, 2012 with an average number of 12 indiv./50 double strokes.

In the second season, 2012/13 data represented in Fig. (2) show the population abundance of *H. brunneipennis*. The adults were found in clover field during the early season beginning in December to May. It was observed that, the population abundance of EAW in second season was higher than in the first one. In case of sweep net, the average number showed two peaks. The first peak was 10 indiv. /50 double strokes on January 10th, 2013 and the second peak was 38.6 indiv./50 double strokes on April 4th 2013,.While in case of photoelector only one peak was recorded on April 11th, 2013 with an average number of 29.6 indiv./50 double strokes.

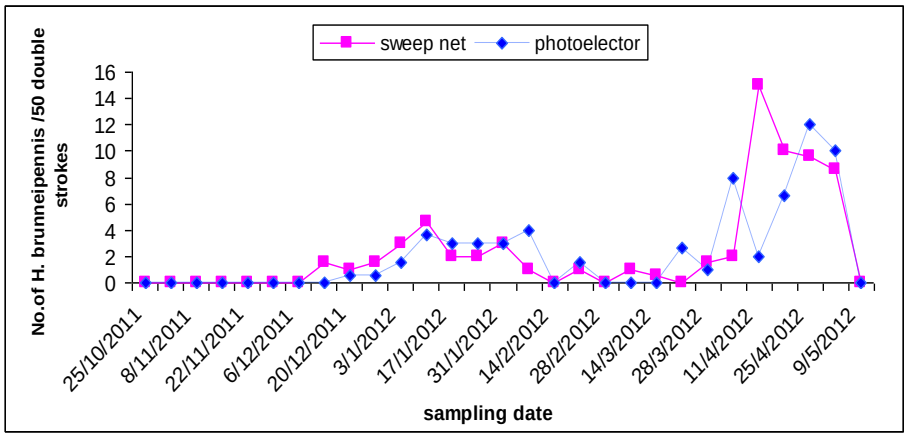

Fig. (1): Population abundance of *H.brunneipennis* collected by two methods sweep net and photoelector during 2011/12 season.

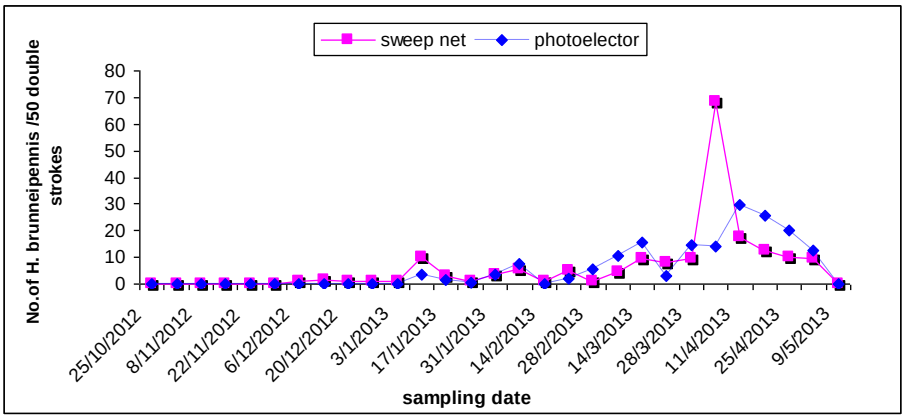

Fig. (2): Population abundance of *H.brunneipennis* collected by two methods sweep net and photoelector during 2012/13 season.

Data presented in Table (1) show the monthly average numbers of *H. brunneipennis* adults collected by two methods during the two successive seasons; 2011/12 and 2012/13. In the first season 2011/12 the results showed that, the highest monthly average number was recorded in April with an average of 9.2 and 7.2 indiv./50 double strokes by sweep net and photoelector, respectively. In the second season 2012/13, the highest monthly average number was recorded also in April with an average of 27.2 and 22.3 indiv./50 double strokes by sweep net and photoelector, respectively.

As a conclusion, the average number of the insect adults were 2.3±1.1 and 2.2±0.9 indiv./50 double strokes by the two methods sweep net and photoelector during the first season 2011/12, respectively. While, during the second season 2012/13 were 5.9±3.2 and 5.7±2.7 indiv./50 double strokes by sweep net and photoelector, respectively.

Table (1): Monthly average numbers of *H. brunneipennis* adults collected by two methods during the two successive seasons; 2011/12 and 2012/13.

Months	2011/12 season		months	2012/13 season	
	Sweep net	Photoelector		Sweep net	Photoelector
Oct. 2011	0	0	Oct. 2012	0	0
Nov.	0	0	Nov.	0	0
Dec.	1.0	0.3	Dec.	1.2	0
Jan. 2012	2.9	2.8	Jan. 2013	3.7	1.9
Feb.	0.5	1.4	Feb.	3.2	3.8
Mar.	0.8	0.9	Mar.	8.0	11
Apr.	9.2	7.2	Apr.	27.2	22.3
May	4.3	5	May	4.8	6.3
Total	18.7	17.6	Total	47.1	45.3
Mean ± SE	2.3±1.1	2.2±0.9	Mean ± SE	5.9±3.2	5.7±2.7

1.2. The population abundance of the insect larvae:-

In the first season, 2011/12 data represented in Fig. (3) show the population abundance of the insect larvae. The larvae of EAW were absent from October to the end of January and began to appear in clover field on February 7th with an average of 0.6 and 3 larvae /50 double strokes by sweep net and photoelector, respectively . The Population abundance showed one peak on March 28th, 2012 with an average of 92 larvae /50 double strokes by sweep net. While in case of photoelector only one peak was recorded on March 21st, 2012 with an average of 97 larvae /50 double strokes.

In the second season, 2012/13 data represented in Fig. (4) show the population abundance of the insect larvae. The larvae of EAW were absent from October to the end of January and began to appear in clover field on February 7th,2013 with an average number of 14.6 and 10.6 larvae /50 double strokes by sweep net and photoelector, respectively . The Population abundance showed one peak on March 21st, 2013 with an average number of 943 and 574 larvae /50 double by sweep net and photoelector, respectively.

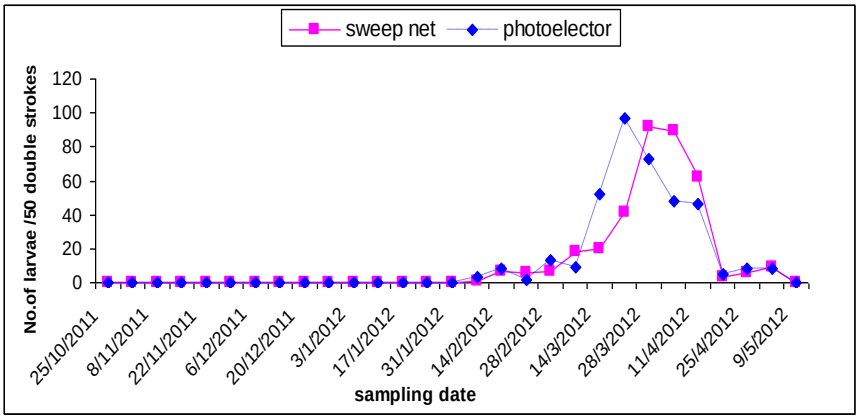

Fig. (3): Population abundance of *H. brunneipennis* larvae collected by two methods sweep net and photoelector during 2011/12 season.

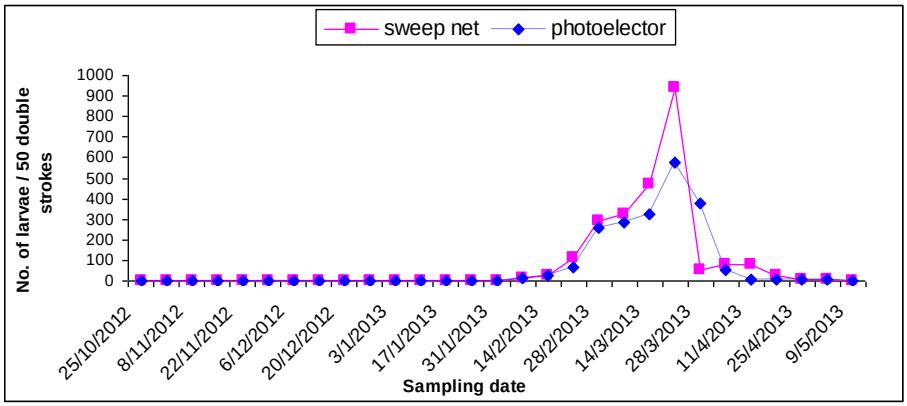

Fig. (4): Population abundance of *H. brunneipennis* larvae collected by two methods sweep net and photoelector during 2012/13 season.

Data represented in Table (2) show the monthly average numbers of *H. brunneipennis* larvae by two methods during the two successive seasons; 2011/12 and 2012/13. The first appearance of this insect was in February in both seasons. In the first season, 2011/12 the results showed that, the highest monthly average number was in March 2012 with an average of 42.8 and 57.8 larvae./50 double strokes by sweep net and photoelector, respectively. In the second season 2012/13, the highest monthly average number of was in March 2013 with an average of 446.9 and 378.8 indiv./50 double strokes by sweep net and photoelector, respectively.

Table (2): Monthly average numbers of *H. brunneipennis* larvae collected by two methods during the two successive seasons; 2011/12 and 2012/13.

Months	2011/12 season		Months	2012/13 season	
	Sweep net	Photoelector		Sweep net	Photoelector
Oct. 2011	0	0	Oct. 2012	0	0
Nov.	0	0	Nov.	0	0
Dec.	0	0	Dec.	0	0
Jan. 2012	0	0	Jan. 2013	0	0
Feb.	5	6.7	Feb.	110.9	88.9
Mar.	42.8	57.8	Mar.	446.9	378.8
Apr.	40.2	26.8	Apr.	48.6	19.0
May	4.5	4	May	3.8	3.5
Total	92.5	95.3	Total	610.1	490.2
Mean ± SE	11.6±6.8	11.9±7.3	Mean ±SE	76.3±54.7	61.3±46.6

As a conclusion, the average number of the insect larvae were 11.6±6.8 and 11.9±7.3 indiv./50 double strokes by the two methods sweep net and photoelector during the first season 2011/12, respectively. While, during the second season 2012/13 were 76.3±54.7 and 61.3±46.6 indiv./50 double strokes by sweep net and photoelector during the second season 2012/13, respectively.

These results are in agreement with those obtained by Ali (1980), Ali *et al*., (1982) in the New Valley, El-Mezayyen (2003) and Rakha (2008) in Kafr El-Sheikh who recorded that, this insect pest had two peaks in January and April and the insect larvae had one peak in March.

Influence of different host Plants on some biological aspects of *H. brunneipennis* under laboratory conditions:

Data illustrated in Table (3) showed the influence of different host plants as Egyptian clover, fenugreek and kidney bean on the immature stages and adult stage of *H. brunneipennis* reared under laboratory condition of (23±3.2ºc and 60± 5.0%R.H).

It can be noticed that, in Egyptian clover, the larval stage (20.8±0.5 days) and the pupal stage (5.2±0.5 days) were the shortest periods followed by fenugreek and represented by (23.7±0.4 and 5.7±0.3 days) and the longest periods on kidney bean and represented by (28.0±0.3 and 6.9±0.4 days) for larval stage and pupal stage, respectively.

As a conclusion, data arranged in Table (3) indicated that, the total period from the larval stage until the adult stage were the shortest (26±0.6 days) when the insect reared on Egyptian clover followed by (29.3±0.6 days) on fenugreek and the longest periods were recorded on kidney bean and represented by (34.8±0.5 days). Statistical analysis revealed that, there were significant differences between the total period from the larval stage until the adult stage (the immature stages) reared on different host plants.

Table (3): Influence of different host plants on some biological aspects of *H. brunneipennis* reared under laboratory condition (23±3.2ºc and 60±5.0%R.H

Biological aspects		Egyptian clover	fenugreek	Kidney bean
Larval stage	1st instar	4.8±0.4 b	6.3±0.4 a	7.4±0.3 a
	2nd instar	5.7±0.5 a	6.4±0.3 a	6.6±0.3 a
	3rd instar	5.0±0.5 b	5.9±0.4 b	7.3±0.2 a
	4th instar	5.3±0.6 b	5.2±0.3 b	6.8±0.3 a
	Total	20.8±0.5 b	23.7±0.4 b	28.0±0.3 a
Pupal stage		5.2±0.5 a	5.7±0.3 a	6.9±0.4 a
Larval- adult		26.0±0.6 c	29.0±0.6 b	34.8±0.5 a
Adult Longevity		27.2±0.5 a	23.9±0.5 b	18.8±0.6 c

In the horizontal rows, the means followed by the same latters are not significantly different at 0.5 level probability (one way ANOVA).

In respect to the adult longevity was the shortest (18.8±0.6 days) when the Egyptian alfalfa weevil reared on kidney bean followed by (23.9±0.5) on fenugreek and the longest period was recorded on Egyptian clover and represented by (27.2±0.5days). Statistical analysis revealed that, there were significant differences between the Adult Longevity on different host plants.

Data represented in Table (4) showed the Influence of different host plants on the survival percentages of *H. brunneipennis* reared under laboratory condition (23±3.2ºc and 60± 5.0% R.H).

It can be noticed that, the survival percentages of larval stage were the highest (94.0%) when reared on Egyptian clover followed by fenugreek (88.1%) and the lowest survival percentages were recorded when the EAW reared on Kidney bean and represented by (65.0%). On the other hand, the survival percentages of pupal stage were the highest (94.1%) when reared on Egyptian clover followed by fenugreek (92.9%) and the lowest survival percentages were recorded when the EAW reared on Kidney bean and represented by (83.3%).

As a conclusion, the obtained results from Table (3 and 4) indicated that the total period from the larval stage until the adult stage were the shortest when the *H. brunneipennis* reared on Egyptian clover, the longest period was recorded on Egyptian clover and the highest survival percentage of this insect was on Egyptian clover plant, so Egyptian clover is consider the prefer host plant to *H. brunneipennis*.

The obtained result are in agreement with those obtained by Al-Azawi, *et al*., (1986) they found that EAW preferred alfalfa and Egyptian clover than broad bean. Also Fouad *et al*., (2012) found that Egyptian clover and fenugreek were arranged under a group of host plants Favorites for *H. brunneipennis*.

Table (4): Influence of different host plants on the survival percentages of *H. brunneipennis* reared under laboratory condition (23±3.2ºc and 60± 5.0% R.H)

Biological aspects		leguminous plants		
		Egyptian clover	fenugreek	Kidney bean
Larval stage	1st instar	90.0	85.0	75.0
	2nd instar	94.4	88.2	73.3
	3rd instar	94.1	93.3	72.7
	4th instar	94.1	92.9	75.0
	Total	94.0	88.1	65.0
Pupal stage		94.1	92.9	83.3

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سوسة ورق البرسيم كآفة حشرية تصيب بعض المحاصيل البقولية.

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أجريت هذه التجارب لحشرة سوسة ورق البرسيم فى المزرعة البحثية ومختبر معهد بحوث وقاية النباتات بسخا محافظة كفر الشيخ بهدف دراسة الوفرة العددية لسوسة ورق البرسيم و تأثير بعض العوائل النباتية على بعض الخصائص البيولوجية لهذه الحشرة. وقد أظهرت النتائج أن الحشرة لها ذروتين فى يناير وابريل سجلت بواسطة شبكة الجمع أما الفتواليكتور سجل للسوسة ذروة واحدة فى ابريل، ووجد ان يرقات الحشرة لها ذروة واحدة فى مارس سجلت بكلتا الطريقتين.

كما أوضحت النتائج أن متوسط عدد أفراد الحشرات الكاملة 2.3±1.1 و 2.2±0.9 فرد لكل 50 ضربة مزدوجة وذلك بواسطة شبكة الجمع والفوتواليكتورخلال الموسم الاول على التوالى. بينما كان متوسط عدد الأفراد خلال الموسم التانى 5.9±3.2 و 5.7±2.7 فرد لكل 50 ضربة مزدوجة بالطريقتين على التوالى. وكان متوسط عدد أفراد اليرقات 11.6±6.8 و 11.9±7.3 فرد لكل 50 ضربة مزدوجة وذلك بواسطة شبكة الجمع والفوتواليكتورخلال الموسم الاول على التوالى. بينما كان متوسط عدد الأفراد خلال الموسم التانى 76.3±54.7 و 61.3±46.6 فرد لكل 50 ضربة مزدوجة بالطريقتين على التوالى

وقد أظهرت النتائج أن مجموع فترات الاطوار غير الكاملة (اليرقات- العذاري) أقصر (26± 0.6) عندما تم تربية الحشرة على البرسيم المصرى وسجلت أطول فترة على الفاصوليا (34.8±0.5). وقد سجلت النتائج فروق معنوية للاطوار غيرالكاملة عند التربية على عوائل مختلفة. وقد بلغت طول فترة حياة الحشرات الكاملة أطول فتراتها عندما تم تربيتها على البرسيم المصرى يليها الحلبة ثم الفاصوليا. وسجلت فروق معنوية لطول فترة حياة الحشرة الكاملة التى ربيت على العوائل المختلفة التلاثة. ووجد أن أعلى معدل بقاء لطور اليرقة والعذراء تم الحصول عليه عندما تم تربية الحشرة على البرسيم المصرى (94% ، 94.1 %) على التوالى , بينما تم الحصول على أقل نسبة عند تربيتها على الفاصوليا (65 % ، 83.3 %) على التوالى.