

New Recorded Parasitoids of the Peach Twig Borer, *Anarsia lineatella* Zell. (Lepidoptera: Gelechiidae) on Peach in Egypt

Maha, A. Habib* ; A. M. Hekal* ; H. E. Sakr* ; H. E. Hanafy** and S. A. Azab**

*Plant Protection Department, Faculty of Agriculture, Ain Sams University, Cairo, Egypt

**Insect Taxonomy Department, Plant Protection Res. Institute, Agric. Res. Center, Giza, Egypt

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ABSTRACT

Parasitoid species of the peach twig borer, *Anarsia lineatella* Zell. (Lepidoptera: Gelechiidae) were surveyed in peach orchards at El Giza Governorate, Egypt during the period from March to October 2007. *Glyptapanteles (Apanteles) africanus* (Cameron), *G. (A.) maculitarsis* (Cameron), *Glyptapanteles (Apanteles) sp.* and *Dibrachys cavus* (Wlk.) (*D. boucheanus* Ratz.) were recovered from host larvae. *G. africanus* and *G. maculitarsis* seemed to be new recorded parasitoids of *A. lineatella* in the world. *Glyptapanteles sp.* may be a new recorded species. *D. cavus* is a new record on *A. lineatella* in Egypt.

Key Words: *Glyptapanteles (Apanteles) africanus*, *G. (A.) maculitarsis*, *Glyptapanteles (A.) sp.*, *Dibrachys cavus (D. boucheanus)*, *Anarsia lineatella*, Egypt.

INTRODUCTION

The peach twig borer, *Anarsia lineatella* Zell. (Lepidoptera: Gelechiidae) is an important pest threatening peach, apricot, almond, plum and nectarine trees in Egypt (Tadros *et al.*, 2006). Annual increase in the area of stone fruit orchards established the pest under local conditions and its population has reached high levels in some areas (Saafan, *et al.*, 1994). Parasitic species of the pest recorded in literature all over the world were 40 species belonging to orders: Hymenoptera (38), Diptera (1) and Acarina (1) distributed in Egypt, India, Italy, France, Romania, Bulgaria, USA and British Columbia (Sarra, 1915; Faure and Alab., 1924; Keifer and Jones, 1933; Jacob, 1974; Stoeva, 1976; Dimova, 1987; Daane *et al.*, 1993; Trandafirescu *et al.*, 2004; Molinari *et al.*, 2005 and Abdel-Samad, 2006).

The pteromalid, *Dibrachys cavus* (Wlk.) (*D. boucheanus* Ratz.) was recorded as a larval parasitoid of *A. lineatella* in USA (Keifer and Jones, 1933). In Egypt, Abdel-Samad (2006) recorded *Apanteles ruficrus* Hal., *Microgaster tiro* Reinhard and *Diplazon laetatorius* Fab. from *A. lineatella* on peach at ElGharbia Governorate.

The present work aimed to survey the parasitoid species of *A. lineatella* larvae on peach at El-Giza Governorate, Egypt during 2007 season.

MATERIALS AND METHODES

Survey of parasitoids:

A survey of parasitic species of *A. lineatella* larvae was carried out in peach orchards untreated

with pesticides, located at Bani Salama district, Elkhataiba region, El-Giza Governorate during the period from March to October 2007. The pest larvae were twice monthly collected from peach twigs, placed in small glass tubes (7 cm leng. and 2 cm dia.) containing an artificial diet for larval feeding (McElfresh and Millar, 1993) and transferred to the laboratory. Larvae were incubated at $27\pm 2^{\circ}\text{C}$, $90\pm 5\%$ RH and 16:8 (L: D). Tubes were daily examined for pupation of unparasitized host larvae or formation of full grown parasitoid larvae, which were left to pupate beside the host remains. The parasitoid pupae were transferred to large glass tubes (14 cm leng. and 2.5 cm dia.) until emergence of adult parasitoids, which were preserved in 70 % ethyl alcohol for later mounting and identification.

Mounting and identification of adult parasitoids:

Specimens of adult parasitoids were boiled in 10% KOH for two hours to dissolve the inside tissues, washed in water and transferred to H_2O_2 for one hour for bleaching. Specimens were passed through a series of different concentrations of ethyl alcohol ranged from 30 to 100% for dehydration. Xylene was used for clearing and Canada Balsam for mounting. Parasitoid species were identified by Dr. Azab S. A., Insect Taxonomy Department, Plant Protection Research Institute, Agricultural Research Center, Giza, Egypt.

RESULTS AND DISCUSSION

Table (1) shows that four hymenopterous species were surveyed from *A. lineatella* larvae on peach at Bani Salama district, ElKhatatba region, El-Giza Governorate during 2007 season. These species were the three braconids *Glyptapanteles (Apanteles)*

Table (1): New recorded hymenopterous parasitoid species of *A. lineatella* on peach in Egypt.

Scientific name	Family	Number of emerged adults				Emergence period of adults	Type of parasitism	Life style	Host stage
		Total	♂	♀	Sex ratio ♂:♀				
<i>Glyptapanteles (Apanteles) africanus</i> (Cameron).	Braconidae	33	10	23	1:23	4 th week of June – 3 rd week of August (eight weeks)	Endo & Sol.	Koinobiont	1 st inster larva
<i>Glyptapanteles (Apanteles) maculitarsis</i> (Cameron)	"	22	8	14	1:18	4 th week of June – 1 st week of August (six weeks)	"	"	"
<i>Glyptapanteles (Apanteles) sp.</i>	"	15	15	0	1:0	2 nd week of July-1 st week of August (three weeks)	"	"	"
<i>Dibrachys cavus</i> (Wlk.) (<i>D. boucheanus</i> Ratz.)	Pteromalidae	9	3	6	1:2	4 th week of July-3 rd week of August (four weeks)	Ecto & Gre.	Idiobiont	Full grown larva
Ecto = Ectoparasitoid		Endo = Endoparasitoid		Gre. = Gregarious		Sol. = Solitary			

africanus (Cameron), *G. (A.) maculitarsis* (Cameron) and *Glyptapanteles (Apanteles) sp.* (Microgastrinae), as well as the pteromalid *Dibrachys cavus (D. boucheanus)* (Pteromalinae). Walker (1994) transferred *Apanteles africanus* Cameron and *A. maculitarsis* Cameron to *Glyptapanteles*.

Total numbers of emerged adults were 33, 22, 15, and 9 for *G. africanus*, *G. maculitarsis*, *Glyptapanteles sp.* and *D. cavus*, respectively. *G. africanus* was the most common species, followed by *G. maculitarsis*, then *Glyptapanteles sp.* and *D. cavus*. The sex ratio of males to females for the respective species was 1: 2.3, 1: 1.8, 1: 0 and 1: 2. Sex ratio was the highest in *G. africanus* and the lowest in *Glyptapanteles sp.* Females outnumbered males irrespective of the parasitoid species except *Glyptapanteles sp.*, from which males were only obtained. *G. africanus* emerged during the period from the 4th week of June to the 3rd week of August (eight weeks), while *G. maculitarsis* occurred from the 4th week of June to the 1st week of August (six weeks). *Glyptapanteles sp.* was recorded from the 2nd week of July to the 1st week of August (three weeks), whereas *D. cavus* was surveyed from the 4th week of July to the 3rd week of August (four weeks).

The three braconid species are koinobiont endoparasitoids and solitary species. Available literature showed that *G. africanus* and *G. maculitarsis* have not been previously recorded on *A. lineatella* all over the world. *G. africanus* parasitized 15 lepidopterous species excluding *A. lineatella* in Nigeria, Ghana, Mali, Uganda, Kenya, Zimbabwe, Malawi, India and Pakistan (Walker, 1994).

G. maculitarsis attacked 14 lepidopterous species excluding *A. lineatella* in Sierra Leone, Nigeria, Kenya, Tanzania, Uganda and South Africa

(Walker, 1994).

Males of *Glyptapanteles sp.* were only obtained from host larvae caused a great difficulty in identification of the species. *Glyptapanteles sp.* may be a new recorded species.

D. cavus is an idiobiont ectoparasitoid and gregarious species. *D. cavus* is a primary larval ectoparasitoid and pupal endoparasitoid of insect species. It was previously surveyed from *A. lineatella* larvae in USA (Keifer and Jones, 1933). Hu Tza (1964) reported 148 host species and subspecies belonging to Lepidoptera, Coleoptera, Diptera and Hymenoptera for *D. cavus*.

On the other hand, *D. cavus* is a secondary parasitoid through pupae of Ichneumonoidea, Chacidoidea or Tachinidae (Andriescu and Mitroiu, 2004). *D. cavus* hyperparasitized the braconid *Meteorus versicolor* (Wesm.) of the notodontid, *Thaumetopoea pityocampa* (Den. & Schiff.) in Spain (Lopez –Sebastian *et al.*, 2005), the ichneumonid *Gambrus ultimus* (Cresson) of the gelechiid, *Pectinophora gossypiella* (Saund.) in USA (Ferro and Rice, 1970), the ichneumonid, *Sphecochaga vesparum* (Curtis) of vespulid wasps in Northern Hemisphere (Donovan, 1989) and the tachinid *Triarthria setipennis* (Fall.) of the earwig in Germany (Peters and Abraham, 2004).

Andriescu and Mitroiu (2004) reported that *D. cavus* is a cosmopolitan species widely distributed in Africa (Algeria, Morocco, South Africa), Asia (China, India, Japan, Kazakhstan, Kyrgyz, Korea, Pakistan, Turkey, Turkmenistan), Europe (Austria, Belarus, Belgium, Bosnia Herzegovina, Bulgaria, Cyprus, Czech Republic, Denmark, Finland, France, Germany, Hungary, Italy, Netherlands, Poland, Portugal, Moldavia Republic, Russia, Serbia, Slovakia, Spain, Sweden, Switzerland, Ukraine, UK), Northern America (Canada, Mexico, USA), Southern America (Argentina, Brazil, Chile, Peru,

Uruguay) and Australia. Therefore, *D. cavus* is a new record from *A. lineatella* larvae on peach in Egypt.

REFERENCES

- Abdel-Samad, S. S. M. 2006. Activity of peach twig borer *Anarsia lineatella* Zeller and its associated bio agents on peach trees. Arab Universities Journal of Agricultural Sciences 14 (2): 813-821.
- Andriescu, I. and Mitroiu, M. D. 2004. Notes on the Pteromalidae fauna (Hymenoptera: Chalcidoidea, Pteromalidae) of Dobrogea, Romania. Anal. Șt. Univ. Biologie Animala 50: 89-96.
- Danne, K.M. ; Yokota, G.Y. and Dlott, J.W. 1993. Dormant-season sprays affect the mortality of peach twig borer (Lepidoptera: Gelechiidae) and its parasitoids. J. Econ. Entomol. 86(6): 1679-1685.
- Dimova, M. 1987. The parasitic entomofauna of *Anarsia lineatella* Zell. (Gelechiidae) and *Grapholitha molesta* (Busck) (Tortricidae: Lepidoptera) and its importance in reducing the density of these pests. Pochvoznanie Agrokhimiya Rastitelna Zashchita 22(6): 87-92.
- Donovan, B. J. 1989. Potential enemies of the introduced wasp parasitoid *Sphecohypha vesparum* (Hymenoptera: Ichneumonidae) in New Zealand. New Zealand J. Zool. 16 (3): 365-367.
- Faure, J. C. and Alabouvette, L. 1924. Note sur 1 *Anarsia lineatella* Zell., et ses parasites dans la region de Lyon en 1924. Rev. Zool. Agric. Appl. 23 (12): 279-287.
- Ferro, D. N. and Rice, R. Z. 1970. Parasites of pink bollworm in southern California. Ann. Ent. Soc. Amer. 63(6) : 1783-1784.
- Hu Tza 1964. Investigations on the biology and utilization of *Dibrachys cavus* Walker. Acta Ent. Sin. 13(5):689-714.
- Iacob, M. 1974. Biological factors naturally limiting populations of oriental fruit moth (*Grapholitha molesta* Busck.) and peach twig borer (*Anarsia lineatella* Zell.) in peach orchards. Analele Institutului Cercetari Pentru Protectia Plantelor 10: 297-301.
- Keifer, H. H. and Jones, L. S. 1933. Some parasites of *Anarsia lineatella* Zell. in California. Mon. Bull. Dep. Agric. Calif. 22 (7-11): 387-388.
- Lopez-Sebastian, E. ; Juan-Martinez, M. J. and Selfa, J. 2005. Some data about the biology of *Meteorus versicolor* (Wesmael) (Hymenoptera Braconidae), a larval endoparasitoid of the pine processionary moth. Redia 88: 9-14.
- McElfresh, J. S. and Millar, J. G. 1993. Establishment and rearing of *Anarsia lineatella* (Lepidoptera: Gelechiidae) on a meridic diet. J. Econ. Entomol. 85: 1399-1404.
- Molinari, F. ; Chiappini, E. and Sambado, P. 2005. Preliminary investigation on the natural enemies of the peach twig borer, *Anarsia lineatella* Zeller in northern Italy. Bulletin OILB SROP 28: (7): 135-138.
- Peters, R. and Abraham, R. 2004. Interactions between parasitoid Hymenoptera (Chalcidoidea: Pteromalidae) and Diptera: Cyclorrhapha in nests of cavity-nesting birds. Entomologia Generalis 27 (2): 133-141.
- Saafan, M. H.; Foda, S. M. and Korashy, M. A. 1994. Ecological studies on the peach twig borer, *Anarsia lineatella* Zeller at North Sinai Governorate, Egypt. J. Appl. Sci. 9 (7): 595-601.
- Sarra, R. 1915. Biological observations on *Anarsia lineatella* Z. injurious to the almond. Boll. Lab. Zool. Gen. Agrar. R. Scuola Sup. Agric., Portici 10: 51-65.
- Stoeva, R. 1976. An effective parasite of larvae of *Anarsia lineatella*. Rastitelna Zashchita 24(8): 25-29.
- Tadros, A.W.; Amina, A. R. and Iman, A. M. A. 2006. Survey of insect pests in peach orchards. Egypt. J. Agric. Res. 48 (5): 1463-1477.
- Trandafirescu, M., Trandafirescu, I., Gavati, C. and Spita, V. 2004. Entomophagous complex of some pests in the apple and peach orchards in the southern Romania. Journal Fruit Ornamental Plant Research 12: 253-261.
- Walker, A. K. 1994. Species of Microgastrinae (Hymenoptera: Braconidae) parasitizing lepidopterous cereal stem borers in Africa. Bull. Ent. Res. 84 (3): 421-434.