A NEW RECORD OF *CERODONTHA* (*CERODONTHA*) *PHRAGMITOPHILA* HERING (DIPTERA: AGROMYZIDAE) ON OBOE CANE, *ARUNDO DONAX* L., IN EGYPT

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Abstract

The leafminer species, *Cerodontha* (*Cerodontha*) *phragmitophila* Hering, is recorded for the first time on oboe cane, *Arundo donax* L., plants grown in or on the banks of the irrigation canals at Al-Aiat region in Giza governorate. The *Cerodontha* Rondani (Agromyzidae) fauna of Egypt includes now 3 species. Females laid its eggs singly near the margin on lower surface of the leaf blade. The initial mine of the newly hatched larvae is linear, became widening corridor by vertically feeding larvae on the blade leaf tissue and pupation of the full-grown larvae within the mine. Infestation started in late August and continued until late October, 2003 and during the last three weeks of September, 2008 with general mean levels about 3 and 8%, respectively. Mines ranged between 1- 3 mines / infested leaf and a single mine is common in each infested leaf. Two larval and pupal parasitoids, Hymenoptera: Chalcidoidea: Eulophidae) i. e. *Diglyphus isaea* Walker (new record) and *Chrysocharis* sp. (new record) were identified. Pupal parasitism was generally higher than larval one with general rates about 64 and 34%, respectively. Both parasitoids started its parasitic activity in late August and continued until the third week of October, 2003 as well as during the last three weeks of September, 2008. It were fluctuated greatly which rates of pupal parasitism increased from about 48% in 2003 to 80% in 2008, whilst rates of parasitized larvae decreased from about 39% to 30% during the same period.

INTRODUCTION

The leafminer, *Cerodontha* (*Cerodontha*) *phragmitophila* Hering, 1935 (Diptera: Agromyzidae), is a new record attacking oboe cane or giant reed, *Arundo donax* L., plants in the governorates of Giza (at Al-aiat) and Qaluobia (at Shobra El-Kheima). Flies reared from oboe cane were submitted to identification by Dr. John C. Deeming (Natural Museums & Galleries of Wales, Cardiff, UK) in April, 003. Spencer, 1973) reported that genus *Cerodontha* Rondani, feeds exclusively on monocotyledons, in addition to the Gramineae, also on the families Cyperaceae, Iridaceae and Liliaceae. It is now a cosmopolitan genus with over 260 species, divided into 7 subgenera and larvae of the subgenus, *Cerodontha* are leafminers feeding in leaf sheaths of Poaceae (Nowakowski, 1962 and Spencer, 1990). The subgenus *Corodentha* is found in all major zoogeographic realms in the Palaearctic and Nearctic regions (Boucher, 2002).

Corodontha phragmitophila is known from Corsica, Hungary, Jugoslavia, Italy, France, Peninsular Spain, Bulgaria and Russia in Europe and (Kazakstan and Pakistan) in Asia (Nowakowski, 1973 and Coutin, 2001) as well as from the southern US (Tracy and DeLoach, 1998). Very little is known about the *Corodentha* species in Egypt where *C. semivittata* (Strobl) recorded by (Steyskal & El-Bialy, 1967) in addition to *C. denticornis* Panzer on cereal crops (Hafez *et al*, 1970).

The present study aimed to obtain new information obout its taxonomy, biology, ecology and associated parasitoids on oboe cane plants at Al-Aiat region in Giza governorate.

MATERIALS AND METHODS

The present investigation was conducted on oboe cane, *Arundo donax* L., plants grown in or on the banks of irrigation canals at Al-Aiat in Giza governorate in 2003 and 2008 years.

To assess the level and intensity (number of mines per infested leaf) of infestation: three hundred leaves on randomly stand plants were visually examined every week from August 26 to October 28, 2003, also from 13 to 27 of September, 2008. On each examination date, leaves classed as infested (mined) and non-infested. The infested leaves were detached, collected in plastic bags and transferred to the laboratory and dissected by dissection microscope. Number of mines per infested leaf were recorded.

To assess larval and pupal parasitism, numbers of alive and parasitized larvae as well as pupae free or with exit holes and empty pupal cuticle were recorded. After examination, parasitized and alive larvae were placed into two bags with the mined leaf pieces for rearing the live larvae and allow the emergence of parasitoids and flies. Daily inspection was made and the emerged parasitoids and flies were identified and recorded. At the end of the emergence period, the dried leaf pieces were reexamined and both failed and emerged adults were also identified and recorded.

Larval or pupal parasitism rate was calculated by applying the following formulas on each collection date:

$$\text{Rate of larval parasitism} = \frac{L}{L + A} \times 100.$$

$$\text{Rate of pupal parasitism} = \frac{P}{P + B} \times 100.$$

Where:

L = Total no. of emerged larval parasitoids.

P = Total no. of emerged pupal parasitoids.

A = Total no. of alive host larvae (pupated – parasitized pupae).

B = Total no. of emerged flies.

RESULTS AND DISCUSSION

1-Taxonomy: A leafminer was discovered infesting oboe cane in Al-Aiat region during the summer of 2002. Emerged adults were identified as *Cerodontha* (subgenus *Cerodontha*) *phragmitophila* Hering, 1935 (Agromyzidae) of which *C. arundinis* Nowakowski, 1973 is a junior synonym. Deeming, (2003) reported that this species resembles the common grass-feeding *C. denticornis* Panzer, except that it has acrostichal bristles (personal communication).

2-Biology: Female fly (Fig., a and b) laid individually eggs near the margin of the leaf blade at lower surface. The initial formed mines by the newly hatched larvae are linear. Larvae feeding vertically oriented on the leaf tissue made widening corridor mine Fig. 1 c. Frass in deposited little granules. The full-grown larvae made an emergence slit before pupation inside the mine. Rarely two mines together, sometimes confluent. The mining fly, *C. phragmitophila*, was oligophagous on *Arundo donax* in Egypt. It has been reported as narrowly oligophagous on the same host plant and *Phragmites austrails* (Poaceae) where are referred to under old name of *Arundo phragmitis* (Nowakowski, 1973 and Tracy & DeLoach, 1998). *Cerodontha*, with seven subgenera and some of 82 reared species restricted to monocots the four families Poaceae, Cyperaceae, Iridaceae and Juncaceae (Spencer, 1990).

3-Infestation level and mine density: Infestation level was relatively higher in 2008 (8.2%) than in 2003 (3.2%) (Table 1). In late August of 2003, infestation started in a low level of 3.7%, increased to 6.3% in early October, then fell drastically to 1% in late October. In mid of September of 2008, high infestation level (10.3%) was recorded, but lowered to 5.7% after two weeks (Table 1).

Number of mines ranged between 1-3 mines / infested leaf. A single mine is common in each infested leaf accounting for about 93 and 89% of the total number of mined leaves recorded in 2003 and 2008, respectively (Table 1). The infested leaves had two mines being in respective were about 6 and 11%, but only 1% had three mines in 2003. The general mean number of mines were about 107 and 111 / 100 infested leaves, whilst the highest estimated numbers about 124 and 113 / 100 infested leaves were attained in early and mid September in 2003 and 2008, respectively.

4-Parasitism: Data in Table 2 indicate that pupal parasitism was generally higher than larval one with grand general rates about 63 and 33%, respectively. It were fluctuated greatly with general rates about 44 and 37% in 2003 which increased and decreased to about 81 and 29% in 2008, respectively.

Two larval and pupal parasitoids (Hymenoptera: Chalcidoidea: Eulophidae) i. e. *Diglyphus isaea* Walker (new record) and *Chrysocharis* sp. (new record) were

identified. Both parasitoids followed a similar pattern of parasitic activity started in late August and continued until the third week of October 2003 as well as during the last three weeks of September 2008. Larval parasitism started in low and high rates of 12.5 and 33.3% in late August and mid September, reached a maximum of 80%, but lowered to 25% in mid October and late September in 2003 and 2008, respectively (Table 2). Pupal parasitism began in high rates of 66.7 and 76.9%, reached a peak of 75 and 83.3% in early October and the third week of September in the first and the second years, respectively.

Reviewing the above mentioned results it could be concluded that the leafminer species, *Cerodontha* (*Cerodontha*) *phragmitophila* is recorded for the first time in Egypt. The *Corodontha* (Rondani) (Agromyzidae) fauna of Egypt includes now 3 species. It is potentially oligophagous species feeding only on giant grass, *A. donax*, in Egypt. It had been primarily found on the same host plant in southern Europe and partially also attacks common reed to a minor degree (Spencer, 1990). Both reeds are very similar in appearance and has been referred to the old name of *Arundo phragmitis* (Tracy and DeLoach, 1998). Females laid singly eggs on the lower surface of the leaf blade, the initial mine is linear and developed to vertically oriented corridor in the leaf blade. Infestation period prolonged from late August to late October and during the last three weeks of September with general levels about 3 and 8% in 2003 and 2008, respectively. Nowakowski (1973) reported that the formed mines by this species found in the leaf sheath (very rarely in the blade), whereas larvae occurs in June-July and September- October. Mines ranged between 1- 3 mines / infested leaf and about 91% of the infested leaves had single mines. Pupal parasitism was higher (about 63%) than larval one (about 33%) which fluctuated greatly during the course of this study. The pupal parasitism by *Chrysocharis* sp. (new record) increased about 36% during the period from 2003 and 2008. Two parasitoid species: *Chrysocharis parksi* Cwfd. on [*Cerodontha* (*Cerodontha*) *dorsalis* (Loew)] in California (Luginbill and Urbanhns, 1916) and *Chorebus pseudoasramenes* sp. n. on [*Cerodontha* (*Cerodontha*) *Phragmitophila*] in Spain (Tormos *et al*, 2003) were recorded. Whereas larval parasitism by *Diglyphus isaea* decreased about 8% during the same period and reported by (Venturi, 1935) on *Cerodontha* (*Poemyza*) *lateralis* (Macquart) in France.

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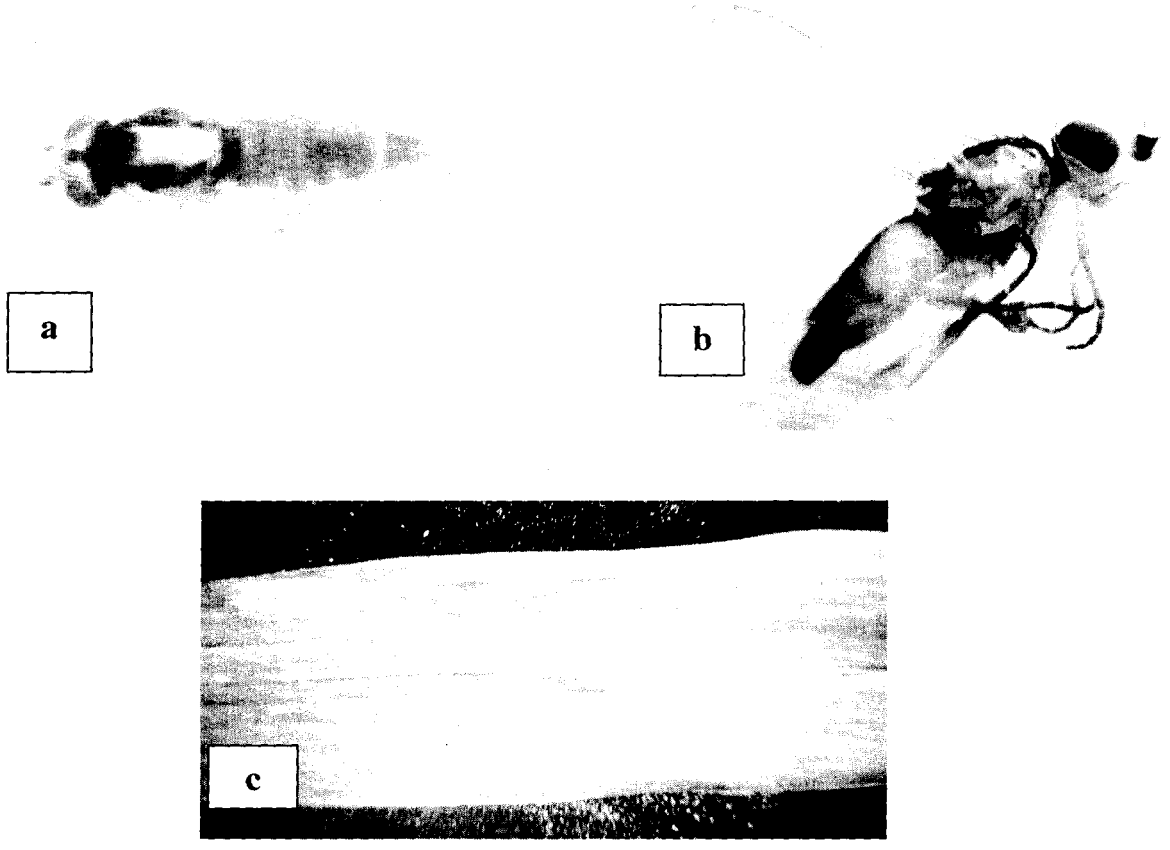

Fig. 1. Dorsal (a), lateral (b) views of adult and mine (c) of the leafminer, *Cerodontha* (*Cerodontha*) *phragmitophila*

Table 1. Percentage of infested leaves and frequency of mines per infested leaf by *Cerodontha* (*Cerodontha*) *phragmitophila* on oboe cane during August-October, 2003 and September, 2008.

Collection date			Total no. of collected leaves			No. of mines / infested leaf			No. of mines/100 infested leaves
Year	Month	Day	Non-infested	Infested		1	2	3	
				No.	%				
2003	August	26	289	11	3.7	11	0	0	100
	September	2	283	17	5.7	14	2	1	124
		9	293	7	2.3	6	1	0	114
		16	294	6	2.0	5	1	0	117
		23	289	11	3.7	11	0	0	100
		30	293	7	2.3	7	0	0	100
	October	7	281	19	6.3	19	0	0	100
		14	289	11	3.7	9	2	0	118
		21	294	6	2.0	6	0	0	100
		28	297	3	1.0	3	0	0	100
Total			2902	98		91	6	1	
General mean					3.2				107
2008	September	13	269	31	10.3	27	4	0	113
		20	274	26	8.7	24	2	0	108
		27	283	17	5.7	15	2	0	112
Total			826	74		66	8	0	
General mean					8.2				111
Grand general mean					5.7				109

Table 2. Larval and pupal parasitism of *Cerodontha* (*Cerodontha*) *phragmitophila* during August- October, 2003 and September, 2008.

Collection date			No. of larvae			No. of pupae		
Year	Month	Day	Healthy (pupated)	Parasitized		Healthy (emerged flies)	Parasitized	
				No.	%		No.	%
2003	August	26	7	1	12.5	1	2	66.7
	September	2	7	2	22.2	5	7	58.3
		9	1	1	50.0	5	1	16.7
		16	2	2	50.0	2	1	33.3
		23	5	0	0.0	4	2	33.3
		30	1	1	50.0	2	3	60.0
	October	7	7	4	36.4	2	6	75.0
		14	2	8	80.0	2	1	33.3
		21	1	2	66.7	1	2	66.7
		28	0	0	0.0	3	0	0.0
Total			33	21		27	25	
General mean%					36.8			44.3
2008	September	13	6	3	33.3	6	20	76.9
		20	7	3	30.0	3	15	83.3
		27	6	2	25.0	2	9	81.8
Total			19	8		11	44	
General mean%					29.4			80.7
Grand general mean%					33.1			62.5

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تسجيل جديد لصانعة أنفاق ألأوراق *Cerodontha* (*Cerodontha*) *phragmitophila* Hering على نبات الغاب فى مصر

سمير عوض السروى

معهد بحوث وقاية النباتات- مركز البحوث الزراعية- دقي- جيزة

سجلت صانعة أنفاق ألأوراق *Cerodontha* (*Cerodontha*) *phragmitophila* Hering لأول مرة على نباتات الغاب النامية فى وعلى جانبى قنوات الري بمنطقة العياط في محافظة الجيزة . يمثل الجنس *Cerodontha* Rondani من فصيلة Agromyzidae الآن بثلاثة أنواع فى مصر. وجد أن الأناث تضع بيضها فرديا بالقرب من حافة وعلى السطح السفلى لنصل ألأوراق حيث تصنع اليرقات الحديثة الفقس نفقا خيطيا يصبح دهليزاعريضا بتغذية اليرقات عموديا على أنسجة نصل الورقة كما تعذر اليرقات التامة النمو بداخل ألأنفاق. بدأت الإصابة في أواخر أغسطس واستمرت حتى نهاية أكتوبر في عام ٢٠٠٣ وكذلك خلال الثلاثة أسابيع ألأخيرة من سبتمبر في عام ٢٠٠٨ وبمتوسط عام لمعدل ألإصابة حوالي ٣ و ٨%، على التوالي. تراوح عدد ألأنفاق مابين ١- ٣ نفق / ورقة مصابة وأن الشائع هو نفق لكل ورقة مصابة. عرف نوعان من طفيليات اليرقات والعذارى من فصيلة Eulophidae التابع لفوق فصيلة Chalcidoidea من رتبة غشائية ألأجنحة وهما: *Diglyphus isaea* Walker (تسجيل جديد) و *Chrysocharis* sp. (تسجيل جديد). يرتفع معدل التطفل عامة عنة على العذارى عن اليرقات وبمعدلات حوالي ٦٤ و ٣٤%، على التوالى . بدأ ا الطفيليان نشاطهما التطفلي في نهاية أغسطس واستمرآ حتى ألأسبوع الثالث من أكتوبر ٢٠٠٣ وكذلك خلال الثلاثة أسابيع ألأخيرة من سبتمبر ٢٠٠٨. كما أنهما تذبذبا كثيرا حيث أزداد معدل التطفل على العذارى من حوالي ٤٨% في عام ٢٠٠٣ إلى ٨٠% في عام ٢٠٠٨، بينما أنخفض معدل التطفل على اليرقات من حوالي ٣٩% إلى ٣٠% خلال نفس الفترة.