

Annals Of Agric. Sc., Moshtohor,
Vol. 45(4): 1717-1723, (2007).

**PERCENTAGE OF PARASITISM AMONG THE AMERICAN BOLL
WORM *Helicoverpa armigera* (Hubner) INFESTING COTTON PLANTS IN
GHARBIA GOVERNORATE
BY**

Ragab, M.G.; Amal A.A. El-Zoghby and Fatma A. Attala
Plant Protection Research Institute, Agriculture Research Center (ARC), Dokki, Giza

ABSTRACT

The present study was carried out at El-Gemmeiza Agricultural Research Station, Gharbia governorate for two successive growing seasons, 2005 and 2006. An area of one feddan of cotton plants was (variety Giza 89) cultivated in two planting dates; March, 21st and 27th, respectively. Six parasitoid species were recorded, one on eggs of *Helicoverpa armigera*, i.e. (*Trichogramma* spp.), the other five species are primary larval parasitoids: *Bracon bcevicornis*, *Microplitis rufiventris* Kot, *Apantelis ruficurs* (Wal.), *Tachina larvarum* (L.) and *Copidosoma* sp. During the first season, this study cleared that percentages of parasitism by the egg parasitoid, *Trichogramma* spp. recorded 6, 4, 3 and 2% during June, 17th, 24th, August, 5th and 12th, respectively. But in the second season, the egg parasitoid, *Trichogramma* spp. recorded percentages of parasitism ranged between 0-5%, but the total parasitism was 12%.

Concerning the larval parasitoid, *Apantelis ruficurs* Wal. It recorded only 41 adults during 2005 season. But the percentages of parasitism recorded four peaks on June, 3rd, July, 1st, August, 13th and the highest one was in September, 2nd, these peaks were 33.3, 57.14, 33.3 and 60%, respectively. While, during the second season 2006, the total percentages of parasitism ranged between 0-37.5%, but the highest one recorded (37.5%) in September, 2nd.

INTRODUCTION

Cotton is a major crop that plays an important role in the development of domestic economy of Egypt. The bollworm *Helicoverpa armigera* (Hubner) is a pest which attacks cotton plants (Ismail and Swailem, 1975). It's larvae start feeding on the plant leaves and soon they hide in the plant organs (flowers, fruits, etc..), bore holes may be visible, but otherwise it is necessary to cut and open the plant organs to detect the pest. Also, this pest has a wide range of alternative host plants, such as maize, legumes, tomato and okra (Kovalenkov, 2006). On each host plant, this pest has become increasingly difficult to control by insecticides. The insecticide applications to control this pest cost millions of dollars per year and have resulted in resistance to nearly all types of chemical pesticides. Ghulan *et al.* (2004) observed natural mortality of *H. armigera* on cotton. But, predators and parasitoids were the major causes of mortality. So, use of natural enemies is an important approach to

control pests. Johns and Whitehouse (2004) released some predominant natural enemies to control *Helicoverpa armigera*.

The present work was conducted to evaluate the role of some egg and/or larval parasitoid species (*Trichogramma* spp., *Bracon bcevicornis*, *Microplitis rufiventris* (Kot), *Apanteles ruficurs* Hol. *Tachina larvarum* L. and *Copidosoma* sp.) to control *H. armigera* and to study the seasonal distribution of their parasitoids throughout 2005 and 2006 cotton seasons.

MATERIAL AND METHODS

The present study was carried out at El-Gemmeiza Agricultural Research Station, Gharbia Governorate for two successive cotton seasons, 2005 and 2006.

An area of one feddan was cultivated with cotton seeds (Giza 89 variety) in March, 21st and 27th during 2005 and 2006, respectively. Weekly samples were collected from May until end of September, during the two seasons. Each sample was represented by 100 green bolls randomly collected plants. *Helicoverpa armigera* eggs and larvae were collected. The eggs were kept in glass tubes (8 x 2.5 cm) and covered with muslin till hatching or emergence of parasitoids. These parasitoids were collected, counted and identified. The collected larvae were individually fed on bolls or buds in glass tubes (2.5 x 12 cm) until pupation or parasitoids emergence. Parasitoid adults were counted, classified into species and preserved in vials containing 70% ethyl alcohol and glycerin, in addition to slide mounting of specimens for identification in the Biological Res. Dept., Plant Protection Res. Inst., Agric. Res. Center, Giza, Egypt.

RESULTS AND DISCUSSION

Data in Table (1) indicate that, the American bollworm started its infestation to cotton plants in late May during the first season (2005), at Gharbia governorate. As shown in Table (1), the highest number of collected eggs was 154 eggs occurred on mid of June 2005, while no egg was detected during the first of May and the second half of September. Also, the data show that the larvae of this pest started infestation at the beginning of June and recorded 15 larvae, the highest number of collected larvae was (80 larvae) occurred during mid June. From the beginning of August the number of larvae decreased gradually and reached its minimum (3 larvae) in mid September of the same season.

- Parasitoids

In this study, six primary parasitoid species were recorded on *H. armigera*. One of them egg parasitoid, *Trichogramma* spp. and the others *Apanteles ruficurs* (Wal.), *Microplitis rufiventris* (Kok.) *Bracon bcevicornis*, *Tachina larvarum* (L.) and *Copidosoma* sp are larval parasitoids.

Percentage Of Parasitism Among The American Boll Worm...1719

Table (1): Number of eggs and larvae of *H. armigera* per 100 cotton plants and percentages of parasitism in Gharbia governorate during season 2005.

Date of sampling	No. of pest eggs	% of parasitism	No. of pest larvae	No. of parasitoid species emerged during 2005					Total	% of parasitism
				<i>A. ruficrus</i>	<i>M. rufiventris</i>	<i>B. brevicoronis</i>	<i>T. larvarum</i>	<i>Copidosoma</i> sp.		
6/5/2005	0	0	0	0	0	0	0	0	0	0
13/5	0	0	0	0	0	0	0	0	0	0
20/5	0	0	0	0	0	0	0	0	0	0
27/5	4	0	0	0	0	0	0	0	0	0
3/6	60	0	15	3	1	0	1	0	5	33.33
10/6	100	1	39	5	3	0	2	0	10	25.64
17/6	154	6	80	9	4	0	0	0	13	16.25
24/6	123	4	56	2	2	0	0	0	4	7.14
1/7	73	2	35	19	1	0	0	0	20	57.14
8/7	54	1	39	0	3	0	0	0	3	7.69
15/7	49	0	23	2	1	0	0	0	3	13.04
22/7	53	0	29	0	0	0	0	0	0	0
29/7	46	0	22	0	0	0	0	0	0	0
5/8	31	3	27	1	1	0	0	0	2	28.57
12/8	17	2	15	0	2	1	1	1	5	33.33
19/8	9	0	9	0	0	1	1	0	2	22.22
26/8	6	0	8	0	1	2	0	0	3	37.50
2/9	2	0	5	0	0	2	0	1	3	60.00
9/9	1	0	4	0	0	0	0	0	0	0
16/9	0	0	3	0	0	0	0	0	0	0
23/9	0	0	0	0	0	0	0	0	0	0
30/9	0	0	0	0	0	0	0	0	0	0
Total	782	-	409	41	19	6	5	2	36	

a. Egg parasitoid

Data in Table (1) show that the highest percentage of parasitism (6%) by *Trichogramma* spp. occurred on June, 17th. This number decreased gradually to 4, 3 and 2% on June, 24th and August, 5th & 12th, respectively.

b. Larval parasitoids

Results in Table (1) reveal that there are five primary parasitoid species attacking *H. armigera* larvae; *A. ruficrus*, *M. rufiventris*, *B. bcevicornis*, *T. larvarum* and *Copidosom* sp.). Also, from these data it can be observed that *A. ruficrus* recorded the highest percentage of parasitism, a total of 41 adults were obtained opposed to 3, 3, 2 and 5, parasitoid adults for *M. rufiventris*, *B. bcevicornis*, *Copidosom* sp. and *T. larvarum*, respectively. The highest percentage of parasitism (60%) was recorded at the end of the season (September, 2nd). No parasitoids emerged during May, the last week of July and the second week of September.

Fig. (1-A) clear that during the first season 2005, percentages of parasitism on *H. armigera* showed 3 peaks; on June, 3rd, 1st July and the beginning of September. These peaks were 33.33%, 57.14% and 60.00%, respectively.

During season 2006, data in Table (2) indicate that the eggs of *H. armigera* started to be found on cotton plants at the end of May (9 eggs). The highest number of eggs was 196 eggs /100 plants on June, 10th, then eggs decreased in number during the rest of the season and recorded minimum on 2nd of September (2 eggs). On the other hand, larvae began to appear on June, 10th (15 larvae). The maximum and the minimum numbers of larvae were 80 and 3 on June, 24th and September, 23rd, respectively.

- The Parasitoids

a. Egg parasitoid

The rate of parasitism by the eggs' parasitoid, *Trichogramma* spp. ranged between 0 and 5%. This means that low activity of *Trichogramma* against eggs of *H. armigera* infesting cotton plants.

b. Larval parasitoids

In the second season, *A. ruficrus* recorded the highest total number of obtained parasitoids (23 adults). *M. rufiventris* came the next (11 adults), while *T. larvarum*, *B. bcevicornis* and *Copidosom* sp. recorded 5, 3 and 2 adults, respectively. Throughout 2006 cotton season, recorded 3 peaks of parasitism on *H. armigera* larvae (33.3, 33.3 and 37.5%) were recorded on June, 10th, August, 19th and September, 2nd, respectively (Table, 2 and Fig. 1-B). No parasitism occurred during the end of May and beginning of June, end of July and also during the second half of September.

In this respect, Ismail and Swailem (1975) found that *T. larvarum* (Tachinidae) and *A. ruficrus* (Braconidae) were active in May and June, but a very fine parasite *Copidosoma* sp. (Encyrtidae) was found in the late summer.

The present results, also, agree with Streito and Nibouche (1997) who indicated that the highest parasitism rates on lepidopterous pests on cotton were recorded on *H. armigera*. While, Ahtam *et al.* (2006) indicated that use of *Trichogramma* spp. and *Bracon* spp. to control *H. armigera* in cotton fields is successful on large scale in Uzbekistan.

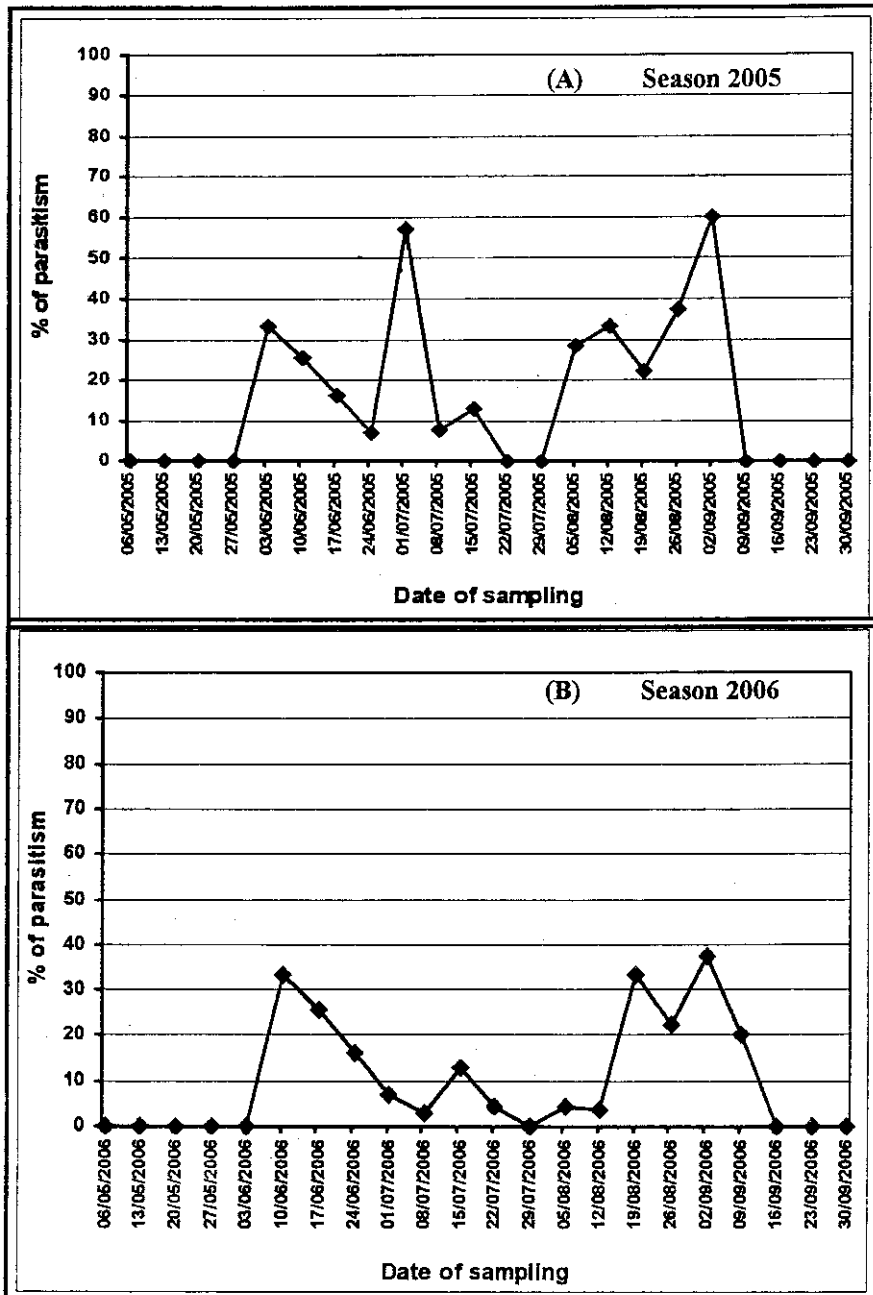


Fig. (1): Total parasitism on *H. armigera* by different parasitoid species during two seasons.

Table (2): Number of eggs and larvae of *H. armigera* per 100 plants of cotton and percentages of parasitism in Gharbia governorate during season 2006.

Date of sampling	No. of pest eggs	% of parasitism	No. of pest larvae	No. of parasitoid species emerged during 2006					Total	% of parasitism
				<i>A. ruficrus</i>	<i>M. rufiventris</i>	<i>B. brevicornis</i>	<i>T. larvarum</i>	<i>Copidosoma</i> sp.		
6/5/2005	0	0	0	0	0	0	0	0	0	0.00
13/5	0	0	0	0	0	0	0	0	0	0.00
20/5	0	0	0	0	0	0	0	0	0	0.00
27/5	9	0	0	0	0	0	0	0	0	0.00
3/6	83	1	0	0	0	0	0	0	0	0.00
10/6	196	5	15	3	1	0	1	0	5	33.33
17/6	156	2	39	5	3	0	2	0	10	25.6
24/6	128	1	80	9	4	0	0	0	13	16.25
1/7	79	0	56	2	2	0	0	0	4	7.14
8/7	57	0	35	0	1	0	0	0	1	2.86
15/7	51	1	39	2	3	0	0	0	5	12.82
22/7	43	0	23	0	1	0	0	0	1	4.35
29/7	47	0	29	0	0	0	0	0	0	0.00
5/8	33	2	22	1	0	0	0	0	1	4.55
12/8	18	0	27	0	1	0	0	0	1	3.70
19/8	9	0	15	0	2	1	1	1	5	33.33
26/8	7	0	9	1	0	0	1	0	2	22.22
2/9	2	0	8	0	1	2	0	0	3	37.50
9/9	0	0	5	0	0	0	0	1	1	20.00
16/9	0	0	4	0	0	0	0	0	0	
23/9	0	0	3	0	0	0	0	0	0	
30/9	0	0	0	0	0	0	0	0	0	
Total	918	-	404	23	11	3	5	2	52	12.70

REFERENCES

- Ahtam, Uwais; Gao Wenchao; Xu Jianjun; Parharti Mamati and Ibragimovich, R.M. (2006): Biological control technology of *Helicoverpa armigera* in Uzbekistan. Xinjiang Agric. Sci., 43(4):310-312.
- Ghulan, M.; Abida, Nasreen Mohammed Askfaq and Saleem M. (2004): Natural mortality of *Helicoverpa armigera* on cotton. Pakistan Entomologist, 26(1):5-8.
- Ismail, I.I. and Swaillem, S.M. (1975): On the biology of the bollworm *Heliothis armigera* (Hubner) Lepidoptera: Noctuidae. Bull. Soc. Ent. Egypt Lix 59, 207-216.

- Johns, C.V. and Whitehouse, M.E.A. (2004): Mass rearing of two larval parasitoids of *Helicoverpa* spp. (Lepidoptera: Noctuidae: *Netelia producta* (Brulle) and *Heteropelma scaposum* (Morly) (Hymenoptera: Ichneumonidae) for field release. Austral. J. Entomol., 43(1):83-87.
- Kovalenkov, V.G. (2006): Characteristics of the qualitative and structural change in entomofauna in agrolandscapes of Southern Russia. Russian Agric. Sci., 4:13-17.
- Streito, J.C. and Nibouche, S. (1997): First observations on the parasitoids associated with lepidopterous pests of cotton in Burkina Faso. Entomophaga, 42(4):543-557.

نسب التطفل على دودة اللوز الأمريكية التي تصيب نباتات القطن في محافظة الغربية

محمد جمعه رجب ، أمال أحمد الزغبى ، فاطمة أبوبكر عطاالله
معهد بحوث وقاية النباتات - مركز البحوث الزراعية - الدقى - الجيزة

تمت هذه الدراسة خلال موسمين زراعيين ٢٠٠٥ ، ٢٠٠٦ على محصول القطن في محطة البحوث الزراعية بالجميزة بمحافظة الغربية وعلى مساحة فدان واحد. تمت زراعة القطن خلال يومى ٢١، ٢٧ مارس خلال عامى الدراسة على التوالى وبالصنف جيزة ٨٩. ولقد تم حصر ٦ أنواع من المتطفلات الحشرية أحدهم طفيل بيض هو طفيل التريكوجراما وخمسة طفليات على اليرقات وهى البراكون - ميكروبليست روفينزيس - أبنتليس روفيكورس وتالينا لارفارم وكوبيدوسوما. ولقد أوضحت الدراسة أن نسبة التطفل بطفيل البيض فى الموسم الأول كانت ٦، ٤، ٣ و ٢% سجلت فى يوم ١٧، ٢٤ يونيو و ٥، ١٢ أغسطس على التوالى. أما فى الموسم الثانى سجل نفس الطفيل نسبة تطفل تتراوح بين (صفر - ٥٥%) وكانت نسبة التطفل الإجمالى ١٢%.

أما عن تعداد طفيل اليرقات *Apantelis ruficurs* فقد سجل خلال الموسم الأول ٢٣ فرداً ، أما نسبة التطفل سجلت ٤ قمم فى يوم ٣ يونيو وأول يولييه و ٣ أغسطس وأعلى قمة كانت فى ٢ سبتمبر وسجلت ٣٣، ٣٣ ، ٥٧، ١٤ ، ٣٣، ٣٣ و ٦٠% على التوالى ، أما فى الموسم الثانى ٢٠٠٦ فقد تراوحت نسبة التطفل بين صفر - ٣٧،٥% وأعلى نسبة تطفل سجلت فى يوم ٢ سبتمبر وكانت ٣٧،٥%.